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THE OTTAWA NATURALIST.

VOL. XVII.

OTTAWA, JANUARY, 1904.

No. 10

REMARKS ON SOME MARSH DWELLERS.

By LEWIS M. TERRILL, Montreal.

(Read before the McIlwraith Ornithological Club.)

Not having previously had access to a locality suitable for the study of waterfowl, on June 6th, 1903, I decided to visit the marshes in Lake St. Francis, near Summerstown, Ont., about forty miles from Montreal.

During our drive from the station to the lake shore my friend pointed out a former nesting site of the sparrow hawk, a scarce summer resident in Montreal. Arrived at the lake, we had a short row to Stanley Island, where we found excellent accommodation at the Algonquin Hotel.

The waning light now warned us that we had barely time for a short survey of the island, and during our walk we noticed where a kingfisher had burrowed in the crumbling bank, while later, when darkness had fallen, we flushed a bobolink from its nest and eggs. Owing to continued drought, the cover afforded ground birds was very scant and this particular bird, ignoring concealment, had built her nest flush with the ground amongst last year's stubble, trusting to protective coloration, which was aided by the eggs being conveniently of a grayish appearance in place of the usual rich brown.

Before five o'clock next morning we were well on our way toward the nearest shallows, the chucking of gallinules our guide through the lifting mists. Arrived at the first marsh, distant one-half mile from the mainland, we took our first plunge, dispelling any lingering drowsiness and startling a pair of gallinules into hurried flight. A shallow platform of dead rushes fastened to reed stalks and elevated several inches from water level, was

soon found containing eleven eggs of this species (*Florida Gallinule*). Nearby, a floating mass of dead rushes, the home of a pair of pied billed grebes, allowing that they were sometimes at home, held five eggs partially covered with rushes laid lengthwise of the nest.

Leaving the open water and coming to a more central portion of the island, we were in the home of the long-billed marsh wren, whose long tails were far more conspicuous than their bills. When startled from the rushes they appeared to have some definite destination in view and would solve the problem of getting there by a direct mathematical flight on quickly whirring wings, swerving neither to right nor left. Their globular nests were everywhere, and resembled those of the field mouse but were very strongly woven with rushes with a lining of feathery down from the bullrushes. The entrance was a small round hole in the side, which, in the first nest, I did not readily find, but later I observed that it invariably opened out between the rushes to which the nest was fastened. The nesting sites were chiefly in clumps of last year's rushes, when they were composed of dead material. Many birds, however, fastened their nests to the long rank grasses which covered the marshes where the water was only a few inches deep. In the latter choice, green grasses were used in building, the wrens thus blending the color of their homes with that of the immediate surroundings. Often three or more nests appeared to be the property of one pair of birds, those occupied being several yards apart. The surplus nests are probably built with the purpose of discouraging enemies, or possibly having cause to fear rising of water, the birds are not satisfied with their first attempts.

One nest that I found contained four eggs of a pure glossy white, without a sign of coloration. They were slightly malformed and almost globular in shape, measuring: $.58 \times 53$; $.58 \times 52$; $.59 \times 54$; $.57 \times 53$, averaging $.58 \times 53$, whilst an average specimen of the normal egg measures $.66 \times 49$. In two of these eggs incubation was somewhat advanced, whilst the other two were almost fresh. It has been suggested to me that these albino eggs might be the short-billed marsh wrens. The same idea caused me to stand in one and one-half feet of water for a

considerable time, though I was not rewarded with the sight of any other wren than the long-billed.

Referring to authorities, I find that measurements of eggs of the two species are practically the same. Taking these facts into consideration it would seem inconsistent that the first short-billed observed breeding in this locality, out of its regular habitat, should lay an unusually small set of malformed eggs, reminding one of badly formed clay marbles, in different stages of incubation, with measurements at variance with normal.

On a low boggy island, less marshy than others, and partially covered with alders, we saw several woodcock and snipe (Wilson's, I believe). Here we found the Sora and Virginia rails nesting. Their nests, miniature gallinules, though better hidden, were fastened low down amongst the long marsh grass, the birds acting much in the same manner as the bobolink in leading one from the nest, always rising several feet away.

From the further end of the island an ever increasing clatter notified us of the presence of a colony of black terns. They came and went, after the manner of their namesakes of the clay bank. Their apologies for nests were placed on slight elevations in boggy spots, where vegetation had slight chance, sometimes a rock, a piece of driftwood, or again a solitary tuft of short grass being chosen. The eggs were the landmarks, as the nests were barely noticeable without them. Another colony breeding in a marsh where the water was two or three feet deep, simply laid their eggs on the surrounding floating mass of reeds.

The only bare spot amongst the rank growth in this marsh was the home of a pair of terns.

I failed to mention that notes on the brown creeper and Hudsonian chickadee, appearing in a recent issue, were taken at Robinson, Compton County, 125 miles S.E.E. of Montreal.

A WOMAN'S VISIT TO A PEAT BOG. PLENTY OF FUEL
FOR CENTURIES TO COME. A VISIT TO THE
NEWINGTON PEAT WORKS.

After an early breakfast, which to a woman living in chambers, with the aid of a gas stove, was a thing of despatch, a woman journalist, a fair-haired teacher in a Ladies' College, and a bright, joyous enthusiast with the breeziness of a Canadian prairie characterizing her, set out from Ottawa on a tour of investigation.

At the Central Depot a train on the Ottawa and New York Railway was boarded, and the party was augmented by the addition of five scientific men: a geologist, a chemist, and botanists and entomologists—men whose names are household ones in Canada.

It was a mid-October morning, a morning with the wine of joy in it, clear, mellow, with the faint scent of frost in the air. With Lampman we sang—

“ Silvery-soft by the forest side,
Wine-red, yellow, rose,
The Wizard of Autumn faint, blue-eyed,
Swinging his censer, goes.”

The scientific men were armed with botanical cases and kodaks, the weaker sex with lunch boxes, and magazines, which were never opened until the return journey.

The officials of the Ottawa and New York Railway were polite and attentive, the cars ran easily, and after a pleasant journey of perhaps an hour and a half, the neat little station of Newington was reached, forty miles from Ottawa. Here wraps were deposited, and a walk of over two miles on the rail-tracks was taken.

With jest and good-humoured raillery, here and there in spots, little earnest discussions on the plants, insects, and birds discovered in passing, were indulged in. At last the tall chimneys and brick walls of the Newington Peat Works were seen in the distance, and, following the switch on the railway track, we came to our destination. Here we were met by the energetic president, Dr. Spencer, and his efficient manager, Mr. Gray, who were kindness itself in explaining all about the works. A number of

men were engaged in conveying the brick-like blocks of peat that issued from a great iron machine in continuous procession, to large iron tramcars, which were run on rails into the huge brick drying chambers on either side of the driveway. Massive iron doors, studded with iron bolts, shut in the tramcars with their precious burden with a clashing sound, and then the heat was turned on, fierce, terrific, the furnaces, when the doors were opened for a second, belching out fire and smoke like Dante's Inferno.

To the scientific of the party the process of heating and draughts was explained. Behind the furnaces were rows and rows of peat blocks, drying in the sun and air to be used in the furnaces.

Then we were taken to the bog. A narrow trestlework, supported a cable-like arrangement by which the peat was carried in something like the conveyors in a flour mill, the lower ones from the bog full of peat, the upper ones returning empty.

Our three dauntless females followed their attentive guide on this very narrow pathway, a tight-rope feat bravely carried out despite the instructions of the fatherly one of the party, who held his breath between times and occasionally ejaculated "Don't talk," "Go slow," "Watch your footsteps." Once we did look around to see the deep-voiced one of the party taking a snap shot of us on our perilous journey.

At last the opening in the bog was reached, where the derricks were placed, with knives descending and clasping the peat and bringing it to the surface. Here it was shovelled aside to dry, by a stalwart German in overalls, who might be a study for a painter or sculptor, with his grace of action and magnificent proportions. The cranks of the derricks were turned by the ladies of the party, and only once they struck a snag and needed assistance. We learned that as soon as the space is large enough steam dredges will be set to work bringing up larger quantities of peat.

It takes Nature fifty years, it is said, to make a foot of peat, and, as the bog here has over thirty feet of peat, as was shown by a slender iron rod driven down for our benefit, one can imagine how almost inexhaustible is the supply.

This "household fuel" is economical, clean and non-odorous.

It will burn in almost any stove, or in the open grate, and it can be regulated at will. Industrial coke is made by carbonization, it welds steel and iron admirably and will stand burden in furnace. The by-products are valuable; these are obtained from coke making and distillation.

The machines and diggers used are from Europe and have many medals for efficiency; they are the first imported into Canada. The Newington plant will turn out 50 tons of fuel daily as soon as it is in regular working order.

Having armed ourselves with a quantity of the beautiful pink moss or sphagnum which forms a large proportion of this peat in its original state and which covers the surface of this bog for thousands of acres, with here and there scrubby spruces, larches and cedars, pitcher plants, and many swamp shrubs—Labrador tea, sheep's laurel, cassandra, andromeda, blueberries, etc.—we started on our way back.

At the works we were presented with blocks of peat in its finished state, ready for our grate fires, the scent of which would take some of us back in memory to the old home across the sea, and the hills of Wicklow would rise before our mind's eye, and care and sorrow be a thing of the past.

All the employees of the works were photographed, grouped in front of the buildings, and we took leave of our entertaining friends.

A brisk walk back to the town of Newington took but a short time, and we were ready for the good dinner which mine host of the "Newington House" had provided. There were no scientific disagreements on this excellent repast, but it was pronounced very good, and the pumpkin pie "just as good as a New England housewife could make."

We discovered in our walks that the town possessed four churches and a first-class public library (the latter without the help of Carnegie, but erected as a memorial to a worthy citizen), a cheese factory, with a bright, business-like proprietor, who informed us that the cheese was sent direct to Glasgow, Scotland; and, on sampling it, we found it very good. The business places were filled with up-to-date goods, and the post office evidently does a large mail business.

We were sheltered in the railway station during a sharp storm of rain, thunder and lightning, which had no effect on our spirits, and the evening train brought us back to Ottawa shortly after six in the evening, tired, but happy, with very pleasant memories of our Canadian peat bog.

M. McK. S.

Ottawa, Oct. 31, 1903.

The following description of the manufacture of fuel from peat has been furnished by Mr. D. B. Dowling, of the Geological Survey of Canada :

Experiments in Canada in the manufacture of peat have been carried on for many years, but were mainly unsuccessful because the attempts to drive off the moisture had been limited to mechanical means. Air drying, a long process, produces a fuel in which there is an average of 30 per cent of moisture. A quicker means of getting rid of the water is imperative, but the expense of mechanical pressure combined with other difficulties have led to the abandonment of that method. In some of the localities where the manufacture of peat fuel is going on, the process followed consists of partial drying, by first draining the bog which removes only the water which accumulates in the trenches and then partial air drying on the surface, to be followed by artificial drying by the application of heat either before or after the fashioning into bricks or bars.

Draining the bog allows of the transport of the material by portable tramways to the works and the partial drying of the surface. In wet bogs the transport is by water in barges, and when the work is on a large scale the digging is by dredges. At Beaverton the peat is dried in a rotary furnace and when in an apparently dry state pressed into bricks. The plan adopted at Newington is, for the initial stage, to dig the peat by a German machine which cuts out a vertical section by means of a box-like spade being forced down into the bed. This, on being lifted brings up with it the block cut out. The transport to the works is by means of an endless wire cable working in a trough, up which the peat is pushed by the carriers attached. It then falls into a hopper leading to the mixing machine, something like a

huge sausage mill. The macerated pulp issues from the spout in long continuous bars, which are cut by hand into short bricks and transferred to cars which are then run into the heated chambers for drying. The chambers are long brick structures which, when filled with cars of peat bricks, are closed and heated by a furnace at the end, the fumes from which are forced through the chambers by a fan or steam jet. Some experience is necessary in order to judge the amount of heat and time required to bring the drying to the proper point.

The fuel so produced is not in so condensed a form as when pressed after drying, but is more of the specific gravity of hardwood and is, perhaps, in better form for kitchen ranges, as it will make a quick fire.

Newington, situated only some fifteen miles north of Cornwall, is on the edge of the watershed between the Ottawa and St. Lawrence rivers. The country passed over on the trip from Ottawa is the gently sloping surface of a marine terrace. This was built up in the bottom of the gulf that was formed when the present land surface was emerging from the sea after its burden of ice was removed by melting. The surface was probably nearly level, but in the continental uplift all parts did not attain the same elevation, so that the gentle slope north may in part be due to this cause. It is now drained by several streams, the branches of the South Nation River, and in the trip over this part glimpses were enjoyed of bits of scenery not unlike parts of the sparsely wooded plains of the West. The drainage of the surface near the channels of these streams is so nearly complete that there are not many lake basins or swamps. Near the watershed between the smaller streams and along the height of land between the major systems undrained areas are more frequent. South of the station at Newington there are depressions on what seems to be a former wave-swept face of the terrace. The surface here is more undulating and several basins are found. The lapse of time since this land emerged from the sea, several thousands of years, has allowed the complete filling by vegetable matter of the shallow lake, which is here just at the height of land.

The area and depth of this bog our short visit did not allow us to determine, but the extent seems considerable and the depth

shown at parts near the southern edge is over 20 feet and farther in over 30 feet.

The submerged part of these bogs consist of the dead and decaying portions on which flourish many growing mosses, sphagnum, and moisture-loving shrubs. Many of these peat bogs are found to be floating masses of vegetation from the bottom of which the disintegrated fibres as they lose their structure through decay slowly deposit over the bottom, layer on layer of a structureless mass of cells which form a brown material not unlike gelatine or soft celluloid. In the bog at Newington the surface does not seem to be floating but resting on the decayed mass beneath. The lack of drainage is shown in the filling up by water of trenches cut in the peat, thus allowing of the extraction of the peat from the bog only in a thoroughly saturated condition.

A VISITOR FROM THE SOUTH.

A fine specimen of the magnificent noctuid moth *Erebus odora*, Linn., was taken "at sugar" by the writer at Mech Lake, P. Q., on the 2nd August last. This is a rare insect in the Ottawa district. The species is a native of the West Indies and Mexico, but isolated specimens have been taken right across the Dominion, at St. John, N.B. (McIntosh); Montreal, Que. (Bowles); Ottawa (Fletcher); Toronto (Geddes); Orillia (Grant); Winnipeg, Man. (Hanham); Beulah, Man. (Dennis); Calgary (Miss Moodie); Vancouver, B. C. (Bush).

Erebus odora, which bears the popular name of the Black Witch, is a strong flyer, and, as no instances are known of its breeding in Canada, all the specimens taken are supposed to have migrated from the south. It is one of the largest moths in the North American fauna, sometimes expanding nearly seven inches; the specimen here referred to is a female and measures $5\frac{1}{8}$ inches across the wings, but a male taken by Dr. Fletcher in 1876 expands $6\frac{7}{8}$ inches. This grand moth is figured in Comstock's "Manual for the Study of Insects" at page 297.

CHAS. H. YOUNG.

REPORT OF THE NINTH MEETING OF THE
BOTANICAL BRANCH.

The meetings of the Botanical branch, which were discontinued during the summer months, have been resumed, the first having been held at the residence of Mr. W. T. Macoun, Experimental Farm, on Friday, October 23rd. There were ten present at this meeting, which was a good indication that the meetings will be well attended this winter. It was decided that instead of appointing a secretary to report the discussions for the whole season, each chairman or host should report the meetings for THE OTTAWA NATURALIST.

Dr. Wm. Saunders, who was present, exhibited some interesting specimens from the west, among which were: *Epilobium latifolium*, *Menziesia glabella*, *Rhododendron albiflorum*, *Pinus albicaulis*, and *Abies subalpina*, with its dark purple cones, from near Glacier; *Helenium autumnale*, from near Battleford; *Collomia linearis*, which is a crop pest about Saskatoon; and *Eleagnus angustifolia* from Medicine Hat. He referred to the great September snowstorm, and said that near Indian Head, although the snow fell to a depth of eighteen inches the wheat was very little injured by it. Dr. Saunders also referred to his work in originating hardy apples for Manitoba and the North-West by crossing *Pyrus baccata*, the wild Siberian crab, with the apple, and showed examples of the hybrids, which were about as large as Transcendent crabs. The flora of the Peace River was briefly touched upon by Mr. J. M. Macoun. He said that it was a surprise to him to find so few species, there being only about 200 in all. There were large areas of some species, such as *Astragalus hypoglottis* and *Hedysarum boreale*. Trees were represented by only seven species, namely two poplars, two spruces, one pine, tamarac, and one birch. While in that immense district only some 200 species of plants were found, the contrast between it and the Ottawa district was impressed on the members by Mr. Guillet's statement that he had found 28 species of plants on that little island in the Ottawa River off Bank street which is covered with water every year for a time. Among the number were six species of trees.

A discussion on the subject of thorns and spines was introduced by Mr Campbell, who had specimens of the thorns of *Gleditschia triacanthos*. There seemed a doubt as to whether this tree bore thorns or spines, but the conclusion reached was that whereas some of the younger thorns, which were really from supernumerary buds, resembled spines, not having a marked connection at first with the woody tissue, the older thorns were undoubtedly true thorns.

There was a number of interesting specimens shown by Dr. Fletcher, who referred briefly to each one of them. Among these was an interesting crab apple from British Columbia, apparently a natural hybrid between *Pyrus rivularis* and the apple, which had been sent by Mr. Orion Bowman, Upper Sumas, B.C. The fruit was larger than *rivularis*, being $1\frac{1}{2}$ inches long by a little over one inch in diameter, and of better quality. *Egopodium Podagraria variegatum* which was shown is a variegated leaved plant found in many gardens, but the name of which is known by very few, as is shown by the frequent inquiries. *Matricaria inodora*, which is a weed in the Maritime Provinces, was shown by Dr. Fletcher to make a good cut flower, lasting a long time in water. He also had specimens of American mistletoe, *Arceuthobium Americanum*, parasitic on *Pinus contorta*, from British Columbia, Indian corn showing abnormal cobs among the male inflorescence or tassel. Some fine water color paintings of Manitoba wild flowers were also exhibited by Dr. Fletcher, framed in the method known as *passerpartout*, which the exhibitor thought was worth bringing before the section as a very cheap and efficient way of saving such drawings and paintings as frequently come into the hands of a botanist.

The chairman read an article developing the economic aspect of Nature Study, and invited criticisms of the same. An animated discussion on the whole subject of Nature Study followed.

Prof. Macoun said that he had collected 958 species of flowering plants in the Ottawa district this year. Those present at this, the ninth meeting of the year, were Dr. Wm. Saunders, Prof. J. Macoun, Dr. J. Fletcher, Mr. A. E. Attwood, Mr. D. A. Campbell, Mr. C. Guillet, Dr. E. Blackadar, Mr. St. Jacques, Mr. J. M. Macoun and the chairman.

W. T. M.

REPORT OF THE TENTH MEETING OF THE
BOTANICAL BRANCH.

The second of the autumnal meetings of the Botanical Branch met at the residence of Mr. James M. Macoun, on Thursday, Nov. 5th. The members present were Messrs. Fletcher, John Macoun, Clarke, Guillet, White, Attwood, Blackadar, W. T. Macoun, St. Jacques, Campbell and J. M. Macoun.

After the minutes of the previous meeting had been read some specimens of the pepos of *Echinocystis lobata* were exhibited in which the fibrous structure was beautifully shown. The luffa of commerce is of the same order—*Cucurbitacea*—and the fruit of *Echinocystis*, when the cellular tissue has disappeared, resembles in miniature the towel-gourd, *Luffa Egyptica*, the dried fruit of which is cut up and used as a flesh-brush. It is to be seen in any drug-store. The fibrous interior of these gourds is known in commerce under the various names luffa, loof, loofa, lief and liff. Another species of *Luffa*—*L. acutangula*, the sponge-gourd—is called "the strainer-vine," from the use of the fibrous network contained in its fruit for straining palm-wine.

Growing plants of *Hepatica* and *Corydalis*, brought from the woods the day before, were shown by Mr. J. M. Macoun. These were about to flower, and a few days later the *Hepatica* was found in bloom by Dr. Fletcher. The occurrence of *Physalis grandiflora* only on burnt ground and never in abundance was commented on, but no explanation was suggested. Dr. Blackadar introduced the subject of the propagation of the Lombardy poplar, and in the discussion which followed it was brought out that only male specimens of the Lombardy poplar had been seen in Canada by any of those present and only female trees of the Abele poplar.

Dr. Fletcher told of the use of *Heuchera hispida*, alum-root, for the cure of diarrhœa by Indians near Rat Portage, Ont. In discussing reforestation by nature after forest fires Professor Macoun showed that in the years immediately following a fire poplar and birch making the quickest growth are most in evidence, the conifers growing more slowly not being seen; these appear later.

The conclusion of the report of this meeting will appear in the next number of THE NATURALIST.

NATURE STUDY—No. IX.

THE PRACTICAL ASPECT OF NATURE STUDY.

By W. T. MACOUN.

It would be easy for the enthusiastic lover of nature to describe in glowing terms the wonderful beauty of a tiny flower or the marvellous markings of a crawling caterpillar, but by most persons the first would be considered an insignificant plant and the latter an ugly worm; and, although the enthusiast might study nature with such persons for days, it is doubtful if they would ever become true nature students, unless each, of his own accord and by himself, went forth and communed with nature, and, becoming inspired by personal contact with her, seized every opportunity to glean a few grains from her inexhaustible stores. It is when the student has reached this stage that the teacher will be eagerly sought out, for, once the desire for knowledge is born, the thirst for it is intense.

It has been strongly impressed upon the writer that the permanent success of the Nature Study movement will largely depend upon the demonstration of its practical value. This is a practical age, and things useful take a very prominent place in it. I believe, therefore, that our nature studies should begin with something that it is generally conceded we should know more about, such as the economic plants which produce our daily food, as wheat, barley, oats, Indian corn, roots of various kinds and fruits; the trees which are of greatest value for timber, furniture and other purposes; the animals, birds and insects which are beneficial and injurious; the soil, the air, the clouds, and, in fact, everything by which we live and move and have our being. These can be studied in such a way as to show their natural beauty, their structure, their life history, and their relation one to another, and, at the same time, studied with a view to obtaining some practical result and the developing of the power of observation. Excursions to the woods need not become rarer, but there should be excursions to the farm, the orchard and garden as well. If a real interest in, and a definite knowledge of, the growth and development of a pumpkin, for instance, or of a plant of wheat, is the result of nature studies with the student, it will then be

easier to create an interest in things which are not of as practical value; but much of the value of the lesson will depend on whether it promotes a spirit of investigation in the student and helps his powers of observation. Nature studies in class rooms should be with things with which the child will be sure to come in contact with through life. Be it what it may, some practical turn should be given to the study, although the arousing of interest in, and the creating a love for, the beauties and wonders of nature should always be one of the chief features of the lesson. Success in obtaining this object should be much more certain if one began with the practical and used the theoretical to aid him, than if one began with the theoretical and hoped to get something practical out of it.

The writer's main purpose in presenting this article is to show, if possible, that the amateur gardener, as a student of nature, combines the love for nature with the practical, in an almost ideal way. I do not refer to the amateur as opposed to the professional, but to the man, woman or child who grows and cares for plants mainly for the love of it; and it seems scarcely possible that one can be a true lover of nature unless, as far as his circumstances will allow, he prepares soil, sows seeds and cares for plants; for it is only in this way he can come into closest communion with nature and become best able to understand and appreciate the growth and development of the wild flowers and forest trees. From personal experience he finds that some plants succeed best in heavy soil and some in light; that some require much moisture and others comparatively little. His observation becomes keener, and he soon perceives that when growing in their native homes some species of plants will be found under certain conditions of soil and moisture, and others under different conditions. From his experience with beneficial and injurious insects, he appreciates far more than he could otherwise do, the effect these have on the growth and development of plants. He is brought into daily and closer relation with the birds and soon becomes familiar with their appearance and can identify all the commoner species.

It is a small garden, indeed, in which a robin or at least a chipping sparrow does not built its nest. Hence there is an opportunity for nearly everyone who has a garden, to study the

habits of birds. On their arrival in spring their song delights him; then there is the mating and building of the nest to observe; the laying of the eggs and the habits of the birds when brooding; the hatching, feeding and rearing of the young; the vacating of the nest; and finally the flight of the fledglings. What more delightful nature studies can we have than these? And these are what will draw us to the woods, where hundreds of such bird studies await us.

The smaller animals, also, receive a share of the amateur gardener's interest and observation. A certain gardener found one morning this autumn that something had been digging holes in various places in his garden. He thought, at first, that some cat had done this, but when night after night new holes were made, he decided to investigate the matter further. He looked about carefully for footprints and found some which did not look like those of a cat. He made a still closer examination, and in one hole a faint skunk-like odor was detected. But what could a skunk be making so many holes for? It was known that he fed on chickens and sucked eggs, but there were none of these here. Did he feed on the roots of plants? What could he be after? It was decided to ask someone who knew, and then the gardener learned that the skunk—which this turned out to be—which occasionally kills chickens and eats eggs, and sometimes annoys by his penetrating odor, is really a friend of gardeners and destroys many injurious insects among which are cutworms. And, if this skunk had been killed and examined, undoubtedly some of these insects would have been found inside it. On again looking at the holes, it was found that they were much more numerous in places where the soil was sandy and warm; and all gardeners know that in sandy soil cutworms are, as a rule, most numerous. Here was a nature study which would never be forgotten, and would lead to further studies of the habits of animals in the fields and woods.

The amateur gardener's joys, which are perennial, receive an annual revival when the New Year's seed and plant catalogues come in. What pleasant hours are spent in studying the names and descriptions of plants from *Abronia* to *Zinnia*, only the lover of plants knows. And then those glorious days in spring-time

when the thrill and ecstasy of life is in us and all about us! The turning of the soil and the feel of it in our hands! Even though our plants may later be destroyed by frost or cutworms, it is worth the labor just to feel that contact with the warm and steaming soil in spring. Then follows the sowing of the seeds, their germination, thinning to ensure perfect development, cultivation to conserve moisture, aerate the soil, and promote a healthy growth of the plant, the benefits of which are learned by experience and hence are never forgotten. With what expectancy he watches the developing flower buds, and when, at last, the tender petals expand, what pleasure is derived from studying the form and color of the perfect flower!

The vegetable garden furnishes ample food for thought as well as for the table. Its economic value is only of secondary moment to the true amateur. He grows his vegetables mainly for the love of it, and hence watches his crop with quite different feelings to the man whose livelihood depends on it. There are few methods of studying nature that are at once so practical and yet so delightful as gardening, for definite knowledge of nature's methods is here obtained by personal observation, which is one great object of Nature Study.

Not only is the amateur gardener a true student of nature, but he is a public benefactor as well. His garden is a delight to all who see it. It improves the appearance of the city, town, or place in which he dwells, and even if everyone who attempts to follow his example does not catch his enthusiasm and the true spirit, he will exert a very powerful influence for good.

One of the most hopeful turns which Nature Study has taken is the establishment of school gardens, where each child, with a little garden of his own, prepares the soil, sows the seed, cares for the plant, and where he should learn more about nature from his own practical experience than could possibly be taught him by another. If his garden is in a city, or town the child will probably be more interested at first in studying the growth of ornamental plants and perhaps of fruit and vegetables, for these are what he has been brought most in contact with, and, in the teacher's effort to create a love for plants and a definite knowledge of how they grow, success will be quicker and surer if he begins with known rather than with unknown objects. In the country, where pupils are likely to become farmers or farmers' wives, special attention should be paid to economic plants, such as wheat, oats, barley, pease, corn, potatoes, grasses, and roots of various kinds, and fruit. Here Nature Study will in part take the form of elementary agriculture, although the main purpose, as elsewhere, should be to uplift the mind of the child to a nobler conception of life.

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