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THE
NATURE-STUDY
REVIEW

Volume XVII, 1921

ANNA BOTSFORD COMSTOCK

SECRETARY-EDITOR

CORNELL UNIVERSITY

PUBLISHED BY
THE COMSTOCK PUBLISHING COMPANY
ITHACA, N. Y.

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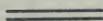
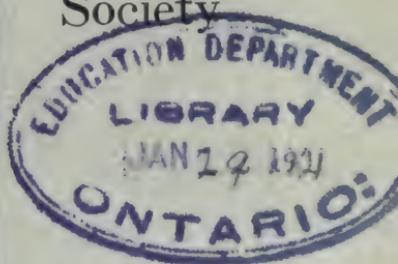
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Eclipse of the Sun

Photo by Verne Morton

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“ Wood	Yellowlegs, a North
Goose, Canadian	American Sandpiper

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An ancient English, vertical sun dial in the garden of the Editor

INSCRIPTION

Beata Solitudo O Sola
 Beatitudo
 Mihi Opidum Carcer est
 et Solitudo Paradisus
 W. H.
 Deus Nobiscum
 et Corona Manum Opus
 Nostrum
 1663
 Vivat Carolus Secundus

Translation

Happy solitude, O, only
 happiness to me the city a
 prison is and solitude is
 paradise
 W. H.
 God be with us
 and crown the work of our
 hands
 1663
 Long live Charles the Second

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No. 1

A Sun-Dial for the School Garden

The construction of a sun-dial and the setting it up properly should be a delightful means of educating the pupils in a very important subject, the measuring of time,—a subject which is given very little thought in this day of clocks and watches. Even during the discussion of “time saving” turning back the clock an hour, very few understood its real meaning.



A Sun-dial made by pupils

Sun-dials are very ancient of origin; and probably the earliest form was a pole fixed in the ground with the spaces covered by its shadow during the day divided

and marked by stones or in some other manner. The earliest mention of a sun-dial is found in Isaiah xxxviii, 8: “Behold, I will bring again the shadow of the degrees which is gone down in the sun-dial of Ahaz ten degrees backward.” This must have been written about 700 years B. C. but we have no idea of the form of this dial. The earliest dial, the construction of which we know, was made by the Chaldean astronomer Berossus who lived about 300 B. C. and it consisted of a hollow hemisphere with its rim horizontal and a bead fixed at its center which cast a shadow, the path of which was an arc which was divided into twelve equal parts. This form of dial was used many centuries by many peoples.

No one knows certainly when the first clock was invented nor by whom, but the use of clocks in Europe in the 13th century has been recorded. A clock was put up in a tower of Westminster in

London in 1288 A. D. and one was in use on Dover Castle in 1348; and by 1400 there were clocks made resembling those we have now. It is well for us all to think of the many, many centuries of human history which passed with their days marked only by the shadow of the sun upon a dial.

In order to make the construction of the sun-dial of greatest use in a school, all the pupils of a suitable age should make working plans for a dial; these may be made on ordinary drawing paper and the gnomon may be made of card-board and cut out and set in place with pins. After the plans are made, even to the inscription, one of them should be chosen, because of its excellence, as the model to be followed in the manual training class in making the dial to be set up in the school yard.

HOW TO MAKE THE PLANS FOR A SUN-DIAL

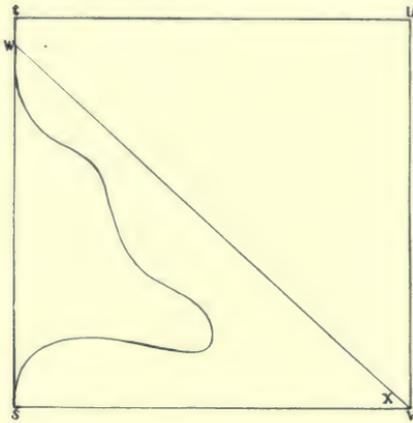
Take a piece of drawing paper about 16 inches square, find its exact center and draw upon it a square with sides 14 inches; find the center of the square, *y*. Draw on it with a pencil the line *AA''* a foot long and one-eighth inch at the left of the center. Then draw the line *BB''* exactly parallel to the line *AA''* and a fourth inch to the right of it. These lines should be one-fourth inch apart—which is just the thickness of the gnomon.

With a compass, or a pencil fastened to a string draw the half-circle *A A' A''* with a radius of six inches with the point *C* for its center. Draw a similar half-circle *B B' B''* opposite with *c'* for its center. Then draw the half-circle from *D, D', D''*, from *c* with a radius of five and three-quarters inches. Then draw similarly from *c'* the half-circle *E, E', E''*. Then draw from *c* the half-circle *F, F', F''* with a radius of five inches and a similar half-circle *G, G', G''* from *c'* as a center.

Find the points *M, M'* just six inches from the points *F, G*; draw the line *J, K* through *M, M'* exactly at right angles to the line *A, A'*. This will mark the six o'clock point so the figures *VI* may be placed on it in the space between the two inner circles. The noon mark *XII* should be placed as indicated (the "*X*" at *D, F*, the "*II*" at *E, G*). With black paint outline all the semi-circles and figures.

HOW TO MAKE THE GNOMON

The word gnomon is from a Greek word meaning "one who knows." It is the hand of the sundial, which throws its shadow



The gnomon

on the face of the dial, indicating the hour. Take a piece of card-board six inches square and be very sure its angles are right angles. Let s, t, u, v represent the four angles draw on it a quarter of a circle from s to u with a radius equal to the line vs. Then with a cardboard protractor, costing fifteen cents, or by working it out without any help except knowing that a right angle is 90° , draw the line vw making the angle at x

the same as the degree of latitude where the sundial is to be placed. At Ithaca the latitude is $42^\circ, 27'$ and the angle at x measures $42^\circ 27'$. Then the board should be cut off at the line vw, and later the edge sw may be cut in some ornamental pattern.

TO SET UP THE SUN-DIAL

Fasten the base of the gnomon by screws or brads to the dial with the points of the gnomon at F, G, and the point v of the gnomon at M, M', so that the point W is up in the air. Set the dial on some perfectly level standard with the line A, A'' extending exactly north and south. If no compass is available, wait until noon and set the dial so that the shadow from W will fall exactly between the points A, B, and this will mean that the dial is set exactly right. Then with a good watch note the points on the arc E, K', on which the shadow falls at one, two, three, four, and five o'clock: and in the morning the points on the arc J' D on which the shadow falls at seven, eight, nine, ten and eleven o'clock. Draw lines from M to these points, and lines from M' to the points on the arc E K'. Then place the figures on the dial as indicated in the spaces between the two inner circles. The space between the two outer circles may be marked with lines indicating the half and quarter hours. The figures should be outlined in pencil and then painted with black paint, or carved in the wood and then painted.

INSCRIPTIONS UPON DIALS

From the beginning, a sun-dial seems to have made man thoughtful of life and philosophical concerning its length or brevity, as

“Life is but a shadow,
Man is but dust;
This dial says
Die all we must.”

or

“When thou dost look upon my face,
To learn the time of day,
Think how my shadow keeps its pace,
As thy life flies away.”

Many of the old dials have most lugubrious mottoes, but there are many beautiful ones that may be written or carved upon the lower half of the school dial, such as

“Let others tell of storms and showers,
I'll only count your sunny hours.”

“Light rules me
The shadow, thee.”

“I mark not the hours unless they be bright.”

“Time and tide tarry for no man.”

“The shadow passes; light remains.”

“Amidst the flowers
I tell the hours.”

“Time goes not,
Time stays, we go.”

“Let there be light; and there was light.”

Star

From *Wind and Weather*

LIBERTY HYDE BAILEY

Twinkle, twinkle, little star
How I wonder what you are!

If I knew then I should learn
What some men shall yet discern—
What it is that sets us here
Each within his proper sphere
Making plain to contemplate
On the miracles of fate.

But I think that now I see
What your twinkle is to me—
Just a little friendly light
Set against the roof of night
As the trees do stand by day
When I walk upon my way.

Twinkle, twinkle little star
You are not so very far!

The Sun

The following account of the sun is a part of an address by Professor W. W. Campbell of the Lick Observatory delivered at the dedication of the Warner and Swasey Observatory in Cleveland, Oct. 12, 1920 and printed in *Science*, Dec. 10, 1920.

The wonders of our sun are many and most remarkable, and are but little known. I have referred to its enormous size. The quantity of heat which the sun is radiating into surrounding space, to the earth, to Mars, and to all other objects which intercept its rays, is stupendous and not to be comprehended by the astronomer or the man of affairs. It is, and has been, the source of all the energy upon which we draw, save only a negligible residual. A great quantity of heat is indeed stored up in the interior of the earth, but it reaches the earth's surface in such minute quantities that in all practical details of life, save to those who labor in deep mines, or live near volcanoes, or are interested in hot springs, this source of energy may be neglected. If this statement should be difficult to accept, let your thoughts travel to the south pole of our planet. What does the interior heat of the earth do for that region? The antarctic continent's perpetual covering of ice and snow is unaffected by it, nor does the actually enormous quantity of solar heat falling upon that continent suffice to remove the white mantle. If aught should intervene to cut off the sun's energy from the earth for one short month, the tropics would attain to a state of frigidity to which the south polar continent, as now observed, would be a rose garden in comparison.

It is the sun's heat which grows the farmers' crops, the trees of the forest and all vegetation. The coal deposits upon which we draw today for the running of trains, ships, factories and rolling mills, are but the solar energy of an earlier age, compressed, transformed and preserved for our comfort and power. In the mountainous regions of our land, where water can be stored in high level reservoirs and, passing through water wheels at lower levels, be made to generate electric power for lighting, for heating and for the running of motors, it is the sun's energy which is transformed to meet the needs of men. The sun's rays evaporate the surface waters of the oceans, lakes, streams and lands; the winds, generated by the unequal solar heating of our atmosphere, transport some of the water vapor to the high mountains, where it is deposited as rain or snow. It is merely the descent of these waters to the

lower levels that is controlled by man and transformed into electric power for his own purposes.

It would take more than two billion earths placed side by side to form a continuous spherical shell around our sun at distance equal to the earth's distance, and thus to receive the total output of solar heat. Therefore less than one two-billionth part of that output falls upon the earth. The earth's share of solar energy, expressed in horse-power or other familiar units, is too great to set down in figures. If you should happen to own 250 acres of land in one of the tropical deserts of the earth, you will be interested to know that your quota of the solar energy, near the middle of a summer day, is falling upon your tract of land at the rate of about one million horse-power—more than enough heat and power to supply all the needs of this great city—and this is but two-thirds of the sun's good intentions toward you, for some 40 per cent. of the energy is intercepted by the atmosphere overlying your farm, and returned forthwith to outer space.

Your neighbor's tract of 250 acres is also receiving solar energy at the rate of one million horse-power. Figuring backward, if one farm area receives a million horse-power and, there are more than a hundred million such farm areas on the earth turned toward the sun at one time, and the whole earth intercepts less than one two-billionth of the sun's energy output, is it any wonder that sun worship became one of the recognized religions? Accurate knowledge saves us from that, but it is becoming in us to give the sun our due respect.

A great problem ahead of the scientific world is the storage of the sun's beneficent heat rays for release as needed. Astronomers are seeking intently for the sources of the sun's outpouring of energy: how can the sun maintain the supply for tens of millions of years, as it undoubtedly is doing? One important source has been found—the sun's own gravitation which tries constantly to pull every particle of its material to the sun's center—but another and greater source seems to await discovery. Does any one say since the supply of solar energy will surely meet our needs for ten or a hundred million years, why look further for the cause? Why not let it go at that? This selfish spirit, if applied to all subjects, would retrograde our civilization. Even the possession of the truth is not so potent for good as the desire to know the truth, and the struggle to discover it. Practically, a knowledge of the origin of the sun's heat may be the key for locking up great quantities of it on summer days and unlocking it when and where needed.



Photo by Verne Morton

The Moon

E. CUBILLOS

Bogota, Columbia, S. A.

The moon is the nearest body to us in all space, and so great is the distance that separates us from the stars that we speak as if she were not very far off, yet compared with the size of the earth the space lying between us and her is very great.

After the sun, the most important body to the inhabitants of the earth is probably the moon, owing to its variety of phases and to rapid changes of position in the skies.

The mean distance of the moon from the earth is about 238,840 miles. Owing to the eccentricity of its orbit it is sometimes 252,972 miles away and sometimes only 221,614. According to the latest measurements, the diameter of the moon is 2,163 miles, which is more than a quarter that of the earth. It travels eastward

around the earth in an orbit whose circumference is about 1,500,680 miles, at an average velocity of 2,290 miles per hour, and completes a circuit in 27 days, 7 hours, 43 minutes and 11.5 seconds, which constitutes a sidereal month, the average length of the common month being 29 days, 12 hours, 44 minutes and 2.8 seconds.

The mean density of the moon is about three-fifths that of the earth and its mass rather less than one-eightieth, while the force of gravity at its surface is about one-sixth that at the earth's surface.

The lunar globe is found to be devoid of any bodies of water and probably without any sensible atmosphere. Having no atmosphere, there is nothing to temper the alternate changes there, either from light to darkness or from heat to cold. The day side of the moon is exposed to the sun's intense heat for about two weeks, the temperatures probably reaching the boiling point, while thru the long lunar night, the surface freezes and the temperature falls very low, perhaps 200-250 degrees below zero.

The most striking phenomena connected with the moon are its series of changes or phases which are repeated every 29.5 days. Being an opaque body it can only be seen as the light of the sun illuminates it. When the moon is between the earth and the sun, its dark side is turned towards the earth. It is then entirely invisible and this phase is the real new moon. About two to three days after this a thin crescent of silvery light appears, just after sunset, this crescent commonly called new moon. Gradually the crescent broadens out, as the moon moves away from the sun, until on or about the seventh day, it reaches a position known as its first quarter, and is then a bright semi-circle off in the south at sunset. During the next few days, as the moon moves eastward, more and more of its illuminating surface is brought into view, until three-quarters of the disk appears lighted up and is then said to be gibbous. On or about the 14th day, the moon now opposite the sun, shows the whole of its round disc illuminated, this is known as full moon, rising about sunset and setting about sunrise. Passing on in its orbit, its phases recur in reverse order, the full phase giving place to the gibbous, this in turn to the semi-circle, which phase it reaches about the 21st day and is then seen high in the heavens in the early morning hours. Step by step it draws closer to the sun, thinning down to a crescent shape again, until it is lost once more in the solar glare, only to re-emerge, on or about the 28th day, as new moon, and begins again its cycle.

Owing to its eastward motion, a daily retardation of the moon's rising and setting occurs, being about $50\frac{1}{2}$ minutes.

Among some of the most wonderful phenomena of the heavens are the lunar eclipses. They are produced only when the new or the full moon is at or very near one of the nodes. If the orbits of the earth and the moon were exactly on the same plane, an eclipse would take place every new or full moon. However, the plane of the moon's orbit is inclined to the plane of the earth's orbit at an angle of about five degrees. Besides the moon's nodes are not stationary, but have a daily backward motion, owing to the attraction of the sun on the earth and moon. As a result of this backward motion of the moon's nodes, eclipses occur on average about 19 days earlier every year.



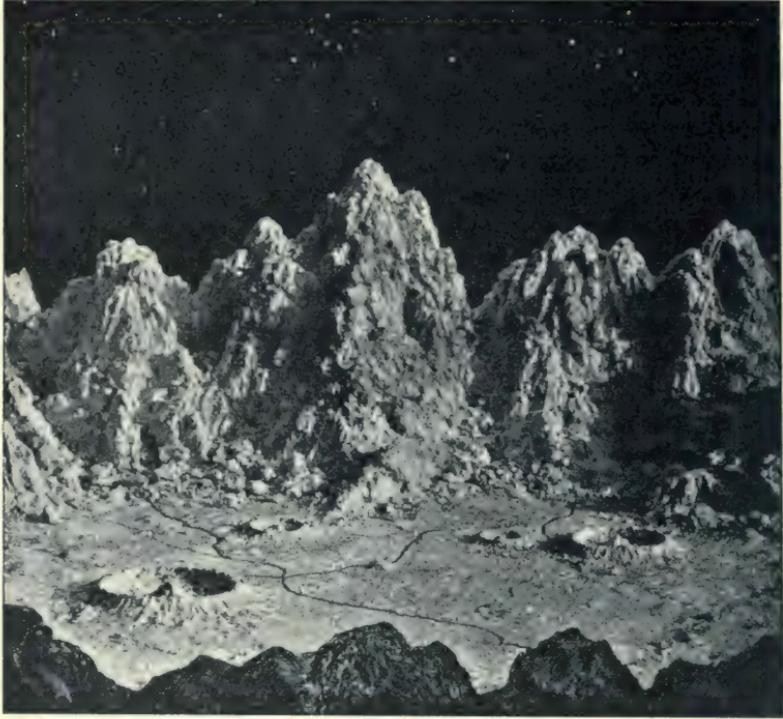
The moon's
surface
showing the
craters
Mercator
and
Campanus.

Photo after
Nasmyth

The Moon Landscape

From a magnificent volume on The Moon by Naysmith and Carpenter,
two eminent English astronomers.

And now for a time let us turn attention from the lunar sky to the scenery of the lunar landscape. Let us in imagination, take our stand high upon the eastern side of the rampart of one of the great craters. Height it must be remarked is more essential on the moon to command extent of view than upon the earth, for on account of the comparative smallness of the lunar sphere the dip of the horizon is very rapid. Such height however, would be attained with great exercise of muscular power, since equal amounts of climbing energy would, from the smallness of lunar gravity, take a man six times as high on the moon as on the earth. Let us choose for instance, the hill-side of Copernicus. The day begins by a sudden transition. The faint looming of objects under the united illumination of the half full earth, and the zodiacal light is the lunar precursor of daybreak. Suddenly the highest mountain peaks receive the direct rays of a portion of the sun's disc as it emerges from below the horizon. The brilliant lighting of these summits serves but to increase by contrast, the prevailing darkness, for they seem to float like islands of light in a sea of gloom. At a rate of motion 28 times slower than we are accustomed to, the light tardily creeps down the mountain-sides, and in the course of about 12 hours the whole of the circular rampart of the great crater below us, and towards the east, shines out in brilliant light, unsoftened by a trace of mountain mist. But on the opposite side, looking into the crater, nothing but blackness is to be seen. As hour succeeds hour, the sunbeams reach peak after peak of the circular rampart in slow succession, till at length the circle is complete and the vast crater-rim, 50 miles in diameter, glistens like a silver-margined abyss of darkness. By-and-by in the centre, appears a group of bright peaks of bosses. These are the now illuminated summits of the central cones, and the development of the great mountain cluster they form henceforth becomes an imposing feature of the scene. From our high standpoint, and looking backwards to the sunny side of our cosmorama, we glance over a vast region of the wildest volcanic desolation. Craters from five miles diameter downwards crowd together in countless numbers, so that the surface, as far as the eye can reach, looks veritably frothed over with them. Nearer the base of the rampart on which



Lunar Mountains

Ideal lunar landscape from Nasmyth and Carpenter

we stand, extensive mountain chains run to north and to south, casting long shadows toward us; and away to southward run several great chasms a mile wide and of appalling blackness and depth. Nearer still, almost beneath us, crag rises on crag and precipice upon precipice, mingled with craters and yawning pits, towering pinnacles of rock and piles of scoriae and volcanic debris. But we behold no sign of existing or vestige of past organic life. No heaths or mosses soften the sharp edges and hard surfaces: no tints of cryptogamous or lichenous vegetation give a complexion of life to the hard fire-worn countenance of the scene. The whole landscape, as far as the eye can reach, is a realization of a fearful dream of desolation and lifelessness—not a dream of death, for that implies evidence of pre-existing life, but a vision of a world upon which the light of life has never dawned.

Looking again, after some hours interval, into the great cratered amphitheatre, we see that the rays of the morning sun have crept down the distant side of the rampart, opposite to that on which we stand, and lighted up its vast landslipped terraces into a series of seeming hill-circles with all the rude and rugged features of a terrestrial mountain view, and none of the beauties save those of desolate grandeur. The plateau of the crater is half in shadow 10,000 feet below, with its grand group of cones, now fully in sight, rising from its centre. Although these last are 20 miles away and the base of the opposite rampart fully double that distance, we have no means of judging their remoteness, for in the absence of an atmosphere there can be no aerial perspective, and distant objects appear as brilliant and distinct as those which are close to the observer. Not the brightness only but the various colours also of the distant objects are preserved in their full intensity; for colour we may fairly assume there must be. Mineral chlorates and sublimates will give vivid tints to certain parts of the landscape surface, and there must be all the more sombre colours which are common to mineral matters that have been subjected to fiery influence. All these tints will shine and glow with their greater or less intrinsic lustres, since they have not been deteriorated by atmospheric agencies, and far and near they will appear clear alike, since there is no aerial medium to veil them or tarnish their pristine brightness.

In the lunar landscape, in the line of sight, there are no means of estimating distances; only from an eminence, where the intervening ground can be seen, is it possible to realize magnitude in a lunar cosmorama and comprehend the dimensions of the objects it includes.

And with no air there can be no diffusion of light. As a consequence, no illumination reaches those parts of the scene which do not receive the direct solar rays, save the feeble amount reflected from contiguous illuminated objects, and a small quantity shed by the crescent earth. The shadows have an awful blackness. As we stand upon our chosen point of observation, we see on the lighted side of the rampart almost dazzling brightness, while beneath us, on the side away from the sun, there is a region many miles in area impenetrable to the sight, for there is no object within it receiving sufficient light to render it discernible; and all around us, far and near, there is the violent contrast between

intense brightness of insulated parts and deep gloom of those in equally intense shadow. The black tho starlit sky helps the violence of this contrast, for the bright mountains in the distance around us stand forth upon a background formed by the darkness of interplanetary space. The visible effects of these conditions must be in every sense unearthly and truly terrible. The hard, harsh, glowing light and pitchy shadows; the absence of all the conditions that give tenderness to an earthly landscape; the black noonday sky, with the glaring sun ghastly in its brightness; the entire absence of vestiges of any life save that of the long since expired volcanoes—all these conspire to make up a scene of dreary, desolate grandeur that is scarcely conceivable by any earthly habitant, and that the description we have attempted insufficiently portrays.

A legitimate extension of the imagination leads us to impressions of lunar conditions upon other senses than that of sight, to which we have hitherto confined our fancy. We are met at the outset with a difficulty in this extension; for it is impossible to conceive the sensations which the absence of an atmosphere would produce upon the most important of our bodily functions. If we would attempt the task we must conjure up feelings of suffocation, of which the thoughts are, however, too horrible to be dwelt upon; we must therefore maintain the delusion that we can exist without air, and attempt to realize some of the less discomforting effects of the absence of this medium. Most notable among these are the untempered heat of the direct solar rays, and the influence thereof upon the surface material upon which we suppose ourselves to stand. During a period of over 300 hours the sun pours down his beams with unmitigate ferocity upon a soil never sheltered by a cloud or cooled by a shower, till that soil is heated, as we have shown, to a temperature equal nearly to that of melting lead; and this scorching influence is felt by everything upon which the sun shines on the lunar globe. But while regions directly isolated are thus heated, those parts turned from the sun would remain intensely cold, and that scorching in sunshine and freezing in shade with which mountaineers on the earth are familiar would be experienced in a terribly exaggerated degree. Among the consequences, already alluded to, of the alternations of temperature to which the moon's crust is thus exposed, are doubtless more or less considerable expansions and contractions of the surface ma-

terial, and we may conceive that a cracking and crumbling of the more brittle constituents would ensue, together with a grating of contiguous but disconnected masses, and an occasional dislocation of them. We refer again to these phenomena to remark that if an atmospheric medium existed they would be attended with noisy manifestations. There are abundant causes for grating and crackling sounds, and such are the only sources of noise upon the moon where there is no life to raise a hum, no wind to murmur, no ocean to boom and foam, and no brook to plash. Yet, even these crust-crackling commotions, though they might be felt by the vibrations of the ground, would not manifest themselves audibly, for without air there can be no communication between the grating or cracking body and the nerves of hearing. Dead silence reigns on the moon; a thousand cannons might be fired and a thousand drums beaten upon that airless world, but no sound could come from them: lips might quiver and tongues essay to speak, but no action of theirs could break the utter silence of the lunar scene.

At a rate 28 times slower than upon earth, the shadows shorten till the sun attains his meridian height, and then, from the tropical region upon which we have in imagination stood, nothing is to be seen on any side, save towards the black sky, but dazzling light. The relief of afternoon shadow comes but tardily, and the darkness drags its slow length along the valleys and creeps sluggishly up the mountain sides till, in a hundred hours or more, the time of sunset approaches. This phenomenon is but daybreak reversed, and is unaccompanied by any of the gorgeous sky tints that make the kindred event so enrapturing on earth. The sun declines towards the dark horizon without losing one jot of its brilliancy, and darts the full intensity of its heat upon all it shines on to the last. Its disc touches the horizon, and in half an hour dips half-way beneath it, its intrinsic brightness and color remaining unchanged. The brief interval of twilight occurs, as in the morning, when only a small chord of the disc is visible, and the long shadows now sharpen as the area of light that casts them decreases. For a while the zodiacal light vies with the earth-moon high in the heavens in illuminating the scene; but in a few hours this solar appendage passes out of view, and our world becomes the queen of the lunar night.



Eclipse of the sun May 26, 1900
Three stages photographed by Verne Morton

Eclipses

One of the best things about sunlight is that whatever it illumines casts a shadow; this would be a monotonous world indeed, without shade to relieve and emphasize the beauty and brilliance of light. However, there is one important limitation to shadow, it has to rest upon something in order to become visible. The shadow of the tree rests upon the ground or against a building or some other object; but if the tree were high up in the sky, we should have to prove it had a shadow by mathematics since there would be no object below it to bring the shadow into visibility. This condition of affairs is what makes an eclipse so very interesting. Our great star, the sun, shines on, day and night illuminating all his other planets and their moons even as he does our earth and our moon; and each one of these spheres, big and little is always one half in the light and one half in the dark, and each of them is casting a cone-shaped shadow, if science is to be trusted, but we are quite unaware of it because there is nothing for the shadow to rest upon so that we can see it. However, occasionally one of these spheres passes between the sun and another sphere and briefly throws its shadow upon it and thus causes us to see it and we call it an eclipse.

We have two kinds of eclipses, one when the moon passes between the sun and the earth and covers the latter with its shadow, which is called an eclipse of the sun; the other is when the earth passes between the sun and the moon and throws its shadow upon it, thus causing an eclipse of the moon.

AN ECLIPSE OF THE SUN

This is the most impressive of the two eclipses because it shuts us away from the light of the sun and gives us a new appreciation of the value of sunlight. It can only occur when the moon is in the new phase and therefore is between us and the sun. The first warning of its approach is a little dark notch on the westward edge of the sun's disc; this gradually moves forward forming a crescent of blackness, until there is but a crescent of light left on the sun's eastern margin. If the eclipse is total, the entire disc will be hidden from view, and just before this occurs, if we have good glasses, we can see the great jagged mountains of the moon outlined against the waning sun-crescent. When the sun is completely hidden, the rosy, subdued light of the sun's corona forms an exquisite ring of light around the black moon disc. This beautiful shining garment of the sun, "the ring with wings" can be observed only during an eclipse. Despite this misty ring, our earth is in total darkness during this phase of a total eclipse, and birds go to roost, the flowers close their petals, the little brothers who are night prowlers or night fliers, the mice and bats and owls, come forth, the sky is full of stars, ignorant people are frightened, and educated people feel subdued because of this impressive phenomenon. A total eclipse is not visible everywhere on the earth but only in a band extending east and west, about 165 miles in width; it appears as a partial eclipse for the distance of about 2,000 miles on either side of this band. A partial eclipse is when the moon is not in direct line between the earth and the sun, and therefore in moving across, it cuts off only a part of the sun's disc. Sometimes, the moon's disc is not quite large enough to cover that of the sun, depending upon the varying distances apart of the two, and during a total eclipse, a ring of the sun's disc entirely surrounds the moon, and this is called an "annular eclipse."

There are records in China of an eclipse that occurred 4,000 years ago. One was recorded in Babylon in 1963 B. C.; many were recorded in Assyria in the following centuries and the Bible also mentions them. Eclipses may be calculated with accuracy for centuries to come.



Eclipse of the moon Dec. 16, 1899
Four stages photographed by Verne Morton

AN ECLIPSE OF THE MOON

It is only when the moon is full that it may enter eclipse, because at that time the sun is shining upon the opposite side of our earth and the moon is on the side of its orbit farthest away from the sun so that the earth in passing between it and the sun casts its shadow upon it. Since the moon has no light to shine with except what it gets from the sun, it ceases to shine when it passes into our shadow. At first a portion of the eastern edge of the moon becomes dim and then disappears; gradually the shadow creeps over the moon's bright face and finally hides it, but not entirely, for we can still see it faintly glowing with a ruddy light; this is caused by the refraction of the sun's rays through our atmosphere which absorbs the green and blue rays so that for a time the moon is bathed in sunset glow. Joel, the Prophet declared "The sun shall be turned to darkness and the moon into blood." If one could be stationed

on the moon at this time he would see the ring of light around the black earth-globe brilliantly crimsoned; at other parts it would have shades of red and yellow, and the whole effect would be to make the "grand earth-ball, hanging in the lunar sky, like a dark sphere in a circle of glittering gold and rubies."

The reason there is no eclipse at every full moon is because the moon's orbit is at an angle of about five degrees to the ecliptic in which the earth moves and in which its shadow always lies, so it is only occasionally that the two are in a straight line from the sun. To appreciate an eclipse of the moon we should try to think how far away from us the moon is. Ball says "An express train which runs 40 miles an hour would travel 240 miles in six hours, and the whole distance to the moon would be accomplished in 6,000 hours, so that by travelling night and day incessantly you would accomplish the journey in 250 days."

It seems very wonderful that our earth can cast a shadow as far as that.

The Tides

When Newton discovered the laws of gravity he made a very great discovery about something of which even at this late day we know very little. Why bodies of matter attract each other has seemed a wonderful fact that we could not explain. However the physicists think they are on the hot trail of the truth now and may be we shall soon receive enlightenment concerning this miraculous force that welds the stars together as surely as it causes the little child to fall if he loses his balance.

We have long known that the tides that sweep over great bodies of water are caused by the pulling of the moon. This is really lifting the water and incidentally pulling it as the moon moves around the earth. If the oceans covered the entire earth the high tide would be regular, but owing to the irregularities of the land, and the varying depth of the water, the tide is much affected as to height and direction. It is easy enough to understand how the moon can cause one tide each day, but it is not so evident how it causes two. At the same time that the moon is lifting the water in the oceans toward it and away from the earth, it is lifting the earth away from the ocean on the opposite side of the earth and this results in a rising of the water there which results in another high tide just half of a day later; thus we have two tides each day, the

average time between two tides is about twelve hours and twenty-five minutes and each day the tide is about fifty minutes later than it was the day before owing to the fact that the moon rises that much later each day. Each tide consists of two phases, high tide and low tide; a tide consists of a wave moving from east to west; this wave is about three feet in height on the ocean but as it moves up against the land, it may heap up until, as in the Bay of Fundy, it is sixty feet or more in height. On Long Island the tide is not more than three feet high while on the coast of Maine it averages ten to twelve feet.

Every lunar month there are two great tides called spring tides and two small tides known as neap tides. The spring tide when the moon is new, that is when it is on the same side of the earth as the sun and the two act together, the sun and moon pulling in a straight line and therefore raising a higher tide. The neap tides occur when the moon is on its first and third quarters, for then the sun and moon are pulling the earth in different directions.

The moon does us great service in sanitation; the tides prevent the stagnation of water at the mouths of rivers which carry away the filth and waste matter from cities and great areas of populated lands. They wash up into the rivers and then retreat carrying with them out to sea great burdens of matter that would breed pestilence if not removed. Somebody has very cleverly said "the tide is a toothbrush and antiseptic wash for the mouth of a river."

The Measurement of Betelgeuse

Professor Albert A. Michelson, the famous physicist, has devised a means of measuring stars, and has just announced the size of Alpha Orionis, better known as Betelgeuse, the red star in the shoulder of Orion. The result is too stupendous for our comprehension, for the diameter of this star is 260,000,000 miles and its volume is 37,000,000 times as great as our sun; in the place of our sun this great fiery ball would reach almost to the orbit of Mars. The light reaching our eyes now from Betelgeuse started on its journey before our Revolutionary war was fought, for it takes 150 years for light to reach us from it.

The Constellations

AS INTERPRETED BY A CLASS IN NATURE-STUDY

Lyra

NELLIE H. CROSBY

I saw with its celestial keys
Its chords of air, its frets of fire,
The Samians great Aeolian lyre,
Rising through all its sevenfold bars,
From earth unto the fixed stars.

—*Longfellow.*

It was the Persians who called this constellation of six large stars a lyre. The early Christians called it King David's Harp, the Britons King Arthur's Harp. To the Czecks it was a fiddle in the sky and to the early Arabian star gazers it was the swooping eagle as contrasted with Aquilla the soaring eagle which was nearby. The legend runs thus: a celestial harp was presented to Orpheus by Apollo. With this harp, when instructed by the muses, Orpheus charmed wild beasts, even stones and trees, upon Olympus, and chained the rivers in their courses. When Eurydice the new bride of Orpheus was snatched from him into the Stygian realms Apollo charmed the guardians of the River Styx so that they allowed him to enter. Before the deities who presided over the kingdom of ghosts he won favor and he was permitted to leave the realm with his young bride following him * * * but * * * he must not look back as he proceeded; this was too much for his anxious love; he simply must see whether she obeyed and was really coming after him—Alas! He lost her again. Nevertheless the magic lyre which could melt Pluto's stern heart, and make the Furies weep, was deemed worthy of a place among the stars. Shakespeare in *The Two Gentlemen of Verona* refers to this legend.

“For Orpheus' lute was strung with poets sinews
Whose golden touch could soften steel and stones,
Make tigers tame, and huge leviathans
Forsake unsounded deeps to dance on sands.”

The constellation of Lyra contains one star of the third magnitude, five of the fourth and a few of the fifth magnitude. The principle stars outline an equilateral triangle and a rhomboid. While the star Aladfar is outside these two figures and is a continuation of a line drawn thru one side of the rhomboid and also a

side of the triangle beyond the star Vega a distance practically the same as the side of the triangle. Epsilon, a yellowish star of the fourth magnitude, is one of the famous stars of this family. It is at one angle of the triangle; a sharp eye can divide Epsilon into two stars, and with a glass each of these stars can be seen distinctly as doubles—hence Epsilon is a double, double star. Sheliak and Sulafat are at the angles of the parallelogram farthest from Vega and its triangle. Sheliak is both a double and a variable star; a noted short period variable and one of the ten pear-shaped stars. It has a white light and is a star of the third magnitude. A powerful telescope locates the famous ring nebula between Sulafat and Sheliak.

By far the most famous star in the constellation of Lyra is the steel blue Vega. It is the most brilliant star of the northern hemisphere. In fact there are only three stars in the whole heavens which surpass Vega in splendor and they are all in the southern skies; they are Sirius, Canopus and Alpha Centauri. Capella and Arcturus are its only close rivals in the northern hemisphere. In the autumn as Vega and her accompanying stars go down in the northwest Capella comes up in the northeast. These two rivals are usually seen in the heavens at the same time. At this time of the year Arcturus is below the horizon. Vega, or the Harp



Star as it is sometimes called, is also termed the Arc-light of the sky. Some 14,000 years ago Vega was the north polar star and it is calculated that 11,500 years hence it will again occupy that position. Together with the other stars of the constellation Lyra, it occupies the region of the heavens towards which our solar system is travelling—the Apex of the Sun's Way being probably fairly near the fourth magnitude star Delta. Vega is 35 light years distant from us and is supposed to give 90 times as much light as our sun. It belongs to the Syrian type of stars, while Capella and Arcturus are of the solar type; hence Vega is supposed to be much more rarefied and less hot than its rival companions. It is travelling toward our solar system at the rate of about ten miles per second; still more than half a million of years must elapse before Vega and our sun shall pass each other.

There is a Chinese-Japanese legend about Vega: A spinning damsel fell in love with a shepherd boy—the father of the damsel was much incensed at their love so he banished them both to the sky on opposite sides of the milky way but gave them permission to meet once a year providing they could find a way to cross the celestial river. Each year on the 7th of July Vega, who was the spinning damsel, came down to one edge of the milky way while her lover, the shepherd boy Altair, came to the opposite edge. Their friends, the magpies, congregated and formed a bridge connecting these two points and Altair crossed to meet his beloved; after 24 hours the lovers were obliged to separate for the magpies had to pass to earth and wait another year before going back to form the celestial bridge. Serviso says that in Corea should a magpie be found in its usual haunts on the 7th of July, the children stone it for shirking its duty. Alas for the lovers should it rain on the 7th day of July! for then the river would be too wide to be spanned by the magpie bridge.

Altair and the Dolphin

A. LEAH GAUSE

Altair, one of the stars in the constellation Aquila, or the eagle, is a star of the first magnitude. It is situated in the edge of the milky-way and may be observed there from early in June until the middle of December. It is the brightest individual in the "pathway of light" during the time mentioned so even an inexperienced "star gazer" may easily locate it and its two companions Beta and Gamma Aquilae. These three form a straight line just five degrees in length with Beta to the south and Gamma to the north of Altair.



Altair in the constellation of the Eagle

Very few people see Altair early in the year although

it is in view near the western horizon before seven o'clock in the evening very soon after Janus opens the gate for the entrance of the New Year. Before many days it is indistinguishable in the "glow of lengthening days" and may not be seen again until the following month. In February, March and April Altair rises after midnight and may be seen by those who rise before the dawn.

There is no burst of heraldry to announce the arrival of Altair, with its fine white brilliancy, as evening star. As was stated it appears early in June and quietly mounts the eastern sky about

that hour of the evening when the woodthrush is finishing his vocalizing and the whippoorwill gives his first clear call.

Altair is comparatively near to the earth being about ninety-four trillion of miles away which is much farther away than the sun. On account of the latter's nearness we receive many times as much light from it as from Altair. But in reality Altair gives off nearly ten times as much light as the sun. It has been said that this star is approaching the earth at the rate of twenty-seven miles a second but even at such a tremendous speed it would be more than a hundred thousand years before Altair could possibly reach the position the earth now occupies.

Just thirteen hours elapse between the rising and the setting of Altair and as it remains so low in the sky it may be seen throughout its entire passage from a comfortable posture. In the order of brightness among stars it is classified as the eleventh.

The Dolphin

Delphinus, the Dolphin, an attractive star cluster in the shape of a diamond is just east of Aquila and a trifle north of Altair.



The Dolphin or Job's Coffin

Although there are said to be eighteen stars in the group only five are clearly seen. Three of these are a trifle variable, one is a double star and another is suspected of being a triple star.

Another name for this constellation is Job's Coffin. But why such a name should be applied is impossible to imagine. Of course in very early times men felt that the stars exerted a very mysterious influence. They noted their rising and setting and tried to find out what composed them. They classified them into groups and gave each the name of some figure or animal according to the position of the stars composing the group. There is a real reason for the name "dolphin" which comes from the old myth told for generations concerning this constellation.

Arion, a famous lyric poet and musician, and a native of Lesbos went to Italy where his art enabled him to amass a fortune. In Sicily he once won a valuable prize which was coveted by some sailors as he was returning home. He was seized but begged to be allowed to play on his flute and as he did so many dolphins

attracted by the music swarmed about the ship. Suddenly he leaped into the sea and was carried to shore on a dolphin's back. As a reward the animal was given a place in the sky.

But even after hearing such a delightful story concerning the origin of the name of the constellation considerable imagination is required to make it appear to possess any animal-like characteristics.

The Northern Cross

MILDRED JACKSON

The Northern Cross is one of the few constellations which really resemble the objects they commemorate. It is a part of the larger constellation Cygnus or "the Swan". The outstretched wings form the arms of the cross. The head of the swan is marked by the same star that forms the base of the cross. The upright piece of the cross lies parallel to the milky way, is over 20 degrees in length and formed by the bright stars, Alpha, Gamma and Beta, together with a few fainter ones. The arms of the cross or wings of the swan are marked by Delta, Gamma, Epsilon and Zeta. Gamma is a star of the third magnitude at the intersection of the upright and cross piece.

Perhaps Deneb is the star of chief interest in this group. It lies 45 degrees from the pole star. It is the least bright of the 20 brightest stars. It is white in color and in an early stage of its existence. It is the farthest north of any of our bright stars. It marks the head of the cross. In the spring when it rises in the north east, the cross is upside down and Deneb appears last. When the cross is setting in the northwest the position is partly reversed and Deneb is the last to disappear.



The Northern Cross,
in the constellation of
the Swan

Capella is one degree farther south than Deneb. Each appear to rise from the same spot and continue in much the same path across the heavens as they pass from rising to setting. Capella continues above the

horizon about one half an hour longer, each taking ten hours to reach the highest point in the sky. Unless obscured by sunlight and in a favorable atmosphere they may be seen 20 hours a day.

Astronomers believe Deneb to be so far away from us that it takes the light from it 325 years to reach the earth. The spectrum shows us that the star is approaching the earth at the rate of 30 miles a second. We may see it every night in the year some times between sun set and midnight. It is most attractive during early evening in January and February, when it hangs low in the north-west.

Alcott in "Star Love of All Ages" alludes to the appearance of the Northern Cross on Christmas Eve as "At nine o'clock this brilliant cross of stars stands upright on the western hills, outlined against the sky, as if beckoning all beholders onward and upward. A beautiful symbol of the Christian faith, glorious, perfect and eternal."

The Pleiades

HAROLD G. DYE

Throughout all ages the filmy light of the Pleiades has stirred the imagination of man. This small dipper-shaped group of bluish stars is visible from every corner of the globe. The myths, legends, and literature of every age and race are filled with references to this tiny cluster of twinkling stars. For over four thousand years the poets have drawn upon this bountiful storehouse, for songs of delightful sweetness and charm. The sweet-voiced Pleiades were described by Bayard Taylor, as a cluster of "golden bees;" and by Tennyson, as "glittering like a swarm of fireflies" in the evening's dusk.



The Pleiades, a group of six small stars surrounded by a misty light

The Pleiades lie on the shoulder of the Bull close to the ecliptic. They rise in the northeastern part of the sky. The whole constellation covers little more than three square degrees. In this constellation a person of normal vision can distinguish six stars, which are in the shape of small dipper. Exceptionally keen sighted individuals have been able to make out from seven to fourteen stars; but the latter mark is exceedingly rare. However with the telescope nearly three thousand have been photographed.

These stars are extremely far away. Light traveling 186,000 miles per second, night and day, takes over three hundred years to reach us from these far distant suns. Although they take up

such a tiny space in our sky, still our whole planetary system could pass with ease between the two nearest of these stars.

Modern photographs show the entire group to be completely enshrouded in a magnificent tracery of nebulous matter, which stretches in curious wisps and streaks from star to star. From this wonderful mass there is probably a great system in the last stages of formation. The six stars visible to the average eye are Alcyone, Maia, Electra, Atlas, Merope, and Taygeta, while some people can distinguish Celaeno, Pleione, and Asterope. If, as we believe, these stars are still in the process of formation, some future generation might be able to see all nine, or even more, with the naked eye. But more probably, the reverse will be the case, for the whole constellation is moving away at the rate of twenty-five miles a second.

There have been a great many poems and articles written on this tiny group of mystic stars, and upon individuals of the group. Alcyone, has received especial attention. It is nearly two thousand times as brilliant as the sun. In his *Alcyone* Archbold Lampman describes it as:

The great and burning star,
Immeasurably old, immeasurably far,
Surging forth its silver flame
Through eternity.

Some sixty years ago the German astronomer Madler imagined it to be the center of revolution of the universe—the place of the Almighty, the Mansion of the Eternal! This theory was very popular at the time, and even today a few may be found who advocate it.

In ancient Chinese, and Hindu legends references are found to the Pleiades. The Egyptian and Babylonian tablets refer to the same group. Aratus in the third century before the Christian era thus wrote of these same Pleiads:

Their number seven, though the myths oft say,
And poets feign, that one has passed away.

In the books of Job and Amos in the Bible we find the group mentioned. The Almighty thus addressed Job:

Canst thou bind the cluster of the Pleiades
Or loose the bands of Orion?

Amos, the herdsman of Tekoa wrote:

Seek him that maketh the Pleiades and Orion
. . . the Lord is his name.

Besides the many poems and myths, both ancient and modern, concerning this jeweled dipper, we find November known as the Pleiad month. In this month are observed many memorial festivals from remote antiquity. The Feast of the Lanterns—a great national festival of Japan—All Hallow 'Eve, All Saints' Day, and All Souls' Day, are supposed to be survival of such memorial festivals. Many temples were oriented to the seven stars. The most famous of these was the celebrated Parthenon. It has also been suggested that the "tors"—names given to British hilltops—were connected with the worship by the Druids of this little group of stars. Surely they have been given more attention than any other similar group in all the sky.

Orion

WINIFRED BAILOR

"Eastward beyond the region of the Bull
 Stands great Orion; whoso kens not him in cloudless night
 Gleaming aloft, shall cast his eyes in vain
 To find a brighter sign in all the heaven."

From late October to May Orion, the most brilliant of the southern constellations appears in our southern heavens. It cannot be mistaken for it contains more bright stars than any other single group, and has the distinction of being the only constellation visible in our latitude that contains as many as two stars of the first degree of brilliancy.



Orion, the three large stars in a line forming the belt, the curved line of smaller stars below forming the sword, Betelgeuse above, Rigel below

There are several myths about Orion, which makes his history somewhat shadowy and uncertain, but all agree that he was a great hunter, and received a place of honor in the heavens. The Hebrews claimed that he was no less a person than the mighty Nimrod himself. The ancient people saw him still at his usual occupation, for in the sky he still hunts the angry bull.

Perhaps your imagination will lead you to see the form of the great hunter but I must confess I can only see a parallelogram in which there is a row of three very bright stars, which form the belt, and from this hangs a curved line of stars forming

his sword. It is the arrangement of these stars that makes the constellation so conspicuous.

Late in November Orion rises about ten o'clock, the first of the principal stars to appear is Bellatrix, a star of the second magnitude and set in the left shoulder of the hunter. Bellatrix represents a female hunter and according to the old astrologers, women born under the influence of this star were lucky, and provided with good tongues.

A little later a little group of stars forming the head of Orion appears, followed closely by Betelgeuse, of the first magnitude. This star represents a type of sun that is in the process of cooling and has nearly reached the stage of extinction. It is now red in color and is so far from earth that its distance is 150 light-years; it is receding from us very rapidly.

About fifteen minutes after Betelgeuse arises a beautiful blue star comes into view. This is Rigel, in the right shoulder of the hunter. Rigel is a new star of the first magnitude and is the brightest in the constellation. It is so far from us that the distance cannot be measured and it is receding from us faster than Betelgeuse.

Following Rigel the three bright stars forming the Belt appears and below these the curved pendent making his famous sword. The stars of Belt are all of the second magnitude all three are double stars and all are white in color. Delta the first star in the Belt has a violet companion of the seventh magnitude. Epsilon the middle star has a blue companion and the companions of Zeta which is a triple star are yellowish white and purple gray.

Orion's beautiful sword is formed of five instead of three stars that are usually seen. The middle star Theta is multiple and involved in a nebula.

The Belt is three degrees and is sometimes called the Ell-Yard. Job referred to it as Orion's Bands.

The last star of the constellation to appear is Saiph, the fourth star of the parallelogram and in the right knee of the hunter.

So famous is Orion, that the University of Leipsic 1807 resolved that the stars in the Belt and Sword should be renamed Napoleon, and the English to offset this proposed to name the constellation Nelson. But Orion has successfully maintained his name and place although he flees in terror from the scorpion and bravely opposes the angry Taurus.

The Hyades

J. G. ETZKOWITZ

Among the most noticeable winter constellations one finds Hyades and Orion.

Aldebaran is the brightest star of the Bull the constellation Taurus—and forms the eye of the bull in the mythological figure.



Aldebaran in the V-shaped constellation called the Hyades. This is a part of the constellation, Taurus

It is easily recognized by its red color. It lies on the end of one branch of a V-shaped cluster called Hyades. The Hyades which Aratus accurately describes as "Whitening all the bull's broad forehead," forms a most conspicuous and beautiful group. The appellation is said to mean "rain" in Greek and is usually attributed to their reputed influence on the weather. In the showery springtime they set just after the sun, and in the stormy

period of late fall just before sunrise. The classic writers again and again refer to them as the rain stars; Spencer called them "moist daughters"; and in Tennyson's *Ulysses* we read:

Thru scudding drifts the rainy Hyades
Vex'd the dim sea.

Aldebaran, the bright star in the Hyades group signifies "hindmost". The Arabians so named it because it follows the Pleiades. Another popular title is "the Bull's Eye" from its position in the constellation. The slight tinge of red in the light of this star gives it an added beauty and makes it a conspicuous ornament of our winter night. Mrs. Sigourney in "The Stars" thus finely portrays it.

Go forth at night
And talk with Aldebaran; there he flames
In the cold forehead of the wintry sky.

Andromeda

ALICE M. PHIPPS

Andromeda, though far away she flies,
Dreads the Sea Monster, low in Southern Skies.

—*Aratus.*

Andromeda is a constellation which comes to the meridian in November. It consists of 66 visible stars, three of second magnitude and two of third magnitude. Most of the others are small.

It is supposed to represent a beautiful maiden chained to a rock. The star Alpha, or Alpheratz, is at the northern corner of the great Square of Pegasus and marks the head. Extending east from Alpheratz, at almost equal distances, are four other stars. Delta is in the shoulder, from which an arm is extended toward the north. Beta or Mirah is in the girdle and Gamma or Almach in the foot. A little farther east is Algol, the famous variable, which represents the head of Medusa carried by Perseus.

This constellation contains at least two very interesting telescopic objects. Almach, in the foot, is a double star which Hercules pronounced the most beautiful double star in the heavens, with beautifully contrasting colors, a deep yellow and sea-green. Some authorities claim that it is a triple star and that the third star is blue. These stars revolve about each other and are members of a common system. Several thousand double stars are known and it is due to their revolution about each other that they are recognized as doubles. It sometimes requires several years to determine whether they are connected in this way or not. As a result of extensive experiments it has been estimated that one out of every five or six stars is probably a system of stars. The star Almach is also the radiant point of the Bielid meteors which appear in November.

Probably the object of greatest interest is the great Nebula, which is sometimes called the "Queen of the Nebulae." It is said to have been known as far back as A. D. 905 and the Arabians called it, "the little cloud." It is the only Nebula which can be seen with the naked eye. It looks like a mass of diffused light and has often been mistaken for a comet. It is of tremendous size, its length being estimated as 30,000 times the distance of the earth from the sun, which in itself is 93,000,000 miles. It is impossible however to form any definite estimate of either its size or distance as nebulae are such filmy bodies that they cannot be measured with the precision and delicacy required for the determination of distance.

The nebula seems to be formed of a series of rings with dark spaces in between, which are evidently gaps between the rings. The spectroscope seems to indicate that it is not gaseous though the most powerful telescope fails to resolve it into stars. Although a magnificent spectacle in the telescope, it requires photography to show its marvelous extent and involved structure.

One star in that vicinity has a peculiar history which shows that it was doubtless in the nebula. It suddenly kindled from invisibility into brilliancy which in a few days was extremely increased. This brilliancy can doubtless be explained in the same manner as the ignition of meteors in our atmosphere. "If a dark star, moving along at terrific speed through space, were suddenly to plunge into a dense region of the nebula, heat and light must be evolved in sufficient abundance to transform the star into a brilliant object."

The mythology connected with this constellation is very interesting and can scarcely be separated from that of the other members of the royal family. Cepheus was King of Ethiopia, Cassiopeia was his wife and Queen and Andromeda was their daughter. Cassiopeia, the Queen, was extremely beautiful and boasted that she was more beautiful than Juno and the sea nymphs. They of course were greatly insulted and complained to Neptune, who sent a frightful monster to ravage the coast of Ethiopia. Cepheus and his Queen became very much alarmed and consulted the oracles. They were advised that nothing but the sacrifice of their daughter Andromeda to the sea monster would appease the wrath of the enraged nymphs. Andromeda was therefore chained to a rock to await her doom.

Just at that time Perseus, the son of Jupiter, who was returning from an expedition in which he had secured the head of Medusa, one of the three Gorgons, appeared and seeing the Princess Andromeda chained to the rock, fell in love with her.

"Chained to a rock she stood; Young Perseus stay'd
His rapid flight, to woo the beauteous maid."

He professed to her father that he would save her if she would be allowed to marry him. The King promised and Perseus changed the monster to stone by turning the reeking head of Medusa upon it. Andromeda had, however, been promised to Phineus, her Uncle, who violently opposed her marriage to Perseus. In the battle which followed Phineus was also turned to stone by the petrifying influence of the Gorgon's head. The celebration of the nuptials soon followed and they lived happily together during life and were all transferred to the sky after death.

An Astronomy Notebook

Recently we have had the pleasure of examining in detail a notebook prepared by Miss Carolyn Slater while she was a pupil in high school in New York City. The notebook was not a part of her school work but was an independent enterprise, carried on with a schoolmate because both were interested in astronomy; perhaps the excellence of the notebook is due to the fact that it was the outgrowth of her own interest and knowledge rather than a study in the curriculum.

The notebook is of the ordinary kind about $6\frac{1}{2}$ by $8\frac{1}{2}$ inches in size, with the owner's name and "THE STAR SYSTEM" on a label on the cover. The inside pages are given to the sun and the planets, the margin being cut to form a thumb index, like a dictionary. The Sun, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, each is given several pages of interesting notes culled from text books and other sources. For instance, one page under "The Sun" is as follows:

SUN SPOTS

"Sun spots are openings in the Photosphere or outer shell of the sun. The umbra or dark shadow of a spot varies from about 500 to 50,000 miles in diameter. The penumbra (less dense shadow) surrounding the umbra is sometimes 150,000 miles in diameter.

The depth of sun spots seldom exceeds 2,500 miles and more often is between 500 and 1,500 miles."

On the last page and on the inside of the cover are pasted envelopes to hold cuttings from newspapers and journals about the sun and planets. This notebook is supplemented by another one in paper covers labelled "Astronomy, Miscellaneous." This is also cut as to its margins making a thumb index under the following divisions: Constellations, Zodiac, Spectroscope, Velocity, Gravity, Star Leaders, Moon, Comets, Nebulae, Astronomical signs and symbols, Diagrams, Greek meaning.

Under Constellations are given the names of the constellations, alphabetically arranged and opposite the name of each is a diagram showing the figure made by the stars in it, for instance:

		*	*	*
Cassiopeia's Chair			*	*
		*		
Delphinus	*		*	
		*		

Under "Star Leaders" are given the names of the stars of the first, second, third and fourth magnitude arranged alphabetically. On the last two pages of this book are pasted four envelopes for cuttings labelled "Stars, Moon, Nebulae, Misc." These envelopes are bulging with a wealth of information gathered from all sorts of sources; statements of astronomers from all the observatories of the world, speculation by the philosophically inclined on the origin and destiny of the universe, pictures engraved from telescopic photographs, pictures drawn from imagination, in fact the most interesting collection of popular data imaginable. These envelopes proved to be all too small for the need, and they are supplemented by a veritable bundle of whole pages from newspapers, reviews, and magazines, some of them of very recent publication, showing that Carolyn Slater, now in college and *not* studying astronomy as a part of her course has kept up her interest in the stars and that her daily life is enriched by this knowledge; we have no doubt that all her life she will pursue and make her own the revelations concerning the wonders of the heavens which astronomers of the world are giving to us.

Sunset Over the Pacific Ocean

On November 22, 1919 there was such a sunset as I have seldom seen; its glory spread itself over land and sea. Watching its changing colors as we drove in the sunset hour through the wondrous California South Land, one was transported into the spirit realm, enwrapped in an unearthly radiance, which uplifted the very soul. Never have I seen its like and never do I expect to equal it again. After all it is an experience that cannot be passed on; it can scarcely be shared.—J. C. S.

Let me so live that when I come to die—
Be it today or after years gone by,
With steadfast Faith I may all fear dispell;
With smiling eyes bid happier friends farewell;
Yield not to vain regret, but leave to youth
The task undone, the broken glimpse of Truth;
The tools of Work and Play lay calmly down
Without impatient haste or lingering frown;
Whisper a word of cheer to those I love,
Of greetings in the Rendezvous above;
Then! my Master meet, in glad surprise
Amid the glory of the SUNSET SKIES

JOHN CUTLER SHEDD

A Voyage of Discovery

KATHERINE R. ROGERS

New Bedford, Mass.

The little waves were very happy when the warm summer days came along, and they rippled gently back and forth on the beach, chasing the pebbles playfully up, and then drawing them down again, and laughing to themselves over the way the pebbles scolded at such treatment. Every day, when the tide went out, the waves went along with it, far down the beach, and then the pebbles were left in peace and they got quite nice and dry, but it was a little lonesome and they didn't really mind the playing of the waves, so they were always glad to see them back, when they rode in again with the high tide. The waves were always full of life then, and ran up a little farther every few minutes with a rush and a roar that gave the pebbles a delicious scare, for they knew it meant they were going to be caught and rolled over and over in the cool salt water.

One day when the sun was shining brilliantly, some children came to play on the beach, with pails and shovels and little carts, and they ran about in great excitement, picking up all the prettiest pebbles and shells they could find, and trying to see how near they could get to the waves without getting *very* wet. Of course, they did get their shoes wet, because they *would* follow the waves as they slipped down the beach, and the waves could always run back *up* the beach faster than the children could, though they scampered and shrieked their best, so finally their mothers decided it was warm enough to take off their clothes and put on bathing suits and let them get as wet as they liked. And then the waves had a glorious time! They tried their best to knock the children down, for that was their idea of fun, and once or twice when a venturesome boy got in pretty deep, they did make him turn and scramble for the shore, and they threw salt water in his mouth and eyes, but he only laughed, and they laughed too, and danced and sparkled in the sunshine.

Suddenly some larger waves came rolling in, sent by a big boat going by out in the harbor, and then the children did tumble over and roll about for a minute!

"Come on!" the big waves cried to the little ones, "get on our backs and we'll take you over to France and Spain. It's awfully exciting out on the ocean!"

One or two of the wavelets, braver than the rest, thought they would like to see the great world of water they had heard so much about, and they boldly climbed up on their big brothers' heads and shoulders, and shouted good-bye to their comrades, and were off, for the big ones were in a great hurry and wouldn't stop a minute for them to think about it!

"Come, we must be off! the tide waits for no one!" they cried. And then the little waves had an experience more wonderful and thrilling than anything they had ever imagined in their wildest dreams! At first, it was great fun, just rolling smoothly along, with the familiar ducks and gulls flying above them or settling down on the water for a rest and a friendly chat, and then suddenly they were out far from land and they were raised way up on a big swell, and looking all around hurriedly, one little wave cried, "Why, I can't see the shore! Where is it?"

"Don't be afraid," said his big brother, as they sank swiftly down, down, down, into a deep green trough, "we're just getting out on the ocean now, there are no rocks here to hurt you, and soon you'll begin to see interesting sights."

The next moment, they began to rise again, and as they reached the top, his brother gave the little wave a toss high into the air, so that he shrieked with delight and cried out that he could see ships, bigger than any he had ever seen before, steaming by in both directions. To please him, his brother now tossed him up every time they rose, and caught him again deftly, just in time to follow the movements of the giant waves they had now joined, and then for a time they were surrounded and covered by a thick fog, so he could see nothing. But this did not worry him, for he was used to fogs at home, and he and his little brothers very often played "Hide and seek" in them. Bye-and-bye it grew very, very cold, and the little wave cried, "Oh, dear! is winter coming again so soon?"

"No, no," said his brother, "look over to your left now, the next time we get up very high, and you'll see something very big and white and shining. That's a big iceberg sailing down on us, but we'll soon get out of its way."

So the little wave looked and there was the most beautiful sight he had ever seen! A great towering mass of ice, glistening in the sunlight with a dazzling brilliancy that made him blink and sparkle in return, and he thought how glad he was that he had

come on this voyage and seen this marvelous berg! Then, as they raced on, borne along by the giants of the ocean, soon it was warm again, and then *very* warm, and the little wave asked, "What does this mean? I don't see anything to make us so hot!"

"Ah," said his brother, "these are our cousins, the waves from the south, rolling along on the stream that comes from the great Gulf, and we are crossing their path."

"Where do they go? and can't we go *with* them? They are so nice and warm!" said the little one.

"All right, we'll join them," said his brother. "They go up by Ireland and Scotland, and over to Norway. I haven't been that way for a long time." So they turned aside and followed the warm stream, and before many days they began to see birds again, and then land! But they didn't stop, as this was a rocky coast and they would only be able to dash up against its sharp sides or run into great dark caves, and besides that, the big brother had something more to show the little waves. They saw jagged peaks on the horizon, and more and more ice floating about, and the days began to be longer and longer, and finally there came one day when the sun didn't go out of sight at all, but just touched the edge of the water, and rose again!

"Now," said the big brother, "you've seen one of the most wonderful sights in the world, but we mustn't *stay* here too long, because by-and-bye it will be night here all the time, and no day at all!"

"Oh, I shouldn't like that!" exclaimed the little wave, "unless the moon shone instead," he added quickly, remembering how beautiful she made some of the clear nights at home.

"Well, I think you've seen enough for one trip," said the big one. "It isn't good for little people to travel too much, so I think we'll be going now, and you can tell the others all about it, and perhaps we'll have a big party of them wanting to voyage around the world, next year!"

So they sailed away home again, the little fellow quite used to the gay life and motion now, and after a good many wonderful days, he ran up the familiar beach, and kissed all the pebbles in turn, he was so glad to see them again!

It is an Ill Wind that Blows Nobody Good

A Fable Sequel to Teaching Plant Diseases in the Grades

WILLIAM GOULD VINAL

Rhode Island College of Education

"Abominable East Wind!" cried the farmer, as he gazed at his potatoes; "to what a woe-begotten end have you brought my winter food!"

"The same old story!" murmured the wind, in reply. "Always blame the weather for troubles you have brought upon yourself. What more could have been done for you? All this day have I brought water to your garden to save you from famine. If you did not spray your potatoes to prevent blight, when warned by the Farmers' Bulletin, who is to blame but yourself?"

"I am unfavored, indeed," rejoined the farmer. "I thought you were a friend, but have been deceived."

"Not by me," replied the wind, patiently. "I tend to my work every day." I bring the crops warmth. I bring them moisture. I mislead none but the superstitious and ignorant."

"Superstitious! ignorant!" cried the farmer. "How little do you know as to who I am. Trustee of the Academy—Superintendent of the Sunday School for thirty years—a leader of the community."

"A leader who cannot lead! Wise, perhaps, in the laws of the village—ignorant in the laws of nature. You have mistaken the friend that brings a good harvest for the pest that causes famine. Alas for your neighborhood, if no better leader can be found."

The farmer turned away, and the wind played across the field. The wind danced up and down the rows and mourned his luckless fate. "Yet," said he to himself, as he dried up a muddy pool about to decay a hill of potatoes, "I will keep on trying. What an ignorant farmer!"

* * * * *

Scene: The kitchen.

Characters: Mother Hubbard, a rich lady who had gone through the form of being patriotic by preserving peas without being intelligent as to the correct method.

Faith, the daughter of Mother Hubbard who had great faith in her fashionable mother.

"These here peas are moulding," observed Mother Hubbard to her daughter Faith, as she slowly took one jar after another from the shelf. "Such miserable weather!" Some would have said "just my luck" but it comforted the fashionable lady's heart to lay all the blame on the weather. Faith, however, took but little interest in the matter. Her mother was always grumbling about the east wind and her rheumatic pains which should have been called the gout.

The door banged with great violence. It was a pity that Mother Hubbard had placed some jars so near the edge of the table, for, when the door was blown to, they fell with a crash, and mouldy peas were strewn across the floor.

And, "Do we meet once again?" said the Jar Spore to the Floor Spore, in whose company he had traveled at preserving time. "Do we meet once again?" How pleasant, indeed. "I have not seen you since Mother Hubbard locked me up with the peas. Well, well, well. Let me first ask how you are this morning?"

"Oh, pretty well," replied Floor Spore, "but very, very sad." You have little cause to be sad. You have had some fine peas to grow upon. But I! Alas, the cruel wind has dried me up and I never can grow again. Most of the merry little cousin spores that played with us have dried up and died. What are you smiling at?"

"I am smiling," said the Jar Spore, "at your calling the Wind a cruel being."

"And why shouldn't I? Do I not well know?" asked the Floor Spore? "I wonder, Floor Spore, what we *do know!* People are very sure as to what they know and then they find out that it is a mistake."

"What makes you think that?" inquired Floor Spore.

"I have learn't it," replied Jar Spore "from an acquaintance I have made here,—Mother Hubbard. She just said that the weather caused the peas to mould and now—"

Just at that moment the door opened. Faith came in and began to look around with wide staring eyes. "Why mother," cried the maiden, "What has happened?"

"That horrid wind!" wept the mother in despair, as she threw the dripping mass into the garbage pail.

"Whew-w-w," said the Wind angrily. "It is always some one else that is to blame. You called me horrid. Why did you open the window and invite anything 'horrid' to come in?"

"I thought that you would cool the room. I mistook your hateful temper. I know you now! Must I lose my preserves? Must my patriotism go for naught? Ay, whistle on in your joy."

"Fool! It is no joy to me to see your jars of peas spoilt nor your moldy views upset. It is my duty to help the peas to grow, to bring rain and warmth. I destroy germs. It is ignorant people like you that turn good into evil. You have turned me toward your ruin. What ignorant parents brought you up and did not teach you the laws of nature?"

"My poor mother!" wept Faith; "how unkindly you speak to her! But you are nothing but the wind. You know not what she does for me, her only child. She takes me into society, I have beautiful gowns, and fairy stories to read."

"Even so?" swayed the wind, "accomplished in the laws of fashion that changed but yesterday—unacquainted with the simple realities of life which have worked through the ages. Oh, that you knew the laws by which I live."

The Wind stole out of the window and across the garden. "I may be of service yet," said he. "What a foolish world."

* * * * *

Little Truth rambled about the fields gathering wild flowers and running after birds and insects. It was her mother who first taught her where to find the gentians and bluets and about the beauty of the hills.

Truth never wearied of watching the garden. She used to throw herself upon the ground and watch the bean plants. One day she spied rose colored spots on the bean pods. She had never seen them before. She thought she knew, and running to her mother, shouted, "Mother! there are roses on the beans!"

Truth's mother took the little girl on her knee, and tried to explain that the colored spots were accidental. Roses could not grow on beans. Truth was very silent, and then asked, "Why?" The mother sighed, as she did not understand these spots herself.

The next day was Sunday. Truth and her mother walked to church. Strange to relate the preacher talked about the colored spots on the beans. He called it blight. Truth's heart beat very fast for she was to hear about the roses. But, alas! The pastor told of the wicked beans and the Divine Wrath, and prayed that his congregation take warning. The little girl began to cry and

the distressed mother had to get up and leave the church, leading Truth by the hand.

The next day found Truth in her favorite haunt. She was watching the beans with a look of pity on her face when she was interrupted by the voice of a stranger. The stranger smiled and said, "What are you doing little girl?"

"I am looking at the colored spots on the bean pods."

"And why are you looking so sadly at the bean plants?"

"I am so sorry for them!" cried Truth. "I am so sorry that God is angry with them."

"What makes you think that God is angry with the bean plants?"

"Why the preacher said so in his sermon."

The stranger nodded with a smile and placed his hand on Truth's head and said: "I will tell you a secret, little girl. I suspect that the preacher never studied the color spots on the bean and may not know very much about them." As he spoke he took a lens from his pocket and let Truth look through it at one of the colored spots. "That is as much a plant as the bean," continued the stranger.

Truth could hardly speak. A look of admiration came upon her face.

Then he touched the red spot with a needle and placed a tiny speck under the microscope. "These are like seeds but we call them spores," he went on to explain. "Do you wish to know more about them?" Truth eagerly nodded her head. The stranger now proceeded to explain. "Each of these little beads is a spore. They are so small that we can only see them through the microscope. The wind blows them around and when they land on the bean plant they send small threads into the pods or leaves. The red spots then appear and in a few hours there are thousands of more spores ready to be blown a round. So now, little girl, you know why those red spots are on the bean pods."

* * * * *

Meanwhile the wind had heard the conversation between the kind-hearted stranger and the little girl. The wind was happy now, and said, "I have at last found some one who can face the truth and explain it in simple words. I am thankful that some people are searching out the wonders of nature instead of blaming her for what they do not know." With these words he whistled merrily and danced away to do his part in the world of natural laws.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN
ELEMENTARY SCHOOLS

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Editorial

OUR PRESENT NEED FOR SUN-DIALS

“What a dead thing is a clock, with its ponderous embowelments of lead and brass, its pert or solemn dullness of communication, compared with the simple altar-like structure and silent heart-language of the old dial.

It stood as the garden god of Christian gardens. Why is it almost everywhere vanished? If its business use be suspended by more elaborate inventions, its moral uses, its beauty, might have pleaded for its continuance. It spoke of moderate labours, of pleasures not protracted after sunset, of temperance and good hours. It was the primitive clock, the horologe of the first world. Adam could scarce have missed it in Paradise. It was the measure appropriate for sweet plants and flowers to spring by, for the birds to apportion their silver warblings by, for flocks to pasture and be led to fold by. The shepherd, carved it out quaintly in the sun, and turning philosopher by the very occupation, provided it with mottoes more touching than tombstones.”

No one has ever expressed the deeper sentiment for the sun-dial so completely and so satisfactorily as did Charles Lamb in the above tribute. Probably there has never been a time in the history of the world when the peaceful, leisurely influence of a sun-dial in a quiet corner of a garden was so much needed as it is today. The chief characteristic of the days of this generation is that they, as Thoreau said, are “minced into hours and fretted by the ticking of a clock.” Every moment of our waking time is apportioned to some action of business, duty, or pleasure, and each moment, like a naughty little boy marching into school, kicks or pinches the one in front. In our opinion, we had much better abate our ardor for “efficiency” and display more interest in “sufficiency” of true living. We are being propelled through the years allotted to

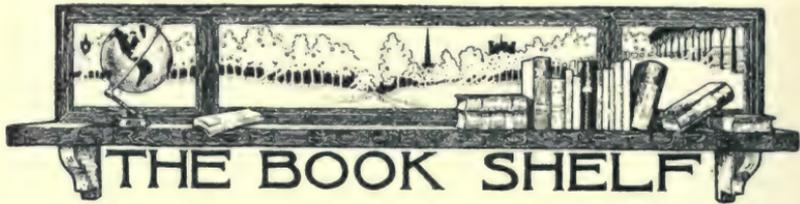
us with a velocity that gives no time for contemplation or for balancing action with thought. What a panacea for this dangerous condition of humanity would be the establishing of a sun-dial in every home and casting into the furnace all the watches and clocks! In case one does not have a garden with roses, which gives the traditional environment to the dial, one could at least have a "noon-mark" on the window sill which would accomplish the same desirable results.

ALPHA ORIONIS AND MORTAL HUMILITY

Astronomy was the first of the sciences to be studied and developed; and to-day it is among the foremost in the matter of adding new knowledge of the great facts and processes of the machinery of the Universe. The telescope, the spectroscope, photography have each, in turn, increased our knowledge vastly as to the stars, their composition, distances, movements and numbers. Then a geologist gave us the planetesimal theory to replace the old nebular hypothesis of the origin of the Universe. Always the physicists have claimed the heavens as a part of their realm, so we need not be surprised that Professor Michelson has devised a method for star measurement by means of which we now know that the beautiful red star above Orion's belt, Betelgeuse, has a diameter greater than that of the orbit of our earth around the sun, and that if it were in the place of our sun, shining upon us it would shut from us all view of the sky. Yet Betelgeuse may have or may have had worlds like our own whirling around it, inhabited as is our world, and subject to the same laws that govern us; and Betelgeuse and our sun are two only of forty million stars that photography reveals in our skies. Why should we on our minute dot of a planet regard our affairs of such tremendous importance? Why worry?

NOTICE

Index for volume 16 will be mailed
with February issue



Wild Creatures of Garden and Hedgerow. Frances Pitt, 285 pp. illustrated with 28 excellent photographs, Dodd, Mead & Co.

This is another of the charming and excellent books on the living creatures that survive in our Mother Country. To those of us who are in the habit of reading English writers, whether poets, essayists or novelists, who deal with life out-of-doors, this book is a boon for it makes us intimately acquainted with many of the common forms of animals and birds which we have only known by name or by tantalizing allusions. It is an ideal nature study book, for it recounts in a most interesting manner the author's own experiences with these little brothers of the garden and hedgerow. Whether it be the story of that Mighty Atom, the common shrew and his prowess, or the fascinating tale of Whiskers the little rat, reared and cherished by Old Puss, or the way the Pied Wagtails brought up their birdlings, the stories have the same charm of style and the same convincing quality of truthfulness and careful sympathetic observation. The chapters of the volume are as follows: Bats, The Bank Vole, Two Common Birds (song thrush and merle), Shrews, Toads and Frogs, The Long-tailed Field Mouse, 'The Little Gentlemen in the Black Velvet Coat' (common mole), Thieves of the Night (brown and black rats), Some Garden Birds (pied wagtail, willow wren, great tit), The Hedgehog, Three Common Reptiles (blindworm, adder, grass snake), The Short-tailed Field Vole. The illustrations add greatly to the attractiveness of this valuable book; they are engraved from very excellent photographs, which give us accurate ideas as to the appearance of these creatures of which we have only known heretofore by name.

A Night Raid into Space. Col. J. S. F. Mackenzie, author of "Wild Flowers and How to Name Them at a Glance", 143 pp. with 20 illustrations. J. B. Lippincott Co.

The Story of the Heavens Told in Simple Words is the sub-title of this little volume. The night raid consists in explaining the things seen in the heavens but children of tender age will find the explanations rather difficult. The book is better fitted for the higher grades or high school. The following are the subjects discussed: Solar System, Birth of the Earth; Earth's Rotation; The Moon; Gravity; Precession of Equinoxes; Year; Longitude, Latitude; Constellations; The Zodiac; The Sun; Weighing the Earth; Equation of Time; The Seasons; High Moon, Low Sun. The illustrations are diagrams to help the reader comprehend the facts of astronomy. The discussions of the topics are brief and clear. There are also suggestions that are helpful to the beginner as: "The first letter of each of the following eight words, and

which are easily learned is the first letter of the name of each planet, in their order as we go outwards from the sun: Many Very Eminent Men Justly Study Universal Nature."

Uncle Zeb and His Friends. Edward W. Frentz, 224 pp. many illustrations school edition, *The Atlantic Monthly* Press.

It would be hard to find another book the size of this little volume that contains 52 stories so varied and so interesting as these told by Uncle Zeb, a kindly man who lived in a cabin near a mountain, and who made toys and told tales for the delectation of children. The stories are by no means only about the animals and birds; in fact, the human interest is predominant in them all; but many of the tales are meant to make the child humane and sympathetic in dealing with little wild creatures. The way Jessie and Harold became acquainted with the muskrat, why Louis adopted three baby woodchucks after he had shot their mother, how Harry and Ruth helped Mrs. Mouse move her family into the country, and many another story of Uncle Zeb's teaches in a charming and convincing manner the lesson of kind treatment for the lower animals. Several of the stories bring to the child of to-day a vivid comprehension of the meaning of Memorial Day and the reasons why the old men, now veterans, fought battles when they were boys and what the war meant to them and why they march to the cemeteries and decorate the graves there with flags and flowers. The whole book is interesting and wholesome and is sure to be loved by all the children happy enough to possess a copy.

Around the World, A Geography Painting Book for Children. Cunard Steamship Co. 10 cents per copy.

The Cunard Steam Ship Co. deserves much credit for this booklet which will charm children into learning some things about geography while they are having a delightful time coloring pictures. It begins with a picture of the Aquitania, a ship that will take the child to all the places marked by red lines on the map. Then follows pictures of the Atlantic with North America and Europe, the Cathedral at Rheims, the tower of London, the Liverpool docks, Gallipoli, map of the world, Rock of Gibraltar, Vesuvius, the Colosseum, the Sphinx, the Pyramids and Nile, Jerusalem, and the sky line of New York. The pages are 12 by 9 inches; the picture is printed in color on the right hand page and the outline for the child to color on the opposite page. Children are sure to enjoy coloring the pictures and at the same time they will learn many interesting things which will cultivate their intelligence.

NOW READY

The Flower Outlines

By MISS M. E. EATON

Botanical Gardens, Bronx

The **Flower Outlines** are the latest additions to our valuable Outline Drawings printed on suitable paper for coloring with either crayons or watercolors,

Miss Eaton has made some very lovable drawings of the flowers and they will be a great inspiration to further the study of flowers.

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NATURE-STUDY REVIEW

Devoted to Elementary Science in the Schools

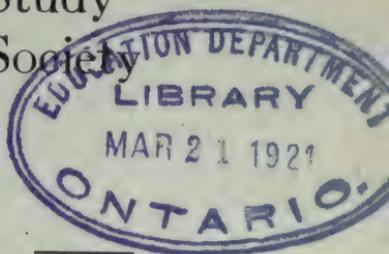
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The Orange Garden Spider

Photo by Mrs. W. L. Moffatt

American
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Annual
Meeting
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FEBRUARY, 1921

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THE NATURE-STUDY REVIEW

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The Fifteenth Meeting of the American Nature Study Society

The morning of December 29, 1920 was decidedly wintry, the thermometer registering three degrees below zero the night before. However, the University of Chicago gave us a greeting warm enough to compensate. Ten o'clock found a goodly number of nature devotees in Room 303, Emmons Blaine Hall which is a building used by the Chicago School of Education. Room 303 adjoins the office and laboratory of Dr. Elliot R. Downing who acted as a most cordial and delightful host to all of us who came from afar. The room was well filled when the meeting was called to order by President Drushel, and since the first part of the program was to be given over to the Chicago Nature-Study Club, Miss Sue J. Reid, vice-president of that Club, was asked to preside which she did with dignity and dispatch.

The first number on the program was a talk on Twenty-five Common Spiders by Mrs. W. L. Moffatt. This was illustrated by many lantern slides made from photographs taken by Mrs. Moffatt. The pictures were excellent, and if any one thinks it is an easy matter to make a good photographic portrait of a spider, he had better try it once. Mrs. Moffatt's talk was informal and especially valuable and interesting because of her many personal observations upon the habits of those spiders which she had had under careful observation. Many of her notes on spider habits are entirely new to science and should be published.

Mrs. W. A. Rowlee gave a talk upon the sand dunes, their flora fauna and silva, illustrated by superb lantern slides made from photographs taken by herself and husband and charmingly colored. Many of the slides were as beautiful in composition and color as the most famous landscapes in one of our art museums. It was hard to tell whether they appealed most to the aesthetic or to the natural history side of the audience.

The election of officers for the ensuing year then took place with the following results: President, J. Andrew Drushel of the Harris Teachers' College, St. Louis, Mo.; vice-presidents, M. R. Van Cleve, Toledo, O., A. E. Satterthwait, Webster Groves, Mo., W. G. Vinal, Providence, R. I., Theodosia Hadley, Kalamazoo, Mich., and W. T. Heilman, Columbus, Ohio.

The report of the Secretary-Editor was as follows: **THE NATURE-STUDY REVIEW** shows a steady increase in number of subscribers, its circulation at present being about 2400, an increase of more than 200 since last year despite the increase of price forced upon the publishers by the high cost of paper and labor. One new club has been added to the subscription list during the past year. This is a club of 125 members at Webster Groves, Mo., and every member, even when there are two in a family, subscribe to **THE REVIEW**. The St. Louis Club numbers 225, and the Pittsburgh Club 175 members, all subscribers to the magazine. Professor M. R. Van Cleve, Director of Nature-Study in the Toledo schools has placed the **REVIEW** in the hands of over 100 of his teachers.

The advisability of having one or two numbers of the **REVIEW** each year gotten up by local clubs was discussed with the result that next year we shall make the trial by having the November number taken care of by the Chicago Nature-Study Club.

At noon we sought refreshment in the cafeteria of the Ida Noyes building for the women students of the Chicago University, a beautiful building in its every appointment.

The afternoon session was given over to "A survey of Twenty Years Progress in Nature-Study" which was discussed by Miss Alice Jean Patterson, Miss Ellen Eddy Shaw, Dr. E. R. Downing, A. F. Satterthwait, Professor E. L. Palmer and the Secretary-Editor. The discussion appears in this number of the **REVIEW**, but it is a great pity that the many informal remarks made during this very interesting discussion were not reported and cannot be given to our readers.

The meeting adjourned at six o'clock, and it was the sentiment expressed by all present that it was the most successful meeting ever held by the society. We adjourned in time to attend the delightful dinner at the Atlantic Hotel given to us by the Chicago Nature-Study Club.



J. Andrew Drushel

Professor J. Andrew Drushel was unanimously re-elected president of the American Nature-Study Society for the coming year at the annual meeting of the Society in December. For the benefit of the new subscribers to the NATURE-STUDY REVIEW the following account of President Drushel is reprinted from the issue of last February.

Professor J. Andrew Drushel has been connected with the Harris Teachers College as head of the biological department, including nature-study, since 1905. While Mr. Drushel has made contributions through scientific investigation along a number of lines,

including glacial drift beneath St. Louis loess, and loess deposits, outlining the limits of Illinoian and Kansan glacial lobes in Missouri, his greatest work has been that of teacher and leader in nature-study and science in the College and community. He not only has developed the course in science and nature-study at the College, but has taught these subjects to more than twelve hundred of the teachers in the St. Louis schools, who are now graduates of the college and who, under his inspiring instruction, are doing effective work in these lines in the St. Louis schools. In addition to this he has taught hundreds of the teachers who had received their appointment before the College was established. He organized in 1910 and has been the central figure in the St. Louis Section of the Nature-Study Society of America. Through the loyal support of many teachers and principals of the St. Louis schools this section has become a large and active one. The present membership in good standing is 190 of whom many are of the original 100 charter members. The popularity of the section is due in a considerable degree, to the Saturday field trips in the spring and autumn of each year.

Professor Drushel was born Nov. 24, 1872. In his early years he attended country parochial and district schools. He received his secondary education in the preparatory department of the National Normal University, at Lebanon, Ohio. He also took normal and collegiate training in the same institution. Later he studied at Yale, taking there the degree of A.B. with Philosophical Oration rank. After graduation at Yale he taught the natural sciences for two years in the East Texas Normal College, Commerce, Texas, and then returned to the Normal University at Lebanon, Ohio, teaching there for four years. He has held his present position since 1905.

Professor Drushel is a member of Woodmen of the World, Masonic, and Sigma Xi fraternities. Member in N.E.A., Fellow in A.A.A.S., member of St. Louis Acad. of Sci. He has collected and studied plants in the field or herbarium in 39 states. His winter avocation is the preparation of material studied and collected in the field for illustrative purposes in botany and nature-study classes.

For several years the publishers of *THE NATURE-STUDY REVIEW* have realized gratefully the staunch support given to this periodical from the St. Louis contingent. This has undoubtedly been largely

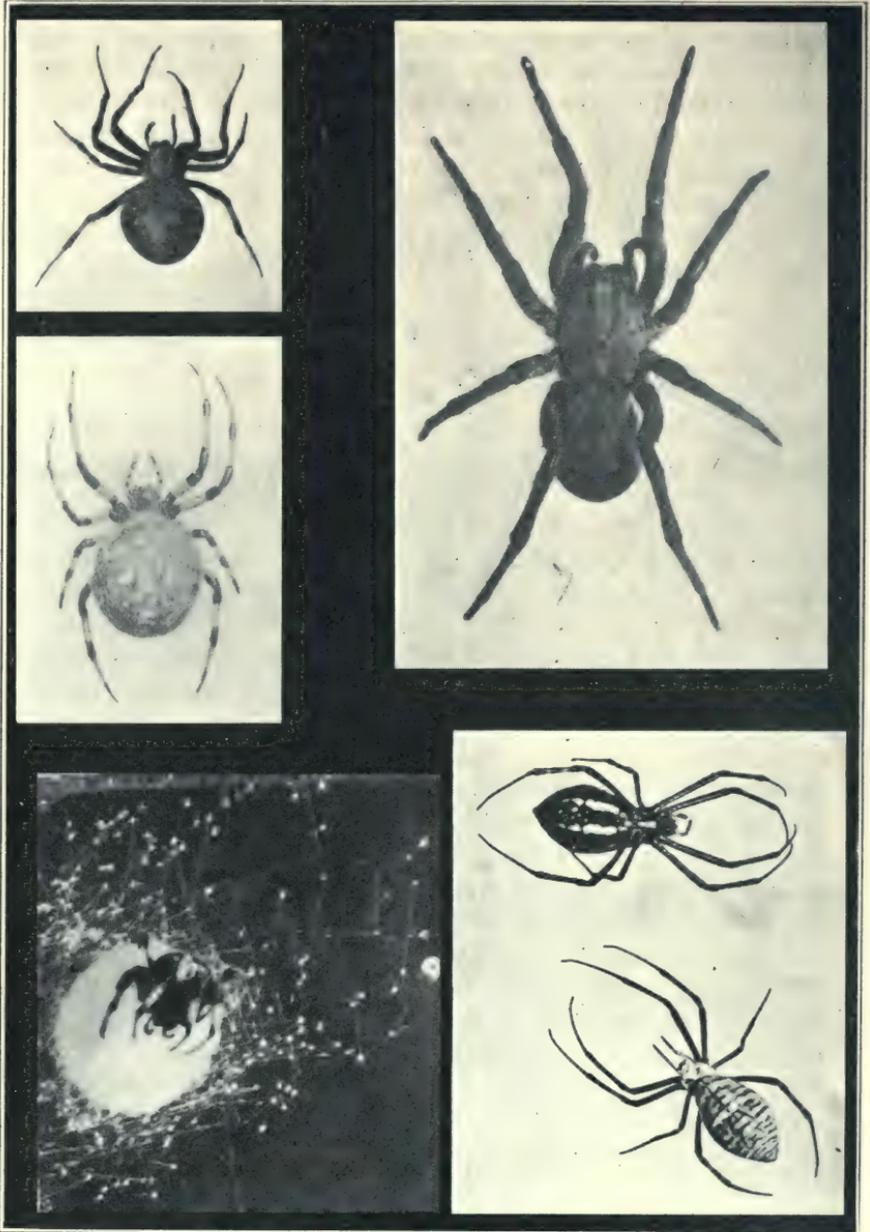
due to Professor Drushel's activities; his influence has been ever widening like the waves started in the educational waters always by the projecting into them a strong and virile personality. Professor Drushel has always stood for the real thing in Nature-Study, for he is an out-of-doors man as well as a laboratory instructor and his influence has been exerted to get the teachers into the fields and to see for themselves what is there. In addition to his strong qualities as a teacher he has a whimsical sense of humor that is most delightful and which enables him to deal with difficult situations tactfully and successfully. The Nature-Study Society of America is fortunate indeed to have secured Professor Drushel for its president.

Notes on Mrs. Moffatt's Talk on Twenty-Five Common Spiders

Mrs. Moffatt gave briefly the habits of twenty-five species of spiders common in the vicinity of Chicago, showing sixty slides illustrating the spiders, their webs and cocoons.

She explained that the webs of many species belonging to the orb-builders are made in sunny situations, on tall weeds and on the borders of woodlands where insects are in abundance. Others that make no webs in which to ensnare their prey, but depend on their alertness and keenness of sight, are found on the ground, in low grass or upon the bark of trees. Numerous insects, such as grasshoppers, mosquitoes, crickets, aphids, katydids, flies, gnats and many kinds of beetles live in and among the weeds, sedges, grasses or on the trees. As far as we know, living insects are the spiders' only food. They choose to live where these insects are abundant. The young, when hatched, will in all probability receive the same kind of food that nourished the mother, so she carefully and securely places her cocoon where these insects abound.

As the species eaten by spiders consist so largely of kinds that we consider injurious, Mrs. Moffatt claims that we must look upon the spiders as beneficial; that some writers have asserted that in the destruction of noxious insects they are more effective than birds; that whether this is true or not, we do know the benefit they are to us in keeping in check many undesirable insect pests, and for that reason we ought to do all that we can to protect them.



Araneus benjaminus
Araneus trifolium
Araneus trifolium with egg sac

Lycosa carolinensis
Argiope trifasciata
 upper and lower sides

Photographed by Mrs. Moffatt

The Cottonwoods of the Dunes

STELLA M. ROWLEY

6812 Normal Blvd., Chicago, Ill.

A part of Mrs. Rowley's Address before the American Nature-Study Society

Trees, like people, have their peculiarities and salient characteristics. The oak stands for strength and solidity. Out West, the giant Sequoia, the oldest living thing on earth typifies immortality. Then there is the aspen, trembling always, fearful of even a slight breeze.

We people, who frequent the dunes that delightful stretch of natural parkland reaching from Miller, Indiana, to Michigan City are well acquainted with a comparatively humble, yet, to us, when we come to know it well, a most interesting and admirable tree, the Cottonwood. In the succession of plant life on the dunes, it is one of the first trees to appear. As a city resident, we think of it as an untidy tree and not desirable for our avenues and boulevards but at the dunes, it comes into its own and is a most valuable tree because of its ability—to adapt itself to conditions. We all admire in the human family those qualities of perseverance and pluck, qualities that laugh at difficulties and work on and on until success is attained. All this the humble Cottonwood is doing, each day of its life out among the sand hills of Indiana.

Even the casual visitor is struck by the evidence of the constant struggle between this tree and the shifting, stifling sand. We may see it almost buried yet still alive, its topmost branch, green and luxuriant. This is possible because its branches so quickly function as roots.

Wherever there is a little moisture, hundreds of cottonwood seeds germinate. Many of the plants in this nursery meet an untimely death but others persist, and thrive singly and in groups.

These groups afford a most welcome shade and are a pleasing feature against a background of tawny sand.

Conditions in duneland change rapidly, however, and the best laid plans of the Cottonwood oft go astray.

When the wind currents blow away the sand, we may find a group of Cottonwoods which have been buried by the sands of by-gone centuries.

At Bald Knob, near Millers, is a most interesting group of stumps, which a returning soldier from the fields of Flanders aptly



Youth
Old age

Making a good fight
A dune graveyard

The story of the struggle of the Cottonwoods with the dunes

Photographed by W. A. Rowley

called a Graveyard. These trees had a pleasant family life, until the shifting sands killed and buried them. Fickle and erratic almost beyond belief, the dunes shifted in this particular locality, leaving the Cottonwood family group exposed. All around the dunes, we find debris, and here and there a twisted gnarled veteran tree, dead or almost so, silhouetted, gaunt and defiant, against the sky.

A Survey of Twenty Years' Progress Made in the Courses of Nature Study

ALICE JEAN PATTERSON

State Normal University, Normal, Ill.

In taking up for discussion the progress made in the course of study in nature-study during the past twenty years, I have thought it worth while to give a hasty glance at the ten preceding years. These were the years which saw the birth and early growth of this new school subject, a subject which had evolved from the object lessons of the preceding decade aided by the introduction of the laboratory method into high school and college science.

I recall as a student in the Illinois State Normal University, in 1890 that a part of our training consisted of demonstration lessons in elementary science. Each member of the senior class planned a series of lessons designed to teach children some fundamental scientific principles. These were taught to the class and afterward thoroughly discussed. It was an easy step from the ideas embodied in these lessons to the nature-study idea which we began to hear about a few years later.

The only complete course in nature-study belonging to those early years that I was able to find was Wilber Jackman's Outline published in book form in 1891. However, I came across reference to a number of others all of which planned to introduce some form of nature-study into certain schools of Minnesota, Massachusetts, New Jersey, and Pennsylvania. Jackman made no attempt in his outline to grade the work. He grouped his questions under the names of the common sciences then taught in high schools—zoology botany, physics, etc. He evidently expected teachers who used the outline to choose the material best fitted to their own schools and classes.

It is of interest to note how early schoolmen began to recognize the fact that a new subject had appeared upon the threshold of the

elementary school. At the National Educational Association in 1893 Superintendent Albert Marble of Worcester, Mass., in discussing the topic, "What should be added to the course of study in the elementary school," said, "There are various branches that should be added but should not displace the essentials already named—that is, reading, writing, arithmetic, geography, etc.—These are embraced under the general term nature-study, physics, or forces. They should be taught objectively from the overflowing abundance of the teacher's knowledge. In this way they may supplement and vivify the essential branches."

In 1894 Charles B. Scott in the department of the elementary school in the N. E. A. makes an appeal for the laboratory method in the grades and states that the new subject, nature-study, furnishes the best basis for this kind of teaching.

In 1895 Prof. Jackman states that in many schools nature-study holds at least a tentative place in the course of study for primary and grammar grades.

During the next five or six years a wave of enthusiasm for the subject spread over the entire country. Superintendents and principals in both city and village schools were eager to give it a trial. The teachers, however, as a rule were not so ardent. The large majority of them had scarcely heard of the subject they were asked to teach. Only a few of them had caught a vision of the possibilities that it held for the education of children. They were therefore unable to handle it with any degree of satisfaction either to themselves or their patrons. They tried to do something but in many cases what they did was far from nature-study. Those that had had training in zoology and botany taught these subjects in diluted form. Insects, crayfish and other animals were dissected and minute details of structure studied. Meaningless collections were made. I remember a teacher of the third grade showed me with great pride a collection of butterflies that one of the children had made. The children of her room had been carrying on a contest to see who could catch the most butterflies. The collection that the teacher showed me belonged to the winner in the contest. I remember he had as many as five or six individuals of the same species. There had been no study of the interesting insects. It was simply a slaughter of the innocents due to misdirected energy. The worst example of the collection craze of the time came to my knowledge a few years later. A country teacher in her zeal to do

something with nature-study set her pupils to collecting all the different kinds of birds' eggs they could find. There was wholesale school-legalized robbing of birds' nests in that region for several years following.

Besides this kind of deplorable teaching much of the class work was stupid and uninteresting. I visited a room while the teacher was giving a lesson on the dandelion. This was in 1903. She stood by her desk in front of the room full of children. In her hand she held one little flowering head of a dandelion. She asked questions about it which the children were supposed to answer from observation. They made a few guesses which she accepted or rejected, then she told them a few facts and the nature-study lesson was done. The yard outside was full of dandelion plants in blossom which held a world of interest to those children had the teacher known how to use them. In most cases superintendents and principals were quite as helpless in dealing with this new situation as were the teachers upon whom they had thrust the burden. The result was that in many localities nature-study was branded as a fad and dropped from the curriculum as a useless waste of pupils' time.

This is, I am glad to say, the dark side of the picture. In many schools real nature-study was taught from the first. Teachers became learners with their children and little by little the leaven spread. One teacher in a system naturally adapted to the work often became indirectly a teacher not only of her children but of her fellow workers as well. She helped all of them to choose suitable material found in the vicinity of the school. She, a real student of nature, conducted field trips for teachers as well as pupils. She suggested how the material collected could be used in the classroom. If every school system could have had then, or could have now, one of these enthusiastic naturalists the causes of nature-study would advance much more rapidly than it has done.

About this time, that is, in the later part of the nineties and early in 1900, the leaders in nature-study realizing something of the difficulties under which teachers were laboring began to publish graded courses of study, with suggestions for teaching, and outline lessons for the different grades.

These appeared almost simultaneously in different parts of the country. One of the earliest was *A Manual* of nature-study with supplementary readers written by Mrs. Lucy Wilson of the Phila-

delphia Normal School. Another was, *Handbook of Nature Study* by Dr. Lange of Minnesota. These early studies were characterized by an over abundance of technical terms and the method of college science. To illustrate: In the second grade children were taught the names of all the organs of a flower. In the third grade a detailed study of composites was made with all the technical terms. Among the best of the early courses and outlines were the Cornell nature-study leaflets which emphasized from the first the necessity of "positive, direct, discrimination, accurate observation and of understanding why the thing is so, or what it means."

In 1902 Hodge's *Nature-Study and Life* appeared; a little later Holtz *Nature-Study*, then Mrs. Comstock's *Handbook*, and a number of others. In fact from this time there has been almost a deluge of courses, outlines, and helpful books, and they are still coming.

From 1905 to 1915 saw the incorporation of nature-study outlines in the Courses of Study of almost every state in the union. I made quite a detailed study of a large number of these courses about eight years ago choosing them to represent different geographical regions, the East, South, Middle West, Northwest, and Pacific States. The most significant thing that this survey revealed was the similarity of the courses not only in material suggested but in aim and method. I quote a few of the aims:

"The primary object of nature-study is to train and cultivate the interest of the child in natural objects and to develop an intelligent appreciation of the things in nature." "The first reason for the incorporation of nature-study is to widen children's intelligent interest in nature objects and processes; the second to train the children in a scientific attitude of mind." "It, nature-study, should train children to investigate carefully and to make clear, truthful statements." In short, not to multiply quotation the aim and purpose given in composite was: To bring children into intelligent, sympathetic touch with their environment and to train them in a scientific attitude of mind toward objects and phenomena in daily life.

All of the courses choose material found in the vicinity of the school and home. This was carefully graded making a progressive study beginning with the first and continuing thru the eight grades. Biological studies received greatest emphasis in all the courses. And of this material more time and space was devoted to plants

than to animals. Most of them included some topics in physics and chemistry and all of them suggested weather and sky observations. In the upper grades there was in all a decided agricultural trend.

All, so far as could be determined from the outlines and the prefatory notes advocated the nature-study method of attack. A few quotations chosen at random substantiates this statement. "The teacher should bear in mind that the pupils in this work are discoverers and should place them in such relation to the subject as to make their investigation profitable." "The teacher must have a strong conviction that nature-study, if it fulfills its mission, must bring children into actual touch with real things." "Progress and results will depend, not so much on the topics as on the method of presentation and treatment." "The best teaching consists of the minimum of instruction by the teacher and the maximum of study and inference by the pupils." "The course presupposes that the work in the schools will be real nature-study; the children will handle and observe real objects, will perform experiments, will work with their hands and think while they work."

All of the courses recommended the correlation of nature-study with other school subjects. Emphasis was placed upon the correlation with language. Geography stood second. In fact a number of courses had attempted to outline these two studies together. In every case, however, after two years' work the course practically dropped nature-study and taught pure geography. The reason for this is not far to seek. The first studies in the best geography teaching is what is called home geography, a large part of which is simply nature-study under another name. Other subjects for correlation were hand work, and reading, with a few suggesting history and arithmetic.

No radical changes have been made in the course during the past five years. They have, however, been repeatedly revised, or rather they are in a continuous state of revision. Some topics are shifted from one grade to another. Some are dropped altogether, some additional ones are inserted, especially is this true in teachers colleges and normal schools where opportunity to test the work with classes of children in training schools is possible.

All this means that the leaders are giving more and more attention to the psychology of the subject. They are trying to adapt

the studies both as regards material and method to the special needs of children in the various stages of their development.

In the lower grades especially but to considerable extent in all the classes a greater use of the muscular activity of the children is employed. This has its manifestation in some places in a greater amount of time given to the care of plants and animals at school and at home. In the other places certain studies reach their climax in a definite piece of hand work in which the children take the initiative, plan the work, meet problems and solve them, in short, express their ideas in a concrete tangible piece of work.

The larger use of the home gardens is another phase of the work that has made rapid progress the last few years. No doubt the war gave an impetus toward increasing the number of children's gardens. But they would have increased any way, because of the greater interest on the part of nature-study leaders. Twenty years ago the courses where gardens were mentioned at all advocated the school garden. Now individual gardens at home are recommended wherever this is possible. The school garden in many places has become a sort of laboratory where the pupils study the underlying principles and the art of gardening which they put into practice at home.

The term "nature-study project" is coming into use in many localities to designate nature-study exercises of various kinds, as garden projects, poultry, rabbit, etc. This is without question due to the use of the term by the advocates and teachers of general science. The project itself may have been used by nature-study teachers for years simply as nature-study lessons and exercises. Now some of the general science people are suggesting precisely the same thing under a new title, and acting as if the whole thing had been thought of for the first time. It is a question whether or not the term may not become as prevalent in nature-study circles as it is in general science.

Indeed, I find that a well planned series of nature-study lessons with the accompanying field and hand work mean much more to school superintendents if it is called a project instead of a nature-study lesson. So much is there in a name.

Another noticeable addition is health study, hygiene and sanitation. Eight years ago only three of the courses studied included hygiene in their outlines. Now a large number recognize that this must be considered a part of the nature-study program. In the

best courses it takes largely the form of habit forming projects with inspection, health records, surveys and the like. In short, it is the nature-study method applied to this subject. The old sort of recitation physiology is fast disappearing.

In our own school in the lower grades we are giving one day each to the discussion of health topics and a few minutes every day to habit forming reports, inspection, games, etc.

In our seventh and eighth grades we are for the first time endeavoring thru experiment to give the children a simple scientific background for their work in physiology and hygiene.

In some courses this kind of work is designated as civic nature-study, by others as community sanitation. Some of the practical suggestions are "clean up day," "street surveys," "back yard inspection, fly and mosquito campaigns."

In the field of physical science also the more recent courses are attempting to plan the work more in line with child life and interests. A wider use of toys, playground apparatus and home and school equipment are suggested. Probably one of the best illustrations of the use of toys is found in the outline used in the school of education in the University of Chicago and in Dr. Downing's *Laboratory Guide in Physical Nature-Study*.

In the use of games and playground apparatus the course by Gilbert Trafton used in the Mankato Normal School gives a number of suggestions for the various grades.

The Illinois State Course revised two years ago contains suggestions for the use of home and school equipment.

Some other rather interesting variations in method are found in a few courses.

In St. Louis, for example, there are not the large number of topics for the different grades found in other courses. Instead one or two main subjects are chosen which are studied much more in detail than in other places. For example the work of the sixth grade for the entire year is based upon sky study, stars, constellations, moon, sun, planets, with the last part of the year given to a detailed study of light, natural, artificial, reflection, refraction, etc. A statement at the head of the course says that this new plan is to be thoroughly tested by principals and teachers before issued in permanent form. It is an interesting experiment. The question, of course, that must eventually be settled, or settled as nearly as maybe, is which is more educational, which will leave the children more independent,

more self reliant better able to meet the problems of daily life more appreciative of their nature environment, a study of a number of different topics, or a few main topics worked out with greater care.

In the last state course of Colorado which came out two years ago, called a war-modified course of study, nature-study as such is omitted. However the language and drawing both suggest nature-study material for study and discussion for the primary grades. Humane education has much good nature-study material.

From this very incomplete survey of the courses the following summary may be given:

1. The earliest outlines and courses were largely in the form of questions. Few of them made any attempt to grade the work. Most of them were over technical for children.

2. The period from about 1897 to 1905 brought out a large number of graded courses with many helpful books, outlines, and suggestions for teaching.

3. The ten years from 1905 to 1915 saw nature-study outlines in most of the state courses and in a large number of city systems. The courses were in the main uniform both in the matter of material used and the method of attack.

4. The last five years has been a period of sifting and shifting, of revising and testing in the light of child study which has resulted in a better adaptation of the material and method to the needs of developing children.

Professor L. H. Bailey with his wife and daughter are in Venezuela this winter. Professor Bailey and Miss Ethel are making botanical excursions into the interior which will undoubtedly result in giving to the world of Science many interesting, new facts.

A Survey of Twenty Years' Progress in Nature Study in Providing Materials for Study

ELLEN EDDY SHAW

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The subject assigned to me shows the real measure of progress in nature-study during these past twenty years. This twenty year epoch, in my own case, happens to be just the length of time I have been teaching nature-study, and from my own experience and that of others associated with me, I shall draw my illustrations.

The progress made in providing materials for study lies first along the lines of choice in materials, and second, in the use of these materials after they have been chosen. Perhaps we might go so far as to say that our progress has been one of wisdom, common sense, and everyday application. I can remember with what zeal I started out in this field, a zeal, not lessened, but harnessed, at the present time. I can remember how wise leaders in this field, some of them at least, said it really did not matter at all what you taught in nature-study, but any subjects and any materials that awake and evoke interest were just as good as any other ones. That I can scarcely believe to be true since well-organized work must bring with it far better results than any haphazard work.

Let us go back to the two points in progress; one, choice of material and the other, application or use of such material after it is chosen. For one illustration I should like to go to the east-side of the City of New York, and mention a lesson on birds given twenty years ago, and a lesson given to-day. The material provided for this lesson of twenty years ago was one dilapidated bird. The class was asked to name the bird. They sat there gazing at the old bird, but not much enthused. After several repetitions of the question by the teacher one child raised his hand and answered, "It was a crow last year." This story speaks for itself. Evidently the poor bird had been worked to the limits in that school and possibly had appeared under different names in different grades. This is an extreme example of the most perfunctory type of nature-study. The prescribed lesson was taught without any doubt; the bird's beak, feathers, and tail were all tabulated and discussed. The subject was covered. The period was over and the work was done. The same school at this time is sending its classes with their little notebooks and pencils up to the Natural History Museum to see

the birds just as they have been placed in that great museum to show their natural habitat. These children are provided with a series of questions about the birds, so that they may go from case to case looking, discussing and inspecting. A similar class is seen in the classroom with bird pictures or bird riddles or going to the little neighborhood park to watch the sparrows and to study the habits of these bothersome little creatures. The difference in these two lessons, the bird lesson of yesterday, and the bird lesson of today, is significant in that in one case any available material was used and a perfunctory lesson was taught; while in the other case, a live lesson was taught, the interest of the children was awakened and they became acquainted with nature at the great museum; a real civic lesson entered in here, a lesson especially needed in these days for all of our children. One such trip a term, to the Natural History Museum, the library, the Children's Museum or the Botanic Garden, is better far than a whole series of perfunctory classroom exercises. Such lessons as these visits represent, are, of course, far more valuable if, after returning to class the work is followed up as it is in many cases, and even if it is not, such a lesson has gone toward the broadening and uplift of these children.

Another nature lesson given in the same city some years ago was a plant lesson presented to 40 or 50 children with one little specimen in the teacher's hand held up for classroom inspection and yet how impossible it was to inspect or see a bit of that specimen if one sat in the back of the room! A similar lesson two years ago, in a school in the same neighborhood on the lower east-side shows the children on the roof hovering about boxes, and pails and pans, in which vessels, seeds have been planted and living plants are forcing their way up. What keen interest and delight shown by these children, how many lessons worked out from just this one center of interest! We might stop here to ask "How is it possible to avoid the first type of lesson, how is one going to be able to gather a great deal of nature-study material for city schools?" It is not always possible but if a few specimens have been brought in by children and teachers, such materials could be arranged as I have seen them many times on a side table in the room. By each twig, or branch, or fruit, or flower-pot is a definite inscription telling something about the specimen, and in odd moments before or after school, when a child has finished his work he may go to that nature-study table and become acquainted with those things. In general, I think

these two or three illustrations are rather typical of the change in the materials provided yesterday and today in nature-study.

This does not mean that there was not much excellent and inspirational work done yesterday, nor does it mean that some teachers were not giving exactly the same practical work that is being given today, but on the whole the work of yesterday was far less well thought out, and far less well applied to the everyday life of the child. I remember a very wonderful piece of work carried on in a rural community about thirteen years ago. Some of you here know Miss Faddis and her work. We happened to be teaching nature-study together in the same New York State Normal School. One of the grades Miss Faddis was working with, was the fifth grade. They were doing some spring work in nature-study and instead of doing a few exercises in the classroom on birds and letting it go at that, Miss Faddis inspired those children to collect birds' nests of different types, nests that were deserted and no longer used. Just this last winter I happened to see in New York one of the boys who was in that class and he said, "I shall never forget that work; it will always live with me. We fellows scoured the countryside for miles around to get the specimens." Such work as that is of no epoch and of no period. Miss Faddis would have taught that kind of work twenty years ago, ten years ago, or now. Any person who has common sense must know that nature-study is not a matter of classroom exercises, of perfunctory work, of sentimental slush, but it is a part of one's daily life, and should be inspiring, thought-evoking, and having to do with the real life of all of us, just as the birds, trips to the museums, planting of real gardens on top of a roof, are all things which do not today belong in the life of any person, any group, any class, but in the life of all people. So, for the first point which I have so sketchily covered, the thought in my own mind is that materials chosen for nature-study work today seem for the most part to be those which have more to do with definite living, and are far better arranged; that we are not taking any old material because it happens to be convenient, but that we are reaching out, and making the right materials serve the right purpose, choosing real centers of interest, working from them and making everyday applications to our everyday lives.

In my second point, the use of these materials, we have advanced as well as in the first point. Very, very few of us who are working in this line are willing to put in energy upon materials which are not going to measure up to some definite results. A new course of

study has just been made out for the City of New York. If you were to read over the old course of study and then compare it with this new one, you would be much interested in the materials chosen for work in the old schedule and the applications made. In the old course, it is suggested in one place, and in fact this is the sort of suggestion running through the entire course, that in a certain grade in the school every child should be provided with a specimen of blossoming arbutus. It was determined by one specialist that if all the little second grades in the city were provided with individual specimens of arbutus all the arbutus plants anywhere near the City of New York would be put to use. That was not even a sensible suggestion of materials to be used, but in the present course of study it suggests that teachers use any everyday kind of material of the section in which the children live. If we have children from the outside sections, and we have many such sections, the new course suggests using the common materials nature herself provides; in a pushcart section, using the fruits the children see and are familiar with on the pushcarts and make these the center of interest. How much one might unfold to children with just these common everyday things! Think of the plebian onion consumed in such quantities! Think how far back its history runs—back even to the time of the pyramids. Think of the foreign relationship that fruits and vegetables present. Imagine the fascinating tales one might unfold if he were willing to put a little time and thought on just this type of nature-study. We hear a great deal in these days about selection of subjects for project work. There is nothing new in these twenty years of work in the idea of projects and hobbies. Good teachers of twenty years ago were giving children special pieces of work to study, to hunt up, to describe, and to experiment over at home and abroad. The fine and understanding teacher always exists. The use of material by a teacher in her work is the third degree which reveals the type of work that teacher expects to do, the type of person she is, and the results she is bound to obtain. Much of our best study of today is presented in the form of problems of some kind, class problems, groups problems, and personal problems so that these become part of a child's thought and consideration for some length of time. For instance, we may teach a lesson on trees, shall it be for example, a lesson in evergreens? Where does it lead us? Shall we just learn to recognize those evergreens which are available or shall we go further and make our blue-prints, mount them, and have the children talk

about them, making this a lesson in written and oral English? As we go farther up in school, shall we not add to this lesson an interesting little stunt of making a key or plan by which a Boy or Girl Scout may easily recognize any of these trees as it comes to them in the park or in the woods? We can even go a step farther and learn the difference between the hard and soft woods; study the fruiting parts of these trees; understand why the term conifer is better to use in this great group than evergreen; read some of the interesting stories about Christmas trees and be ready to tell them in the assembly to the children of the lower grades. Think of all the provocative elements existing in such a subject! To teach a subject in nature-study, drop it, and go on to teach another has always seemed to me, even in the beginning of my experience, a most futile plan. The idea of life, which we are trying to give boys and girls in all subjects we teach, is not a series of jerks, but ought to be a continuous, vital, real matter, and so our nature-study should tie closely not only with life, but with the life of our other subjects in the classroom.

So it would seem that in using nature materials in the course of study today we are giving special heed to the application of such materials, both to the life of the child and to the rest of the course of study, choosing not only such materials as build up a complete, comprehensive and continuous course of study, as we did yesterday, but choosing live centers of interest, making those a real part of the rest of the course of study. Great progress has been made in this line.

Finally, in summing up the progress of the past twenty years, it seems to me that we have progressed as a body or as a group of people from a state of very scattered and diffused interests touching the high points as we have happened to; to a state where materials used are far more practical and of greater life interest than ever selected before. Our field of work has not changed. The materials we are using today were always with us, but more of us today are willing to teach things as they are, and more of us are using those materials which make children think, which apply more definitely to their everyday life and also to the life we trust they are going to live as good appreciative citizens, to support their parks, their museums, their homes, and if possible their own little estates.

"The one or two who hold Earth's coin of less account than fairy gold.
Their treasure not the spoil of crowns and kings
But the dim beauty at the heart of things."

A Survey of Twenty Years' Progress in Measuring Results in Nature-Study

By Dr. ELLIOT R. DOWNING
The University of Chicago

The Revised Range of Information Test in Science

Please put an E beside words and phrases (on the list below) that you can explain or define, an F beside those you have heard or read about, the meaning of which is not clear, and an N beside those that are new. Explain or define the first five you mark with an E, on the back of this sheet.

No. Mark Here.	No. Mark Here.
1 Adaptation	26 Inoculation
2 Atom	27 Instinct
3 Buoyancy	28 Law of gravitation
4 Candle power	29 Law of the lever
5 Center of gravity	30 Law of the pulley
6 Comet	31 Migration
7 Conduction	32 Molecule
8 Conservation of energy	33 Momentum
9 Dew point	34 Natural selection
10 Disease organisms	35 Nitrifying bacteria
11 Drowned valley	36 Orbit of the moon
12 Eclipse	37 Osmosis
13 Electrical resistance	38 Oxidation
14 Electro-magnet	39 Photosynthesis
15 Enzyme	40 Parasitism
16 Erosion	41 Plant or animal cell
17 Equinox	42 Precipitate
18 Evolution	43 Reversion
19 Family tree	44 Sedimentation
20 Fertility of soil	45 Solar system
21 Fertilization of egg	46 Specific heat
22 Flood plain	47 Sterilization
23 Fossil	48 The ice age
24 Gas diffusion	49 Toxin
25 Heat expansion	50 Variation

*Copies of the revised test can be obtained from the author, The University of Chicago, The School of Education, for \$.40 per hundred.

Water is absorbed by the plant from the soil largely by means of the root..... The water is brought up from the deeper layers of the soil by much as oil is brought up to the flame by the lamp wick. The the spaces between the soil particles the more readily is the water brought up. Evaporation goes on rapidly if the surface layer of soil is, slowly if it is For this reason in part the garden is so as to prevent excessive In wet seasons it would be unwise to do this for if the surface layer is rain will easily the soil and would also be checked.

It has been shown that pollination produces more and better seed than self pollination in flowers. Pollen is carried from flower to flower either by or by Flowers of the former sort are called anemophilous of the latter Willows and grasses have their pollen carried largely by and the pollen is produced in great Flowers that depend on to carry their pollen usually have pleasing bright and secrete to attract the Their form and structure are often to the structure of some one sort of Thus flowers with deep tubular corollas are visited by that have a very long to enable them to reach the

An animal breathes (Check the best reason given).

1. Because the blood contains impurities that must be eliminated.
2. In order to get oxygen to the working cells so it may be combined with their substance to generate work power and in order to remove the wastes.
3. To keep the lungs healthy.
4. To destroy disease germs.
5. So the animal will have air enough to make noises that are characteristic of each species, like the song of a bird, the moo of a cow.

A person should wash his hands before each meal because (Check the best reason):

1. It is not polite to come to the table with dirty hands.
2. It helps the grocer to sell his soap.
3. The skin is not healthy unless it is washed often.
4. Disease germs might get from your hands onto your food.

5. Dirty hands show you do not belong to the refined class of people.

Milk is heated to 170° F. (pasteurized) before it is delivered to city customers (Check the best reason).

1. To kill the germs of disease that may be in it.
2. Because it is more easily digested when it is so heated.
3. To make the cream rise to the top more readily.
4. To help keep the bottles clean.
5. Because it tastes better if it is warmed before you drink it.

Check each of the following statements which relates an adjustment of an organism to its environment.

1. The cricket makes his chirping call-note by rubbing his wings together. A tooth on one wing scraping across a series of ridges on the other produces sound somewhat as it is made when you draw your finger nail over the tooth of a comb.

2. The dragonfly or snake doctor is more appropriately called the mosquito hawk for it captures mosquitoes and gnats and eats them on the wing. So you find it usually about swamps and ponds where such insects are abundant.

3. The dandelion flower cluster closes in wet weather and snuggles down to the ground but opens again when the sun shines.

4. During the recent war nearly a quarter of our entire supply of walnut trees was cut to furnish wood for aeroplane propellers and rifle stocks. Walnut is strong, does not readily splinter and works well under cutting tools.

5. Woodchuck digs himself a hole and after stuffing his baggy hide until it can hold no more of fat he crawls down a few feet in it through the winter to a comfortable temperature more equiable than bobolink finds in his southern home reached by hundreds of miles of weary travel.

Two hectograph plates, which were not engravable were also used by Dr. Downing. One with two boys upon a see-saw teeter with the inscription: "The boys find the teeter will not work—one end stays down. Can you tell how to fix it, so it will work and why?" The other a plate with outlines of leaves of elm, tulip, oak and poplar for identification.

EDITOR.

A Survey of Twenty Years' Progress in Nature Study (E) in Extension Work*

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In order to present the progress of nature-study during the past twenty years as evidenced in extension work, it is necessary to review slightly the situation at the beginning of this period and determine, tentatively at least, the relationship of nature-study and extension work.

Nature-study is the acquiring of an understanding of the natural elements and creatures composing the environment of which we are a part. As compared with the natural sciences, it is a gentle approach through the foreground to the ultimate fact, rather than the fact itself, or the science, exact or applied. It is the use of our natural environment for developing in ourselves the ability to observe, to analyze, to correlate objects and ideas, to notice how other creatures adapt themselves to their environment and to adapt ourselves more readily.

Nature-study seems to have been developed for the purpose of rebuilding agriculture. It was taken up with remarkable promptness, aided by Audubon Societies, Junior Naturalist Clubs, and school garden classes. Nature-study underlies each of these related interests and is, in large measure, a preparation for the study of agriculture in later years. It has its greatest value when it is taught at the earliest ages and throughout the grades. It serves the dual purpose of reaching the parents as well as the child, and the value of the accomplishment of the second purpose is not much less, if any, than that of the first, in the case of the rural community.

The story is told of a certain farmer who discovered his son catching beetles, and asked why he was doing it. The boy replied that his teacher wanted them to illustrate talks to the pupils on habits of insects, their ravages, methods of repression, etc. The farmer forbade his son catching any more "bugs," but could not help noticing that the little fellow continued his interest in them. He finally exacted a promise from the teacher not to take his son's time from books "to fool around with bugs and worms and millers." Not long afterwards, the son let fall a remark in his father's hearing

*Published by permission of the Secretary of Agriculture.

about some noxious insect, which showed him to be in possession of information of value to the farmer. The father's interest was thus aroused and the ban against nature-study was removed. He was frequently seen in company with his son collecting, and later on presented the school with a valuable collection of insects properly mounted. He had come to see that nature-study has a direct relation to the improvement of agriculture.

A normal school in New England included in its curriculum, about 1916, nature-study and school gardening, but did not include agriculture. It gave the students thorough and practical instruction in plant production, from selecting the seed to harvesting and marketing the crop, and in banking the proceeds and checking out the money to pay expenses. In this case, nature-study was actually applied agriculture, typical of extension work.

Extension work is advanced nature-study work, limited to applied agriculture in its broadest sense, including home and community health and sanitation. It is conducted by the agricultural colleges and experiment stations, in cooperation with the Bureaus of Soils, Markets, Animal Industry, Plant Industry and Entomology, the States Relations Service and Office of Farm Management of the United States Department of Agriculture, and with county courts and local organizations, or some of these agencies, depending upon the project.

The Illinois Farmers' Institute started extension work in 1901, when its director sent out packages of seed corn to as many boys under 18 years of age as would agree to enter the corn growing contest. Each boy was instructed how to plant and was required to keep a record of the crop and report to the Institute on seventeen specified points, and exhibit ten ears. The ten ears exhibited were to be judged by a prescribed scoring schedule and by persons known to be skilled in judging corn. This effort was unsuccessful, but the following year 500 boys applied for admission to the contest and the boys, together with 500 farmers, came to the Institute meeting at which the corn was exhibited and judged. The following year 1,500 boys entered the contest and 300 boys and 1,500 farmers attended the Institute. In 1904, 120,000 farmer boys of Illinois were invited to enroll for the corn growing contest and 8,000 applied for admission and seed. Over 1,000 entries of ten ears each were submitted and placed on exhibit in the Palace of Agriculture at the St. Louis Exposition. The corn was of excellent quality and quite

uniform in appearance and measurement. The prizes ranged from 50 cents to \$500, and 1,250 exhibits received awards. Extension work in Illinois at this time included boys' clubs for the study of corn growing, corn judging, live stock, vegetable exhibits, local crops, variety tests of sugar beets and visits to agricultural institutions in other states.

About 1902 the Ohio boys club was started by the superintendent of schools, and had an enrollment of 700 boys in 1904.

About 1903 the Texas boys' and girls' club was started. It had an enrollment of over 1,200 by the end of 1904.

Iowa boys' clubs were started by the superintendent of schools in March, 1904, and an enrollment of 335 was reached by the end of the year. Boys' clubs had been started in New York and in Indiana at an earlier date.

Soon after boys' clubs were started by the Illinois Farmers' Institute, similar clubs were organized in certain Southern States, notably Georgia, Mississippi, Louisiana, and Texas.* This movement had grown up and died down before the Farmers' Cooperative Demonstration Work began to attract national attention. This Demonstration Work in the South commenced in 1904. A few bright boy farmers asked to be enrolled in demonstration work along with the men. During the year 1908, boys' club work was extended into several counties and states. At the beginning of 1909, a systematic effort was made by the Department of Agriculture to place boys' clubs on a standardized, uniform acre-basis in all the states where the farm demonstration work was being conducted, which included every Southern State from Virginia to Texas. During the year, 10,543 boys were enrolled, and during 1910, 46,225 boys. Prize trips to Washington were offered by nearly all the Southern States in 1910.

Each boy was required to grow an acre of corn in his demonstration, and the basis for judging was as follows:

Yield	30 per cent.
Showing of Profit	30 per cent.
History of Crop	20 per cent.
Ten Ear Exhibit	20 per cent.

Many of these boys produced over 200 bushels of corn per acre. One boy in Mississippi produced 227 $\frac{1}{8}$ bushels at a cost of 14 cents

*The writer desires to express his thanks to Drs. A. C. True and C. B. Smith and Messrs. J. A. Evans and O. B. Martin, of the States Relations Service for supplying data and correcting manuscript pertaining to their work.

per bushel. Another produced 221.2 bushels at a cost of 16 cents per bushel, alongside of a field producing 40 bushels per acre. One boy in Alabama produced 212.5 bushels at 8.6 cents per bushel, and another, 224.75 bushels at 19.8 cents per bushel. The plan is to instruct, to direct, to guide and to train each boy, and involves the cooperation of school officers, teachers and agents of the Department of Agriculture. The making of a crop economically and successfully is stressed, and particular inspiration is afforded the leaders and the boys when yields perhaps the greatest ever produced, are secured at the low costs of 8.6 and 14.2 cents per bushel.

In South Carolina in 1909, one boy raised 152.5 bushels of corn on one acre, while the state average was less than 16 bushels.

The Farmers' Cooperative Demonstration Work was developed in 1910 to include girls' clubs. That year girls' clubs were organized in South Carolina and Virginia in connection with boys' corn clubs, and 325 enrolled. The girls were started on one-tenth acre gardens, specializing on tomatoes, but including some snap beans and cucumbers. The objects of the girls' demonstration work was to stimulate interest and wholesome cooperation in the home, to earn money and get the education and view point necessary for the ideal farm-life, to encourage the production of better food at lower cost and conserve the surplus products, and to furnish earnest teachers with a plan for aiding their pupils and their communities.

In 1911, more than 3,000 girls, representing eight states, joined the clubs. Many of them put up more than 500 quarts of tomatoes from their crops, besides ketchups, pickles and preserves. A few put up nearly a thousand quarts each.

The girls' clubs began by specializing on a single crop, tomatoes, then including beans and cucumbers, then other vegetables and fruits, progressing upward through meat, bread, milk products and into home demonstration work. The first girls' canning club was organized in Aiken County, South Carolina.

In 1915, the enrollment of boys and girls, both north and south, was 250,000.

In 1916, home demonstration work, which began with girls' canning clubs, had been taken up in 420 counties. The girls' clubs in one county in Alabama put up in the four years ending in 1916, 172,555 cans, valued at \$29,400.

Extension work was greatly forwarded by the passage of the Smith-Lever act, May 8, 1914, which specifies that cooperative

extension work shall consist of the giving of instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in the agricultural and mechanical colleges in the several communities, and imparting to such persons information on said subjects through field demonstrations, publications, and otherwise. The three greatest claimable appropriations under this act for the year ending June 30, 1920, were: Pennsylvania, \$169,722.91; Texas, \$165,868.55; Illinois, \$123,889.52.

The Vocational Training act, which passed February 23, 1917, appropriated a maximum sum of \$1,000,000 for 1920. This act provides for teachers of agriculture, trades, industry and home economics.

Cooperative extension work in agriculture and home economics is divided between the South, consisting of Delaware, Maryland, West Virginia, Kentucky, Arkansas, Oklahoma, Texas and the States south of these, and the North and West, consisting of the remaining states.

The chief lines of activity of the extension work are represented by the county agent, the home economics agent and the boys' and girls' club agent. A banker of central New York said that "within three years after the Smith-Lever act went into force, their county agent had done more for the farmers of that county than the entire Department of Agriculture and the state agricultural colleges had done for them during the fifty years preceding." This expresses the appreciation of extension work felt in counties which have entered into the spirit of improved agriculture and of cooperation.

From its beginning in 1862, the Department of Agriculture has been amassing a tremendous volume of information from its many contacts with agriculture and has dispensed its information freely through its central outlets and through the experiment stations. To such extent as the information was used by farmers, stock raisers, fruit growers and others, they profitted. The difficulty has been in the failure of the farmer to assimilate the information. Having had none of the advantages of nature-study or elementary agriculture in childhood, he grew to depend upon his personal experience almost to the exclusion of all other information. An extreme type is represented in the story of the farmer answering a county agent with the self exposing assertion that "I've run through three farms, and I know. You can't tell me anything about farming."

The county agent, the home economics agent, and the boys' and girls' club agent are excellent means for carrying the wealth of information of the Department of Agriculture to the farmers' entire family. There are many instances in which even these agents cannot impart the information they have at hand to the people most needing it. As they have recourse to the child, the child in such cases becomes the carrier. Instead of teaching nature-study as such, they call the children together and show them a plan whereby they can work together on any one of many boys' and girls' club projects.

Children have faith in teachers and other persons who appear to have information, and generally are very glad to start a project. The follow-up system of instruction by letters from the colleges and by visits from the county agents, coupled with the wholesome spirit of competition with the other boys and girls in the clubs is rewarded with completion of project and of report by a third or more of the enrollment and the knowledge that the instructions have favorably influenced probably all the enrollment and some parents or neighbors of each one. Where precepts fail with the elders, the children are most useful in their example, the successful results of which so often put to shame the indifferent results obtained by the elders.

A case is reported from the southwest in which one of the corn club boys produced 45 bushels of corn on one acre and showed a good report on his work. His case was specially considered because he had such a small yield. The father explained that he knew the boy would not do any good in the project, so he let him use a corner that never was any good. When asked what the yield was on the better part of the farm, the father acknowledged that he produced only 20 bushels per acre!

In eastern Indiana, in 1915, a certain small boy in knee breeches piloted the writer to a tract of land reported to be infested with insects, a part of which land belonged to his father. This boy was in the boys' corn-growing contest and two years in succession had won a week's free trip to Washington, D. C., each time with a purse of \$50 in cash. The lad tendered the second trip to the next boy in the contest. These contests called for the growing of five acres of corn, one measured acre of which was chosen for the judges, the whole procedure being under the observation of the county agent. The first year this lad produced 119 bushels of corn to the acre, the second year, 126 bushels. The prospects were very fair that he would win the third year. The father used no fertilizer

and would allow his boy no advantage over himself, excepting in choice of locality.

The neighboring farmers, in discussing community affairs at the village grocery, became vexed at the idea of this boy winning twice in the contest, assuming that there was unfairness or favoritism. One farmer whose house was just across the road from the lad's field the second year remained silent until the discussion stirred him to speak in defense of the boy. He said, "I do not know how the judging is done, but I know that when I got up in the mornings, he was already at work cultivating that corn. When I quit work in the evenings, I sat on my porch and read my paper for a couple of hours by sunlight and he continued working that corn till dark. I laid my corn by after working it three times. He worked his eight times. Our land is the same. I know how he got his 126 bushels and how I got my 40."

These illustrations show that the boys' work goes home to the men. Here is an illustration where a man's example failed to go home to his neighbors. In Ohio, the writer found a farmer who was successful to a marked degree on land appearing to be identical to the land surrounding him. The crops around him compared very unfavorably with his. This farmer plowed his land about eight inches deep, his neighbors about four inches. They asked him how he was able to raise such crops, and he explained. It was too simple. They could not believe it. They regarded his answer as a subterfuge and himself too mean and selfish to deserve neighborly courtesies.

These illustrations are representative. Artificial barriers exist between the farmer and "the new fangled book-farming." The farmer deserves great credit for surmounting his difficulties as well as he has done. There are today numerous magnificent farmers to be found in every state. Doubtless all of them have profoundly influenced their communities for the better, and probably many of them have observed examples of hostile jealousy similar to that surrounding the Ohio farmer. These farmers who have greatly raised the standards of farming are all too few. They are, however, towers of strength for their county farm bureaus and their county agents, and will have increased companionship when the first generation of the extension work boys and girls assumes responsibility on their respective farms.

Extension work is done chiefly in county units. There are in the United States 2,936 counties. Eventually, 2,850 of these may

require the services of a county agent. In 1923, the Smith-Lever act will have reached its maximum appropriation, at which time it will be serving about 2,650 counties, the estimated number which may profitably employ county agents. When this act went into effect, 930 counties had agents. The present number having agents is 2,000. During the time this act has been in force the number of home demonstration agents has increased from 280 to nearly 800. About 250 counties have also employed a boys' and girls' club agent. Between July 1, 1917 and July 1, 1918, the number of counties with men agents increased from 1,435 to 2,435, and those with women agents from 537 to 1,715. The numbers represent about the high mark that would have been reached had the rate of increase experienced prior to the act of 1917 continued through these years.

The county farm bureau is an institution for the development of a county program of work in agriculture and home economics, and for cooperating with state and Government agencies in the development of profitable farm management and efficient and wholesome home and community life. It is a means by which farmers and their families express themselves concerning all matters pertaining to the advancement of agriculture, home and community life.

The projects carried in the extension work include dairy improvement, swine production, hog cholera control, food conservation, cooperative marketing, home gardens, poultry and many other projects of interest to the community.

The boys' and girls' club work includes home gardens, canning, butter-making, corn-growing, calf and pig clubs, sewing, own-your-own-room clubs, and numerous other projects.

Extension schools or short courses of three to five days are held as part of the extension work, usually coinciding with the leading projects carried by the Extension Division. In 1918, there were 691 county short courses for rural girls, attended by 26,000 girls, colored as well as white girls being reached, in the extension work, South.

Demonstrations afford a vital feature of the extension work, applicable to every person in the rural communities and throughout the list of projects. There are two types of demonstration. The first is conducted *by the person giving* the information, as exemplified by the county agent demonstrating seed corn selection, poultry culling, hog cholera control and tree spraying, and by the home demonstration agent showing methods for canning and drying foods and remodeling garments. The second type is conducted *by the*

person acquiring the information, as exemplified by the farmers' cooperative marketing organizations. In Prentiss County, Mississippi, no cooperative marketing was done prior to the fall of 1917. The county agent undertook a demonstration of this second type, driving an opening wedge when a number of farmers combined to make up one carload of corn for sale. The price received was about 25 cents per bushel above the local offering. The local price advanced immediately 25 cents per bushel. The cooperative shipments of corn were continued and a carload of hogs was tried cooperatively, with marked success. A strong organization has been perfected and a volume of \$250,000 reached in the last twelve months noted.

The results of the extension work are endless. A few summaries will suffice to indicate the material results. The food conserved in 1918 under the direction of the home demonstration agents of the South included 64,604,531 containers of fruits and vegetables, valued at \$15,566,456.15. A very large proportion of the vegetables canned were produced in home gardens and from the tenth-acre plats of the girl club members. Ten years ago, modern methods of canning were almost unknown in the South. In 1918, 855 community canneries were established. These same women and girls, directed by the home demonstration agents, put up 157,605 cans of meat and fish, valued at \$56,463.34. They dried 8,982,787 pounds of fruits and vegetables, valued at \$1,846,625.56. They established 131 community central drying plants. They pickled and brined about 1,006,222 gallons of vegetables, valued at \$382,806.73.

The boys' clubs of the south in 1918 enrolled 204,859 regular, and 202,671 emergency, members. The average production of corn in boys' clubs, in spite of an unfavorable season, was 37.58 bushels per acre, at a cost of 47.3 cents per bushel. Sixty-two boys produced more than 100 bushels per acre. Many boys cleared over \$100 each at raising live stock. Boys in the live stock clubs are taught to raise the crops necessary to feed the live stock, as a part of their club endeavor. The total value of the products of the boys' club work in the Southern States in 1918 is given at \$12,034,271.27.

The year's plan in the boys' and girls' work in the Northern and Western States in 1918 was especially directed to food production. The reports of 115,725 of the 243,406 garden project members show that the reporting members cared for 2,987,984 square rods of land and raised vegetables valued at \$1,693,520. Emergency club boys and girls produced vegetables valued at \$1,954,347. Of the 31,476

enrolled pig club members, 12,847 reporting produced 4,423,081 pounds of pork, valued at \$947,570. Baby beef club members reporting produced 589,123 pounds of beef, valued at \$106,231. Rabbit and chicken club members reporting, raised 26,322 rabbits and 331,072 chicks, and produced 133,566 dozen eggs. Boys' and girls' sheep and calf clubs raised 8,005 lambs and 2,474 calves, the latter for dairy purposes. In addition, club members produced 313,778 bushels of corn, 646,503 bushels of potatoes, 22,399 tons of sugar beets and 2,867 bushels of beans.

So much for the material benefits. A county school superintendent reported in 1915 that there were 4,000 members of the boys' pig club in school and not one was suspended or expelled. The club members averaged 11 per cent better than non-members in school work, except that they averaged 23 per cent better in composition and 16 per cent better in spelling. Church attendance was 5 per cent and Sunday school 7 per cent better among members than non-members.

Another student of the boys' club work states that club work makes for broadening of vision, awakening of spirit and building of character in the members and for spreading the basic virtues throughout the community.

County agents are observing and reporting the valuable leadership exercised in different communities by former members of boys' clubs who have become substantial leaders in their communities. The value of the club work as a means of solving problems in production, organization and marketing, and of crystalizing the thought of the future at an important and impressionable period of life can scarcely be overestimated.

Thus the extension work among children is accomplishing essentially the same excellent results that are found among the children who are so fortunate as to include nature-study with qualified teachers in their school work. If narrower than nature-study in its scope, extension work as we now see it has an advantage in the coordination of action and sympathy in the multitude of groups of the rural men and women of tomorrow, whose vocations and environments are similar.

The extension work among adults is accomplishing an intelligent unification of agricultural interest and purpose, with improved spirit and breadth of vision. It also affords us a strengthened guarantee that the necessities of life will continue to be produced in sufficient quantities for our entire citizenship, under wholesome and increasingly attractive home conditions.

Reaching and Training Rural Teachers

E. LAWRENCE PALMER

Cornell University

New Syllabus in Nature-Study, Humaneness and Elementary Agriculture, for
Rural Schools

A plan of study which may be followed in a system of schools in a city many times is not practical in a one room rural school. There are many reasons for this. Aside from the fact that the same material is not always easily available there is really no reason why a plan of study which can be put into practice in a rural school should not prove satisfactory in a city school system. For these reasons, it would seem best that any plan of study which is to be more or less uniformly followed throughout a state should keep the problems of the rural teacher in mind at all times. In the past, this practice has not always been observed and consequently suggestions which were intended to make the task of the rural teacher lighter have occasionally done the opposite by presenting problems which complicate rather than simplify the duties of that already sufficiently burdened teacher.

A rural school teacher's school consists of children of varied degrees of maturity and preparation. A city teacher's school consists of a selected group of children with a more or less uniform preparation. It is obviously, then, easier for the city teacher to plan and prepare the work of the school than for the rural teacher to do this. If the rural teacher can plan the work so that all of the pupils may be kept busy at the same time on a given subject so much the better. If but one preparation is necessary to care for the needs of eight different grades at once then the proposition is better yet. The present article is an attempt to so simplify and organize the sources of information available to rural teachers that nature-study may practically take care of itself.

An ideal nature-study lesson might be one based on anything of interest found on a trip or brought into school by any child. Few teachers could give a real lesson under the circumstances which would arise following a practice of this sort at the present time. With the help of this outline, this ideal may possibly be more nearly approached than has been convenient in the past.

One lesson gives us but a meager idea of the possibilities of any branch of learning and in order to best appreciate the subject in question we should approach it from many angles. For this reason

a bit of guidance in the selection of material will possibly produce better results than if we are allowed perpetually to follow our own inclinations. This idea of "guidance" is not new. Too frequently, however, it has been carried to such extremes that it has developed into "requirement." Requirements are often more or less odious and frequently seriously besmirch an otherwise interesting field of knowledge.

The requirement that we teach in nature-study five certain birds a year, for example, may make it easy for the teacher to dish out an allotted amount of information to the pupils without much difficulty. The fulfillment of this requirement too frequently leads to book study rather than nature-study. This same practice also has the disadvantage that nearly every bit of information which goes to the children must in some way come through the teacher. Teachers should find their work much easier if instead of trying to teach nature-study to the children, they let the children teach nature-study to themselves. With the leaflets which have been and will be published at hand this should not be difficult in the rural schools of New York State.

It has been brought to my attention by one teacher that the teachers think that they are required to *teach* everything which is published in the *Leaflet* and that they must *know* everything which appears in the *Leaflet*. This is no more so than that they should teach everything which appears in a dictionary and should know the definition of every word in the dictionary. No one would deny that a dictionary is one of the most useful of books and it is hoped that the *Leaflet* may prove to be a more or less attractively organized nature-study dictionary with the ideas expressed in terms which may be understood and appreciated by individuals as young as the youngest school child. The "cut-out-pictures" and story sections of the *Leaflet* for example can teach to the younger children in a simple way the more serious minded facts which the life history chart presents in a more orthodox manner to the older children.

Graded Nature-Study

There is one danger which may arise from an attempt to grade nature-study work arbitrarily. Some teachers may think they should teach only the work outlined for the third and fourth grade whether or not the children in these grades had had the work on the same subject for the lower grades. In most cases it would seem wise to start the whole school with the work outlined for the first

and second grades. The children in the higher grades will of course finish this sooner than the first and second grade children. They can then, go on to the work outlined for the third and fourth grades. The older children should finish this work sooner than the children of the third and fourth grade and can go on to the work outlined for the fifth and sixth grades. The still older children in this group can finish this work more quickly than the younger ones and go on to the work outlined for the seventh and eighth grades. In taking up a new subject, we must all begin "as little children."

A Type Nature-Study Period

If the children in the school have never used the material in the *Leaflet* according to any system, it might be well to consider the following suggestion to show how a lesson may be taught to a whole school at once in such a manner that all may be kept busy and, by the way, if the children are busy discipline will as a rule take care of itself.

Suppose for example at the beginning of the nature-study period some child reports that on his way to school he saw some rather small birds flying around in the air. After he tells all that he can about the bird the teacher may for guidance refer to the outline given for this work.* One page of this outline deals with birds and it will be seen that a part of this page deals with birds found feeding in the air. Under this section, reference is made to Volume XIV, No. 4 of the *Cornell Rural School Leaflet*. This means that that number of the *Leaflet* should be a source of information for studying birds that feed in the air just as the M section of the dictionary gives you guidance for information concerning words beginning with M.

A copy of Volume XIV, No. 4 of the *Cornell Rural School Leaflet* has been sent to every rural school in the state and should have been left in the library. Those schools whose teachers requested additional copies have enough copies for each child. Under these circumstances it should be safe to imply that every rural school in New York State at least has access to this material.

Volume XIV, No. 4 of the *Leaflet* contains a chapter dealing with birds found feeding in the air. These birds are called the ceiling cleaners. This chapter may be read to or by the pupils and should give the school some clue as to what the bird seen might be. It

*This will appear in detail in the September, 1921, NATURE-STUDY REVIEW.

may be decided for example that it is a barn swallow. So far at least the lesson may be carried on by the school as a whole.

Reference to the outline at the end of this article suggests that the work with cut-out pictures will give profitable work for the children of the first two grades. These children and others if they wish, may cut out the swallow and place it on the landscape where it belongs, in accordance with the directions accompanying the landscape.

The children in the third and fourth years can do what the children in the first two grades have done and in addition select some one page in their nature-study note book. On that page they will keep a record through the year of birds seen feeding in the air and in particular some one bird like the already mentioned barn swallow which they themselves have selected. This note book will contain the date when the birds were first seen, when and where they nested, when the first young were seen and when the birds were last seen. It is not necessary that every school in the state select the barn swallow for this study. Any bird of the barn swallow type will do. The *Leaflet* has given help in the study of the barn swallow and chimney swift and it may be easier for the teacher to use these examples but *any other* bird of this type will be satisfactory. This gives greater opportunity for the instructor to teach from the material at hand and is bound to make the work more interesting. The "Fifty Interesting Things" section may prove of assistance in guiding the observations of these children. In a bird lesson like the one under discussion the questions dealing with birds of the desired type may be considered.

The children of the fifth and sixth grades should keep a note book as did their younger fellow students. After they have made all the observations they can independently they may refer to the Life History Chart section of the *Leaflet* and fill in the gaps in their own record. They may incorporate their final conclusions in a story about the barn swallow in which they emphasize the things which they themselves have seen. They should be able to appreciate the work that these birds do in keeping the open air free from insects and should have some idea of how the birds are particularly fitted for the work they do. The use of the birds to nature and their relation to other living things might well be understood.

In case, the children of the seventh and eighth grade have had the work, just outlined for the lower grades or complete it more quickly than their younger school mates they may go further than

has been outlined and study the relation of these birds to man and to agriculture particularly. If desired, they may construct martin or other bird houses and should do all they can to encourage useful birds to lighten the labors and increase the profits of the farmers and gardeners of the community. Any laws dealing with these particular birds might well be known and assistance may be given the authorities in making these laws effective. Any impression that the laws are imperialistic should be dispelled by an appreciation of the common sense back of them. It will not be difficult to see the common sense side, if the program outlined above has been followed.

At the beginning of this section it was suggested that the topic for study come from some child who had seen something interesting. It may come with equal appropriateness from a child whose garden is being attacked by insects. The outline shows appropriate work for the younger children while the older child is being helped with his problem.

All of this work may be taught at one time to a group of children of varied degrees of preparation. But for the fact that all of the material necessary to teach such a lesson is available in every rural school in the state it would be folly to expect that a program of this sort could be put into practice. As it is it ought not be an exceedingly difficult ideal to realize.

So much for this type lesson on birds found feeding in the air. Lessons on other nature-study subjects are outlined in a similar manner and should be understood without great difficulty.

The Work of Different Years

It should be obvious that if we divide the children into groups of two grades each and follow the system already outlined that there will be needless repetition the second year if no effort is made to prevent this. For example, a child who enters school this year and studies a barn swallow this year would next year be in the same group and study the barn swallow again in the same manner. To prevent this, the outline suggests two groups of birds found feeding in the air and suggests that one of these groups be considered one year and the other the next year. In either case, the chapter in Volume XIV, No. 4 of the *Leaflet* would be an appropriate introduction. One year you would consider birds like barn swallows and chimney swifts that are seen for the most part on the wing. The next year it might be well to study the other group which

includes birds like the phoebe and kingbird which fly up from a perch to capture their food and then as a rule return to their original perch. The third year of a child's school work he would return to a consideration of the group studied the first year and he may or may not study the same example of that group. The fourth year he would return to the group he studied the second year. The fifth year, he would return to the group studied his first and third year and the sixth year he would return to a further consideration of the group studied the second and fourth years.

Agriculture and Home-Making

A wise decision was made when it was advised that the seventh and eighth years' work along nature-study lines be largely vocational. The plan outlined organizes the work for the seventh and eighth grades so that the whole matter works in nicely. This work may or may not be done as organized project work. The types selected are all chosen with the view that they will lead up to some home-making or agricultural project. The study of sugar producing plants in nature-study creates an excellent background for the use of sugars as food in a homemaking lesson. The study of rabbit tracks as nature-study in the lower grades creates an interest in rabbits which may be reared as projects or served as a portion of a well balanced meal. It is neither necessary or advisable that any rural school take up all of the projects outlined for the seventh and eighth grades. The outline merely shows how any of the nature-study lessons may be associated with an agricultural or homemaking project. It will probably be found wise to have the girls confine their work to one project and the boys to another and allow them to work on this project during the nature-study period, providing their services are not needed in helping the teacher with the younger children. We all learn by teaching and the older boys will grow in ability and power by making bird baths, bird houses and feeding stations for the school. The older girls will learn additional things about the part of the landscape birds care for if they help the smaller children with their cut-out pictures.

This outline has been developed to meet the requests for assistance which have come from rural school teachers actually in service in rural schools in New York State and in Iowa. The system is not a dream which I *think* ought to work. The ideas have been tried and found *not* wanting. Without exception the plan has had the approval of teachers and superintendents who have looked it over.

The Roosevelt Field Club

RUTH V. WEIERHEISER

Secretary and Treasurer, Buffalo, N. Y.

It is impossible for me to give the reader a complete and well-formed idea of the purpose and activities of this unique club without a short sketch of its history. The Roosevelt Field Club is a children's organization which was formed March, 1920, by Chauncey J. Hamlin, President of the Buffalo Society of Natural Sciences. The aim of the organization is to instil a love of all wild life and to teach children how to understand and to conserve this life which is so often misunderstood. The club was named in honor of Theodore Roosevelt who was a most active naturalist.

Owing to the winter climate of Buffalo being more inducive of indoor study than outdoor hiking, Sunday afternoon lectures are given from Christmas to Easter. Among the lecture subjects last winter were "Trees," "Wild Flowers," "Fossils," "How to Make an Aquarium," "Bird Photography," and the six reels of "How Life Begins."

Last spring, the first trip was held at Williamsville on April the 24th. Although the day proved to be clear, cold and windy, over eighty children and several grown-ups hiked the entire four miles. The last part of the trip was devoted to the exploring of a limestone quarry rich in fossils, garter snakes, and toad and frog eggs. Since the Williamsville trip, thirteen others have been conducted, an unusually interesting one being the outing to Eighteen Mile Creek, on June 12th. This creek is very famous in the realm of geology, William L. Bryant of the Buffalo Society of Natural Sciences having found the fossil of the "Dinichthys Magnificus" in the Devonian rock in this locality, the only specimen of the species ever found in America. Another memorable day for the children was the occasion of the finding of a giant puff-ball on a trip to Toad Hollow. Professor Alexander brought it all the way back to the city to have it photographed.

Since the 26th of June, when the club held a second trip to Hamburg, N. Y., Professor William P. Alexander, formerly of Cornell University, has been the lecturer for the club. On such days you will find him the central figure within a circle of interested boys and girls,—sometimes the radius of said circle being as long as ten or fifteen feet. He is barely given time to eat his lunch, so anxious are the members to have every object in sky, earth and water



Roosevelt Field Clubs in the Field

Mr. Bryant, Director of the museum sitting at the left in the lower picture with Mr. Alexander next; Mr. Alexander standing behind the upper group at the right and Mr. Bryant near the center.

explained, and, of course, all explanations must be immediately rendered. No other human being could, in our opinion, be more of a veritable walking nature encyclopedia than Professor Alexander and the children delight in his knowledge of every living creature and plant. His genial manner, friendly spirit, and great interest in Nature have led the children to realize the humane and economic side of this subject and the part man plays in the scheme of life, with an especial emphasis upon their own individual parts which each must play.

Professor Alexander is preparing the lectures for this winter's Sunday afternoon series of Nature talks which will begin in January. We have also planned a few winter hikes for the purpose of identifying trees by their bark and for the observation of winter birds, such as the evening grosbeak, chickadee and nuthatch. The club now numbers one hundred and thirty-five members, over half being boys. We are steadily growing week by week. A whole column devoted to the activities of the club appears every Saturday evening in a local paper. Several club members have contributed articles on Nature-Study subjects which appeared in this column, much to their pride. The enthusiasm among members and others interested in the club has been most unusual and foretell a wonderful future for this organization.

Index to Vol. 16 will be mailed with March Number. Failed to complete it in time for this number.

The April issue will be a Camp Number, edited by Prof. Wm. G. Vinal, of Camp Chequesset, Head of Nature Study in the R. I. School of Education.

In the Maple Sugar Camp

C. H. DONNELL

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Of the many kinds of sugar, the most common, and also the most important as a food product, is cane sugar (sucrose). It is found in the sugar cane, the beet, the maple, and many other plants.

Grape sugar (glucose) is found in the grape and in some other fruits, but must be distinguished from fruit sugar (fructose). It is not so sweet as cane sugar, but sweeter than sugar of milk (lactose).

Sugar and the other carbohydrates are formed in the green matter of the leaves and rind of plants by photosynthesis, whereby the carbon dioxide of the air is arrested and combined with water to form sugar, starch, etc. *Photosynthesis* means *combining* by the action of *light*. Were it not for this mysterious process, plant and animal life would become extinct.

Plants also have the power of converting sugar, starch, and the other carbohydrates into one another as their needs require.

But my young readers (and some older ones, perhaps) still doubt that maple, beet, and cane sugar are identical. This perplexity is no doubt due to the delicious aroma of maple sugar, and the somewhat unpleasant flavor of partially refined beet sugar.

Let us, therefore, observe another quality and function of plants. Most persons have noticed the little glands in the rind of lemons and oranges, which secrete the essential oil of these fruits. Similar glands are found in the roots, stems, leaves, and flowers of all or most plants. The essential oil secreted by these glands is what gives to all plants, flowers, fruits, and vegetables their characteristic flavor or fragrance. It is very volatile, and can therefore be separated from the plant (and from a water medium) by distillation. There are other methods of obtaining perfumes and flavoring extracts; but, for reasons which will appear later, distillation concerns us most at present. And the reader must remember that the distillation of liquors is not a mysterious chemical process, like fermentation, but a comparatively simple physical process.

If you put lilac blossoms or peppermint leaves into a retort partly filled with water, and apply heat, the volatile oil will vaporize before the water. If this vapor be conducted through a coiled pipe, cooled from the outside with ice water, the volatile essence will be recondensed in the coil and emerge from the end of the pipe

as a liquid (aromatic oil mixed with water). By redistillation it can be made almost pure if desired.

It is this essential oil which enables us to distinguish between sugar made from maple sap and that made from the beet or the sugar cane. When perfectly refined, they cannot be distinguished either by chemical test or by the palate, for they are one. One way to eliminate the flavor of the plant is to permit the sugar to crystallize and then wash out the syrupy residuum. The rock candy which often forms in the maple syrup-jar, if washed, becomes cane sugar. Or, rather, it *was* cane sugar, and is now deprived of its maple flavor.

The carbonaceous matter formed in the maple by photosynthesis is deposited between the wood and the bark in a starchy form called cambium, and becomes bark and also forms the annual layer of wood.

But the winter's freezing reconverts much of the starchy matter into sugar. This conduces to translocation and serves other purposes.

Permit a potato to freeze thoroughly and then to thaw. In a day or so, but before ultimate decomposition takes place, cook and eat the potato. Note the sugary taste.

Among the most delightful memories of my childhood is the opening of the maple sugar camp. If playing is work for a professional ball team, work was a delight to me when the labor was sugar-making. I stood willing orderly to my father, who hewed the troughs from split logs, made the elder spiles, tapped the trees, and practiced other arts beyond my skill.

But I could haul or carry the wood, gather the sap, and tend the fires. This last was probably the most delightful, albeit the most tantalizing, owing to the bewitching fragrance arising from the caldron.

How we children teased and tried to convince father that the syrup was far enough advanced for trial! Two notions which I entertained at that time still persist. One is that the half-formed syrup tasted better than the denser article, and ought to be served, especially while there is no danger of fermentation; and always after it reaches the point where it is self-preserving.

The other notion was that there ought to be some way to prevent the escape of the delightful aroma. But father explained that the boiling carried away the water in vapor and left the sugar in the

caldron, and that the sap could not be reduced to sugar if the steam were confined.

If, when we went to dinner, one of us carried a pail of clear maple sap, and another a Sassafras root or a spray of Spice Bush (both sisters of the Sweet Bay), then at supper time we found these brewed into ambrosial nectar by the simple process of boiling the spice bush in the sap for a few minutes.

And if the days were delightful, what of the nights,—with the camp fire, and the visitors, and the sugaring-off?

The sugar contains even a better proportion of the delightful essence than does the heavy syrup; for it will crystallize at a lower gravity than is required for thick syrup; and for every ounce of water disposed of, a considerable amount of flavor is distilled into the air. But what of the stupidity of those farmers who will even devise ways of refining away the real charm of maple sugar? Or even those who prefer the '*first run*' because it is whiter? The flavor improves as blossoming time approaches, but beyond a certain point the sap becomes ropy and bitter.

Of course, the first run should be harvested, because the frost has helped to convert much starch into sugar, and unless there is alternate freezing and thawing, there will be a poor sap yield.

Before the sugaring-off is over, I must remark that the only Easter egg worth while, is a good sized goose egg with the works removed and the case filled with warm, plastic maple sugar. As the sugar continues to crystallize, it expands to fit the shell.

When sugar-cane sugar and beet sugar are cheaper than maple, as is usually the case, housewives often melt refined sugar and flavor it with maple extract. The result is good, and the sugar is the same, but commercial maple flavor is seldom or never made from maple; probably because the essence distilled from maple blossoms is a little different from that which pervades the sap, and is not desirable.

Maple flavor is distilled from other flowers or made synthetically; and it is good, but not to be compared with the real aroma of maple syrup.

I am still waiting for some ingenious manufacturer to make real maple syrup in a retort, and condense the steam in a coil; and by redistillation secure genuine maple essence, with which to flavor commercial cane sugar, or to fortify maple sugar.

Yes, maple sugar is cane sugar, but its fragrance is found only in the maple.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN
ELEMENTARY SCHOOLS

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Editorial

THE CHICAGO NATURE-STUDY CLUB

To a country person, like the Editor, Chicago seems a strange place for the forming of an active, hiking, nature-study club. The miles and miles of closely "built up" streets, the swift, endless procession of automobiles, the city atmosphere and the city noises would seem an unsurmountable bar to the enjoyment of anything in the realm of nature. However, Chicago has the advantage of being situated on the shore of a great inland sea, and it has many parks and the nature-study possible in parks has never received the attention that it deserves; moreover Lake Michigan has thrown up and with the wind's aid has sculptured miles and miles of dunes, the work being helped or hindered by a willful, adaptable, determined vegetation which manages to succeed, by hook or crook, in the job of binding the waves, which old Canute failed to accomplish with mere chains. But, when all is said, it is people and not place that make a nature-study club;—people born to the freedom of open skies, and wide, flower decked prairies, born to the love of living things whether plant or animal, born with open, inquiring minds and with a desire to know something of the planet on which we live. Of such is the Chicago Nature-study Club composed. Many of its members are imprisoned in office walls during the working days of the week but find freedom on holidays and on Sundays when they seek a place to worship as did Emily Dickenson who found a church

With a bobolink for a chorister,
And an orchard for a dome.
Some keep the sabbath in surplice:
I just wear my wings
And instead of tolling the bell for church,
Our little sexton sings,
God preaches,—a noted clergyman,—
And the sermon is never long;
So, instead of getting to heaven at last,
I am going all along.

Indeed, this club is ideal as to its membership which is made up on the one hand of botanists, zoologists, entomologists and other scientists of noteworthy achievement, and on the other hand of many nature lovers who belong just because they are nature lovers, and who through association with other learners are gaining powers of observation and ability to unravel for themselves the mysteries of life in the fields and forests and especially of the lake shores. If Chicago can have a nature-study club, so vigorous and successful, there is no reason why any other city in the United States should not have one,—no reason except that it lacks the people who combine the love of nature with enough “pep” to carry on such a club successfully.

The work of the Chicago club is not merely for the present, but is for future generations as well, since it has taken an important and practical part in the preservation of wild life and the establishment of areas where it and the natural beauty of the scenery may be protected and conserved for all time.

In Memoriam

ADA E. GEORGIA

The news of the death of Miss Georgia which occurred at Ithaca on the eighth of January will come as a shock to many of our readers who knew this remarkable woman personally. She came to Cornell in the early days of the nature-study movement as an assistant to “Uncle” John Spencer in his great work with the Junior Naturalist Clubs. Later she assisted the Editor in carrying on the Home Nature-Study Course and still later was associated with Mr. W. P. Alexander in teaching and conducting the field trips in Farm Nature-Study, in the Cornell College of Agriculture.

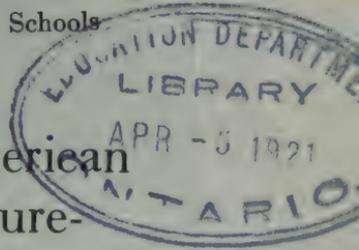
Miss Georgia was always efficient in her work as assistant or teacher; her mind was stored with information on a wide range of subjects for she was an indefatigable reader; her knowledge of plant life was very great and learned largely from observation. Her great contribution to science is *A Manual of Weeds*, the best book on the subject yet published in America. A wide circle of friends and admirers will feel her loss deeply as does the Editor who had the privilege of close association with her for many years.

NATURE-STUDY REVIEW

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School Garden
and
Trail School
Number

Enos Mills exploring the Rockies in winter

MARCH, 1921

VOL. 17 No. 3

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THE NATURE-STUDY REVIEW

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MARCH, 1921

No. 3

The Long's Peak Trail School and Nature Guiding

ENOS A. MILLS

Rocky Mountain National Park, Col.

One year the last of August a clump of aspens on a high, rocky point stood out like a golden sheaf in the sunshine. This autumn color exhibit was at least a month ahead of normal. But the weather was warm and a drouth of weeks was on. All the aspens were colored before frost.

Many visitors attributed the brilliant coloring to "the severity of the mountain frosts." Nature guides when asked gave facts concerning leaf coloration and the frost superstitions; that frost does not color leaves; neither do fairies. Frost is not a colorist; brightly colored flowers of summer would never color if frost came while they were flowering. Leaf and fruit coloring is a chemical process of earth-born mineral paint.

A nature guide can incite a life-long interest in the wild places. Every child, woman and man who knows a few of the real and enlivening facts concerning wild life and the wonderful geological story, will be free from many hampering superstitions, and have a wonderland ever ready for the imagination.

Our nature guides are frequently asked concerning tree distribution, the why of willows and firs by the streams, pines on sunny, and spruces on shady slopes. Everyone is interested, too, in the habits of the grizzly, the beaver, the mountain sheep, and are glad to have the life histories of the flowers, birds and trees of the region interpreted in a live, unscientific story. Old and young become enthusiastic.

A few of the fundamental facts which we endeavor to feature through our nature guides in the Trail School are; that the wilderness is friendly, wild animals are not ferocious, weather is not harmful, and that the outdoors is helpful at all times. We also try to

help people understand the essential things in the life of the wild folks; that wild animals have leisure and much of this is spent in play, some of it in exploring and visiting; their life is not one fierce struggle for food; animals and birds have a philanthropy of their own, form alliances against the common enemy and frequently cooperate within the progressive realm of mutual aid. Nesting time, drouths, and famines, which also reach wiser folks, are times of unusual interest in the wilderness. Most birds and animals have a home territory and live closely within this; many birds returning to the same locality year after year to nest and bring up the children.

On nearly every trip outdoors the unexpected happens and the rare or unusual is presented. Although it may call for the casting aside of well made plans, our custom has been to seize upon the unusual whenever it appeared, allowing the other plan to wait, for the unusual may happen but once; it may be the opportunity of a life time.

One day a nature guide was starting with a party to see the picturesque timberline, with its peculiarly individual trees, flowers, birds and animals. But in sight of the house he came upon a gopher. The gopher was at his life-long activity—making a tunnel through the earth. Down in the tunnel he dug the earth loose with fore paws, then with palms forward and against his chin, he pushed this loosened pile of earth before him along the tunnel and then outside. The gopher darted from the hole a few inches, dropped his load and darted into the hole again, backwards. Suddenly he pushed out a salamander. The salamander kicked about and then slid headforemost back down the hole. Out he was thrown again. There was not supposed to be any salamanders in the country and this and a number of other incidents held the crowd around the salamander for more than an hour. Everyone had an added interest in gophers, their enemies, neighbors, plant roots, geology and other things outdoors.

We are in one corner of the Rocky Mountain National Park, at an altitude of 9,000 feet. Within half a mile radius of us there are about one hundred species of birds, several hundred species of flowers, fifteen species of trees and shrubs; beavers, skunks, coyotes, gophers, ground-hogs, mink, squirrels, chipmunks and rabbits—cotton-tail, Jack and snowshoe; and inside this mile diameter circle, deer, elk, lion, bobcat and bear often make



- (1) Trees at Timber Line, Slope of Long's Peak.
- (2) Following a Nature Guide in Long's Peak Trail School.
- (3) A Beaver House—Note food pile at right.

Photographs by Enos Mills

tracks. Then there are beaver ponds, mountain streams, forested canons, lichened cliffs, glacial boulders, moraines and an array of geological material.

In the mountains one has comprehensive views of life zones and the varied and peculiar life which each sustains. Plants and animals are distributed over the mountains in an orderly manner; each kind being in the climatic zone in which it may be said to belong naturally. The climatic zones of the earth that lie between the equator and the poles are also found on a small scale between the base and the summit of high mountains. As one climbs a mountain or travels toward the north he finds changes of temperature and a changing plant and animal life. The climatic and plant life changes of a thousand mile journey into the north may be almost duplicated by climbing one thousand feet up a mountain.

Many trips are made with a nature guide to timberline and above. Day and night trips are made to the summit of Long's Peak, 14,256 feet. The vast region which rises above the timberline carries many kinds of plant and animal life. Here live mountain sheep, the mountain lion, foxes, ptarmigan and rosy finches the year round; the summer population embraces many kinds of birds, including the golden eagle; bears, woodchucks, deer and a wealth of wild flowers.

It is a joy to see children take to the woods, and also to the cliffs, beaver houses and the clear, swift water. Children are primitive folk full of outdoctr interests. Never do we need to arouse their interest in Nature; but we watch not to confuse it or pervert it with ambiguous answers or fairy stories, nor to discourage it with nature-study lessons.

Children are ever interested in the beaver, and this animal is helpfully used to promote thought and education. Boys and girls who become thoroughly acquainted with the beaver, his adventures, labors and accomplishments, acquire interesting information concerning our natural resources. Aroused by the fascinating information they desire to know about the practical things in the lively university of nature.

There are wild bits and wild places all over the country. As a nature guide is a teacher of refreshing kind, one who quickly enables the guided to get along without a guide, why not an amateur or a professional guide in every nook and locality in the land?

Waking Up Dead Back Yards and Putting Them to Work

W. R. BEATTIE

Horticulturist, U. S. Department of Agriculture

Of all the troubles that beset the boy or the girl who undertakes to make a garden in the backyard or on a vacant lot that of getting the land in shape is the greatest. If an attempt were made to plant a garden in the middle of a cobble-paved street the task would often be easier than in some backyards where the soil has been trampled and pounded for a half century. Bricks are made by pressing wet clay in a mold then drying and burning it and the only difference between the soil of many backyards and bricks is that the bricks are burned and the soil is not.

Land that will grow rank weeds is good land and this proves that most of our vacant lots are good land, but they are in poor condition for cultivating. Like the backyard the vacant lot may have been trampled and pounded until there is no longer any life in it and a soil without life is in poor condition. How to put the life into the dead soil is the problem. Some soils are easier to bring back to life than others but the principles involved are the same for all.

Soils need to be fed just the same as we do only they require a different kind of food, in fact they require two kinds of food, the mineral and the organic or vegetable matter. That old backyard that is as bare and hard as a floor is asleep and before we can feed it we must awake it by digging it up and breaking the clods so that it can take the food that we are going to give it. First the soil must begin to breathe more freely than it did when it was packed so tightly that the air could scarcely get into it. Then if we apply a coating of manure to it there begins to be a growth of myriads of small plants, bacteria we call them, in the soil. These soil plants are so small that they can not be seen but they go right to work to make over the soil so that it will grow crops of beans and peas and radishes and beets and other garden plants for us.

Sunshine, showers, snow, freezing and thawing, all help to break up the soil particles and get them in shape to make plants grow. How is it done? First there comes a rain on the lumps of soil in the backyard that were broken up during the autumn with the spade or a pick and a part of the water gradually soaks into those lumps.

Then along comes Jack Frost and freezes the water in the clods. We all know what happens when a glass or a pitcher is left with water in it on a very cold night, the water freezes and in freezing swells and bursts the glass or pitcher. That is precisely what happens to the clods of earth, for the water freezes between the soil particles and forces them apart so that by springtime the clods are clods no longer but loose and mellow soil.

With the clods broken up and the soil loose and mellow it will be an easy matter to mix a load or two of well rotted manure with it to give it the organic matter and 40 or 50 pounds of fertilizer for the minerals and we can go right ahead as soon as the weather is warm enough and plant a garden. If the backyard is an extra large one more manure and more fertilizer will be needed, but the amounts mentioned will be about right for a space 20 feet wide and 50 or 60 feet long.

Some backyards are particularly hard to deal with because in digging the cellar for the house the lifeless clay taken from the bottom of the cellar was spread all over the yard to a depth of a foot or two. The main thing, however, will be to get it broken up so that the weather can get at it and then work some manure into it. When once in condition to grow plants the process of improvement becomes quite rapid.

VACANT LOT GARDENS

When it comes to making a garden on a vacant lot some additional problems are sure to confront us. Most vacant lots have, at one time or another, been used as dumping grounds and the original soil, which may have been very good, has been completely covered with cinders, broken bricks and stones, broken bottles, bale wire and every kind of refuse you can think of. Even under these conditions the land may be overgrown with weeds showing beyond a doubt that the soil is fertile. The problem will be to get rid of everything that will interfere seriously with cultivation. Perhaps there may be enough stones lying over the ground to build a stone fence along one side but what matter, for it is a long time until planting time and the stones can be carried off. Broken bottles, bricks and large cinders should all be gathered up and either hauled away or piled in one corner of the plot where the unsightly pile can later be covered with vines. It is surprising how a watermelon or a squash vine likes to ramble all over a pile of old bricks and cinders.

Sometimes vacant lots can be cleaned up and spaded or plowed either in the fall or during the winter. Where a school garden is to be planted, either on the school grounds or on a vacant lot, the land should be broken in plenty of time to allow the weather to mellow the clods. If the garden is spaded by hand and cut in thin slices the clods can be broken up with the edge of the spade as the work goes along. Where the land is plowed shortly before planting time it will be necessary to disk and drag or roll it and even pound with an old axe or back of a heavy hoe until the clods are all broken. If a number of lots are to be plowed it is often possible to get a farmer to bring teams and tools into town on an appointed day and prepare the garden land for a whole community.

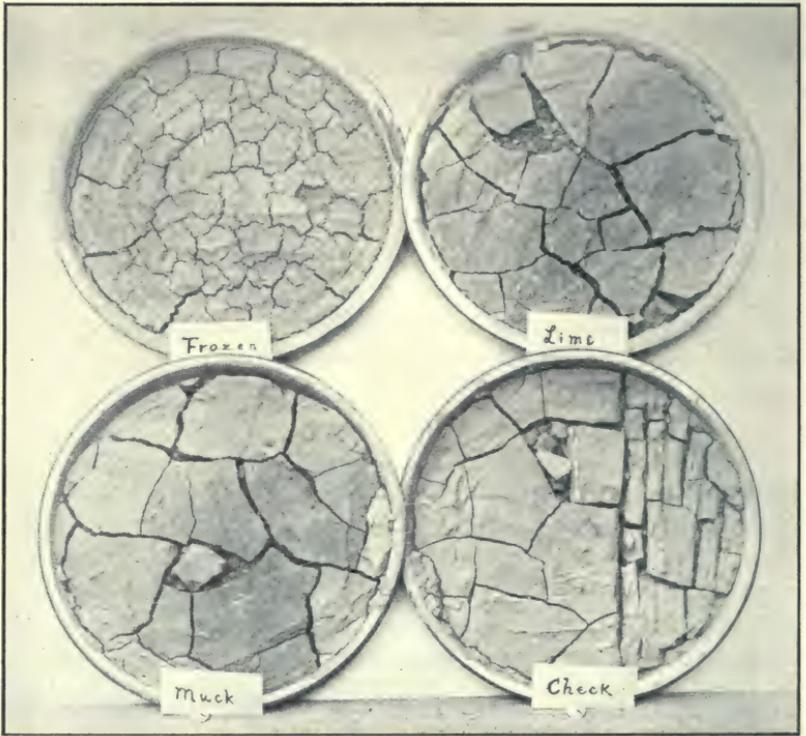
Manure is getting scarcer in cities every year and only enough can now be secured to make a start. Even old weeds cut up fine and worked into the soil will help. After the first season the land should be improved by applying manure if it can be secured also by sowing rye, barley, vetch, clover or something of the kind upon it to improve the soil. This can be done just as the crops are being taken off in the after part of the summer or early autumn and the soil improvement crop can remain on the land all winter.

LIME

Most soils are improved by an application of lime at the rate of 100 pounds on a backyard 20 by 60 feet in size. This sweetens and loosens the soil and should be put on in the springtime when the soil is being pulverized for planting. Lime should not be used on land that is to be planted to Irish potatoes. Wood ashes, where they can be had, have the same general effect as lime on the soil. Sifted coal ashes may be used to mix with heavy clay soils to loosen them, 1 to 2 inches of ashes being worked into the soil to a depth of 8 or 10 inches.

Just a word of warning, for while there are very few plots of land that are beyond hope from a gardening standpoint, yet there are those that it would not pay to fool with. These are low lying and marshy places that can not be drained, also the very shallow soils over solid beds of rock that will surely burn out during the summer. Drainage may help the wet soil but the rockbed soil is almost hopeless even where plenty of water is available for watering. There must be sufficient depth of soil for the roots of the plants to live and work in.

Success in bringing a dead soil to life then lies mainly in breaking it up and working organic matter or manure into it. Chemicals, called fertilizers, may be necessary to supply the minerals but these can rarely be depended upon entirely and there must be decaying vegetable matter in the soil. Once that old sleeping soil is fully awakened there is no guessing what wonderful things it may do.



Experiment to show proper treatment of clay soil.

Fill four pie tins with clay which has been smoothly puddled. In one mix with the clay a small portion of lime; in another add a larger portion of muck; leave two with pure clay, and place one of these out-of-doors where it will freeze hard. Then place the four tins on a shelf and allow to dry. In which of these is the clay most friable? In which is it the hardest?

This experiment shows that freezing the clay rendered it finer, so that it may be broken easily into particles small enough to set closely about the plant's roots. The clay mixed with lime is much more friable than the one mixed with muck, showing that clay needs lime more than organic matter to make it of greatest use. The pure clay which is dried without freezing hardens into large, flat pieces, each being almost as hard as stone.

Symposium of Garden Supervisors from Coast to Coast. Baltimore, Pittsburgh, Cincinnati, Louisville, St. Louis, Kansas City, Seattle

HOME GARDENS OF BALTIMORE

ADELAIDE DERRINGER

Supervisor of Gardening, Baltimore, Md.

The work of the Baltimore School and Home gardens is divided into three sections, field, class-room, and special activities. The field work is also divided into the school community gardens and the school directed home gardens. During the past season there were twenty community gardens located in the school yards, vacant lots, or in the parks. Here the child was given a plot of ground for his individual garden. He was directly responsible for his garden, learned that he got out of his garden what he put into it in the way of effort. Each child has been permitted to carry home all the vegetables which he has grown. Twenty-five schools were represented in these gardens, having an enrollment of 1468 children. The work of the gardens was carried on under the direction of the supervisor and six assistants. Each child was required to cultivate his garden, at least, once a week.

An enrollment of 3150 children was obtained from 29 schools for home gardens. These gardens were visited during the summer by the garden supervisors, and the enlistment cards were marked accordingly. They were divided into 12 districts. To the three best gardens of each district, prizes \$2.00, \$1.00, and \$.50 were awarded by the *Evening Sun*. To all successful gardeners certificates of merit were given thru the Department of the Interior, Bureau of Education.

Aside from the educational and monetary value, as well as the habits of cleanliness and thrift obtained thru the home garden, the visits to the garden tend to form a link between the home and school. The garden supervisors were delightfully entertained with many of the children's stories and doings in their gardens. One child met the supervisor at the door with a very pathetic story explaining why she had no garden to show. "Its broke, she said in a doleful tone. Not knowing that a graden was a brittle object, the supervisor asked, "What could have broken your garden?" The answer came back promptly "The cat laid on it and broke it."

Needless to say the little girl was properly consoled and a plan to prevent the interference of cats with little girl's gardens was discussed on the spot.

At one home the garden inspector was proudly escorted by a small boy to his back yard which was surrounded by a tall wooden fence. The teacher gazed with wonder and finally admitted to herself that she saw no garden, so she asked, "Louis, where is your garden?" "There it is," he answered, looking heavenward.

Sure enough there it was, a garden suspended on a clothes drier! After climbing up a ladder to the garden the inspector looked upon a mass of green foliage. The child had carried two feet of soil up to the drier and there had built his garden in order that it might get full benefit of the sun's rays. Louis's garden has won the name of the "The Hanging Garden of Babylon."

The quality of the vegetables shown at the school garden exhibits last fall compared favorably with that of their country cousins, and proved that "gardening within the city limits" can be successfully conducted. In spite of the fact that the gardens lacked the patriotic appeal of the years of the war, the enrollment increased $33\frac{1}{3}$ per cent and the enthusiasm gained proportionately.

GARDENING IN THE CITY SCHOOL CURRICULUM

JOHN A. HELLINGER

Pittsburgh, Pa.

In the present crisis of the school situation, the kind, amount and organization of subject matter of the city school curriculum is of great importance. Every individual must have a knowledge of human relations and of nature in order to be an effective member of society. The race has depended upon certain fundamentals for its development. These fundamentals, be they human relations or the most common natural phenomena, must form the basis of instruction in the schools. Education performs the double service of aiding individual minds to prepare for the reception and use of knowledge, and of communicating what men through periods of time have learned about nature and humanity.

Gardening may well have a prominent part in the curriculum of the city school. Children should learn early in life that wholesome food and beautiful flowers, shrubs and trees, can be grown from the soil without very much drudgery. The *joy* of this work should be

constantly emphasized. In this way interest can be created that may last a life time. Especially in large cities is gardening needed to help in forming habits of industry, regularity, and healthful recreation; it cultivates patience, prudence, persistence and respect for immutable laws.

Achievements of school gardens in the larger cities of this country have not been of high order. If properly taught, school gardening should result in surrounding every home with a plot of ground, with green grass, vegetables, flowers, shrubs and trees. Tenements and slums would disappear. Where is the man who would fight for the tenement of his nativity? Show me a family living in a home with a plot of ground around it under the powerful influence of the open sky, sunlight, stars, fresh air, green grass, flowers and trees, and there will be evident a patriotic fervor that secures the peace and prosperity of nations.

One of the problems of the twentieth century is to create and maintain proper living conditions in congested areas. As verdure disappears the police force must be increased.

School gardens may be conducted on ground at school buildings, on vacant lots near the school, or on large plots where the pupils of several schools may be accommodated. Where possible, the best school gardens are those located on school ground and owned by the school. These may be an integral part of the school work. In this land of broad acres every city school property should contain a sufficiently large plot of ground to provide facilities for some phase of gardening in every class of the elementary school, and for horticulture courses in the high school. Then all classes up to and including fourth grade might have their class plots and pupils of grades fifth and sixth might have individual plots of not less than 60 square feet on which projects of about six easy growing vegetables can be worked out. In the fifth grade each pupil's work must be intensive and very closely directed. Only about 24 pupils can be handled by a teacher at one time and each group of 24 should have at least 90 minutes, twice a week, in the garden. If these same pupils may have garden work in the sixth grade they should be assigned larger plots and should be granted more freedom in working out their project. The economic and commercial and the aesthetic aims should be more evident in grade 6. A pupil may confine himself to the study of a single vegetable and a few flowers. He may learn what are the necessary soil conditions and

how to bring them about, the best variety of a certain vegetable to be grown, the market demands, and the production of seed to improve the stock. These are aims that call for keen interest and strenuous effort.

In the higher grades this special work may be carried further and may include rather extensive study of truck gardening, shrubs and trees, landscape effects, forestry and lumbering. Is this not an important part of the education of our city youth? If the only results would be some knowledge of natural environment and natural phenomena, a better attitude towards the food producer, and some appreciation of beautiful effects that can be produced with little effort, the work of the school garden would be well worth while.

Equipment for school gardening should be ample for doing the work well. The school should furnish equipment for this work in the same proportion as for any other work. Would a truck gardener with ten or a dozen acres under intensive cultivation rent his implements? Would he hire a man with team, plow and harrow to till his soil? For effective work the equipment and working force must be at hand to do the work when weather conditions are most favorable. Although the aim is educational and not primarily production, yet the most effective work must be done in order that the educational results may be of high quality. Garden land, tools, fertilizer and seeds are as essential as school buildings and classroom supplies. Not until the human race has covered the bosom of Mother Earth with cities, in which dwellings are crowded one against the other; not until man and all other living things have acquired the power to maintain life and pursue happiness within massive walls of stone, brick and mortar, without pure air and sunlight; can the youth of the race be effectively educated by means of books, paper and pencils. With proper organization of the curriculum many wastes can be eliminated and all necessary equipment can be furnished.

During the season of 1920 in a city of 600,000 population, with acre upon acre of vacant ground, only approximately seven acres were cultivated as school gardens. The estimated yield of these seven acres was \$5,161.26 at current market prices. An average of \$737.00 per acre is not a poor yield, but the educational results far outweigh the material products. Between 2,000 and 3,000 pupils, or approximately four per cent of the school population,

received regular instruction in gardening. This work was carried through the vacation months of July and August by twelve teachers and one director. Even this is worth while, better than no discipline at all during the summer months with only the streets and alleys as a rendezvous.

Gardening is not new in the school curriculum. The results of this work, however, leave much to be desired. Advances made in the discovery and invention of material resources by the last generation decidedly surpass the progress of education. Immediate advantageous economic returns seem to receive more serious consideration in our day than does the bridging of the gulf between the vicious and the good. We must somehow get into our scheme of educating all the children a moral force that will foster the joy of creative work. The garden, as a phase of natural science, is here emphatically recommended for a prominent place in the city school curriculum. If given a fair chance it will undoubtedly make for the development of a right spirit for the common good.

SCHOOL GROUND IMPROVEMENT RESUMED IN CINCINNATI

LOUISE LAMARRE

Kirby Road School, Cincinnati, Ohio

Since the necessity for food production has been somewhat diminished more attention is paid in Cincinnati to beautifying school grounds and the esthetic side of gardening.

It has been a great pleasure to be located at a new school where the planting of the grounds has been done entirely by the pupils.

The opportunities at this school have been unusually great as the grounds were graded but not planted when the building was finished. The soil being subsoil stubbornly refused to produce even weeds. A more discouraging situation could scarcely be imagined.

However, the more discouraging the conditions appeared, the more determined teachers and pupils became to overcome the difficulties. After persistent efforts quite a creditable lawn has been developed in front of the building and beds of shrubbery are thriving in suitable places.

Plans are under way for developing the rest of the grounds which occupy about three acres.

The Civic Club composed of the boys and girls of the eighth grade decided that one of their most urgent duties is to continue the

work done by their predecessors by not only caring for the planting already done but to add a new feature in keeping with the example set them.

A committee appointed each month takes charge of the plans which have been carefully worked out and sees to it that each group of pupils carries out the task assigned to it.

A portion of the grounds, ideally located for such a purpose, is being developed as a demonstration garden. When finished with bird fountain, garden seats, arches, and trellises it will indeed be a thing of beauty and a real joy as well as an inspiration to the community.

A group of scarlet oaks planted as a memorial to fallen heroes who formerly attended the school is growing vigorously and will soon afford relief from the hot afternoon sun during the summer.

While these activities are going on outdoors with every child taking an active part, every room and the halls are brightened with pot plants in vigorous condition. While paper-white narcissi were in full glory from Thanksgiving until February first, over five hundred tulips, hyacinths, and daffodils, potted in the fall, were gradually forced into bloom. Many a dark day lost its gloom when these unfolded their brilliant blossoms.

Spring is eagerly awaited so that the work may begin or rather continue in full force outdoors.

EXTRACTS FROM THE SUPERVISOR'S REPORT, LOUISVILLE, KY.

EMILIE YUNKER

Supervisor

Never before has there been such interest manifested in school gardens as this year. More intensive gardening has been practiced and a better system of cropping has been developed. A closer relationship has been established with other departments. Excellent diagrams were made in the drawing department; studies in measuring, estimating values, marketing of products were conducted in Arithmetic; reports were written in the English classes, and flats, window-boxes, labels, trellises, flower stands and tool racks were made in the Manual Training department. Projects on broom corn, asparagus, corn, peanuts, and others were developed, thereby laying the foundation for much purposeful study, enriched with knowledge and experience.

Special teachers for the vacation gardens were selected from the training class of the Louisville Educational Association, conducted by the supervisor. Credit is due these instructors for their faithful work, their splendid results, and the fine spirit of companionship created in the garden; also to the grade teachers who helped make the work a success. The closer the cooperation, the greater the efficiency.

HOME GARDENS

Arrangements were made whereby the children could purchase seeds at 2c per packet. Knowledge gained in the school garden was applied, and so far-reaching has been the good effect of these studies, that it has inspired the making of many back yard and community gardens. Visits were made by the garden teachers. It was gratifying to observe the large number of children who raised a variety of wholesome vegetables. The area of home gardens as reported in 28 schools equalled 68.5 acres. Of these 1214 raised one food crop; 2048 raised more than one food crop; and 1631 raised flowers. The estimated value of crops was \$16,130.05. Commercially, the gardens were a success; educationally, we point with pride to our boys and girls who continued their work faithfully from seed time to harvest, who did their best towards increasing the food productions and who carried beauty into the home by learning to plant flowers as well as vegetables in their back yards and on available vacant lots.

There is another side, the sociological, which is too often overlooked. The garden teacher at Atkinson School reported the following: A truant, appealed to in many different ways at school and punished repeatedly at home, made promises of regularity that were seldom kept. His case was almost hopeless. One day, in sheer desperation, the principal sent him out into the garden. He spaded to his heart's content. Imbued with the idea that he was useful, his first request was for a "job" in the garden. This granted, he was made captain of a team. So interested did he become in his work, that he made a home garden. He helped do the canning and developed enough school spirit to want his school to win a prize. The school spirit is still developing. A better quality of work and a more dependable boy is the result.

FUNCTIONING THE SCHOOL GARDEN WITH THE HOME GARDEN

H. C. IRISH

Supervisor of School Gardens, St. Louis, Mo.

The school garden falls short of its mission if it fails to function with the home garden. If it does not serve as a factor in increasing the number of home gardens or in bringing about greater efficiency in the home garden it has missed opportunities and not reached its greatest usefulness. In other words, a well conducted school garden is bound to increase the interest in home gardens and inspire pupils to the utilisation of hitherto unused facilities for growing ornamental and otherwise useful plants. This influence will also reach out to other members of many households and the active interest of adults secured. Parents will assist and encourage the children and the latter will do much to help make a more profitable as well as more orderly and more properly arranged home grounds.

A pleasing presentation of garden matters in the school makes the subject attractive and should result in raising the dignity of labor and especially of the farm and garden work, which is too often looked down upon. No boy or girl should be overworked in his garden duties, but each should have some particular part in the preparation of the ground, planting of the seed and care of the crop. Moreover, the inspiration of numbers, where all of the pupils in a room have a part in this school demonstration in a measure forces an interest where there would be none if the child attempted to work by himself.

The garden work at school during school hours must be so conducted that pupils without home garden facilities may have equal opportunities with others. Very few of them may be able, or even wish to continue home or other outside garden work. Garden work outside the school room becomes a specialized occupation.

It is not the purpose here to give details of operations, but a general example will best illustrate the beginning of a school demonstration that should lead to a better directed effort at home. It is assumed that the school garden plot has been spaded or plowed by other parties as this operation is too heavy for most pupils in the elementary grades. A spaded or plowed plot of ground in the rough, six or eight feet wide, by twenty-five feet long with a narrow path through the long center, answers well for a demonstration plot for an average schoolroom of forty pupils. The entire room

under the direction of the teacher and competent garden instructor, which may be either one person or two different people, assembles in single line about the plot, each pupil with a hoe or iron rake. The instructor standing in the central path, explains how to use the tools, after which all pupils begin preparing the ground at the same time and those who fail to proceed as instructed are corrected as the work proceeds. In a comparatively few moments the ground is made fine, mellow and in smooth condition, ready for making rows in which to plant seed. Rows are laid out the long direction by two or three pupils according to a plan drawn to scale, made in the room previous to coming to the garden, and which shows the number of rows, distance apart, and kinds to be planted. While rows are being made, a few seeds are distributed to each pupil and when all is in readiness, and the methods for dropping explained, the seeds are scattered, first in the two outside rows, then stepping over to each succeeding row until all are planted. The seeds are then covered, either by hand or by rake, leaving the surface even and loose. In like manner, the after care of the crops is given proper attention and occasional visits are made to the garden for observation.

Unfortunately many city schools have very poor or even no facilities whatever for conducting garden operations. A hot bed, a window box, or even a few flower pots, may often be advantageously used for such work as the examination and behavior of soils when watered and allowed to dry, and also in the germination of seeds and the starting of various early plants for the garden, such as tomatoes, cabbage, and many flowering plants. Many seedlings started in this manner may be taken home later by the children, which in itself will be a stimulus to some home garden project.

By this work at school pupils will have learned much about plants, their culture and uses, and some of them, who have a place will desire to grow a greater or less number at home. They should be assisted and encouraged by the school as far as possible. Experience has taught that boys and girls accomplish more by organizing into school garden clubs for the performance of work outside school hours. All enrolled in this work from one school may constitute the Boys and Girls Garden Club of that school, thus making each school a unit of organization.

The measure of success and continuation of the home project will depend much upon the amount of supervision given. The mem-

bers of the Club should meet occasionally as a whole, or in small groups, if the club is large, for the purpose of learning from one another's experience and visiting one another's gardens. These clubs should be officered from their own numbers by having a captain with subordinates, or a president with associates. In addition, there *must* be a responsible leader or supervisor, either from the teaching force, of the school, or some outside competent man or woman, who may be engaged for these duties or who may be glad to volunteer service for this cause. It is far more important that these supervisors or leaders know children and how to hold their interest than to be expert gardeners. They should know much about gardening, but more about boys and girls. Among teachers in most schools are those who fulfil the requirements as garden leaders. Many of them would be glad of the opportunity to spend their summer vacation in this home garden supervision for a reasonable compensation, and thus help the boys and girls to round out the year's work in gardening. Those pupils maintaining creditable gardens during the year, as reported by the leader should be given a certificate of award in recognition of his faithfulness in the work.

SCHOOL GARDENING VIEWED VOCATIONALLY

CHARLES L. QUEAR

Supervisor of Agriculture, Kansas City, Mo.

The aim in garden work of the Kansas City Public Schools has not been essentially different from other city schools having similar courses of study. While the work starts in the kindergarten and continues throughout the entire elementary grades, the garden work proper is given only in the last three years of school. A nature-study course in the first five years of school is designed with the view of prefacing the garden work so that the whole course represents a continuous and progressive line of study. Upon completion of common school, in a broad way, every pupil is brought to a keen appreciation of the things out of doors and this is accomplished both directly through the nature-study and gardening course and indirectly through close cooperation of this work with academic subjects.

For instance, the art work of the schools is given a practical application in the design of landscape work on grounds and gardens

and an appreciation of beauty is instilled through field work and landscape study.

The mechanical drawing is utilized in making drawings of the garden planting plans, and the work is broadened to include planting plans of the home gardens, drawings of the city block and in some cases even expanded to county maps with permanent geographical features included. Local geography is largely included in the early part of the program of gardening proper, and the geography of the fifth grade is presented with this idea in mind.

The garden course proper embodies education similar in nature to any of the industrial courses in that the hand is trained as well as the mind. In no course given in the schools, can work in Manual Training, Domestic Science and Art, be motivated as in gardening.

Last year the work was offered in 43 schools and reached approximately 3570 pupils. Instructors in the industrial department were responsible for the work, the Manual Training teachers having charge of the boys and the Domestic Science teachers being responsible for the work of the girls. Work was begun early in the year with the making of planting and landscape plans, for the gardens. Each pupil makes completed drawings. As a result of this work and the discussions following either the best drawing of the lot or a new drawing combining the best ideas, is used as the actual planting plan. Then comes a discussion of varieties of vegetables, and preparation of seed orders, followed by the preparation of soil for planting.

Hotbed work, window box plantings, seed testing, etc., receive attention at this time. From the time of the early plantings until the close of the term, garden work receives a full share of the time allotted to industrial work. There is no definite portion of the time given to the garden work, but there is no restriction on the amount of time which may be used. While it receives a small portion of the time in winter months, during the spring and early fall it may be given the major portion of the time devoted to industrial training.

Boys grew most of the vegetables although they were given some assistance by the girls. The girls delighted more in the flowers, did harvesting, canning and preserving of certain crops for cafeteria use.

At no time has there been trouble in holding the interest of pupils. Where instructors find the work interesting and show real effort, the children have responded with a surprising degree of earnest effort.

The teachers in the Industrial Department are given definite instruction in teachers' meetings concerning the work to be taken up, and important points discussed so that a uniform plan of procedure is carried out. Industrial teachers are being selected with a view of their ability to give this work and the plan of having the work handled by such teachers seems to be functioning much better than leaving the garden work in the hands of academic teachers.

During the summer months, the school gardens are in charge of teachers who spend one-half day twice a week in the garden. The children report at those times and work under the teacher's direction. As much of the produce from the garden is given to the children as the teacher feels they should receive for this work. Surplus produce from the garden is used in the cafeterias or donated to charity organizations.

Most of the gardens are laid out to represent typical home gardens. It is felt that a garden worked by a group of pupils gives them a spirit of cooperation, produces a better garden and is a more economical method of procedure than allowing each child a given spot of ground.

Attention to beautifying the garden is given at all times, but it is not made of paramount importance. The garden work is conducted to grow vegetables and flowers and if to grow the maximum amount of vegetables requires that it be conducted so as not to be the most beautiful, we do not let beauty stand in the way. Utility is emphasized in connection with the garden, while beauty is stressed in the landscape work.

What we feel to be the feature of the entire program is the Central Garden plot. This plot comprises 40 acres of ground, 35 of which are given to intensive cultivation. All common vegetables and small fruits are grown here. Plantings experimental in nature are given some space, and demonstration plots are maintained. Specimen plants for use of the nature-study classes are grown. At present 50 hotbed sash are in use, and with a forcing cellar in operation, the growing season is made to cover the entire twelve months.

During the summer all work that can be made educational is done by school children. We expect to give the course this summer to 90 boys and 30 girls. Two or three young men of high school age will be employed for the heavier work with the aim of giving them a vocational course. Their wages will run about \$20 per week.

The school children will receive about 15 cts. per hour, and will work only half days twice per week. The half day will be divided into three and one-half hours work and one-half hour lecture, with four hours pay. The boys and girls will be kept in separate groups under competent teachers. The teacher will give the talk and lead the discussion. A small wooded park comprising five acres of the farm furnishes an ideal lunch ground and place for the lectures. The girls will can and preserve small fruits and vegetables for school cafeterias, using home methods as much as possible. It is expected to use a school Domestic Science room for this purpose which is located across the street from the Central Garden.

The boys, in addition to growing the produce, take it to the city market and dispose of it both wholesale and retail. There is no pleasure quite so alluring to the boys as the trip to market and nothing contains more education. They are responsible for the funds, for the profitable sale of the produce and for maintaining the business relations of the school farm, as we are known on the market, with the commission men and the public.

Last summer's work demonstrated the boys can outsell most men on the market. They are anxious, enthusiastic and pleasant. They treat every one courteously and as a rule sell out a load in short order.

To leave a boy on the market, with a load of produce, giving him all the responsibilities of a grown man will do more toward teaching him reliance, self-confidence and the business end of acquiring a livelihood, than any one piece of school work with which I have ever come in contact. With a hope that we, the boys, teachers and I, can make an actual profit in dollars on the central garden this year, the work is being planned with every care.

But first of all, everything must yield to education. The educational value is paramount and vital. The remuneration is secondary. The former is practically assured, and I confidently predict that we shall win a fair share of the latter.

NOTES FROM A HOME GARDEN SUPERVISOR

HELEN SEAMAN
Seattle, Washington

It was the good fortune of being garden teachers that brought us to Seattle last July, a city set in a wonder spot of beauty. To the west is Puget Sound with its border of low-lying hills—foothills to

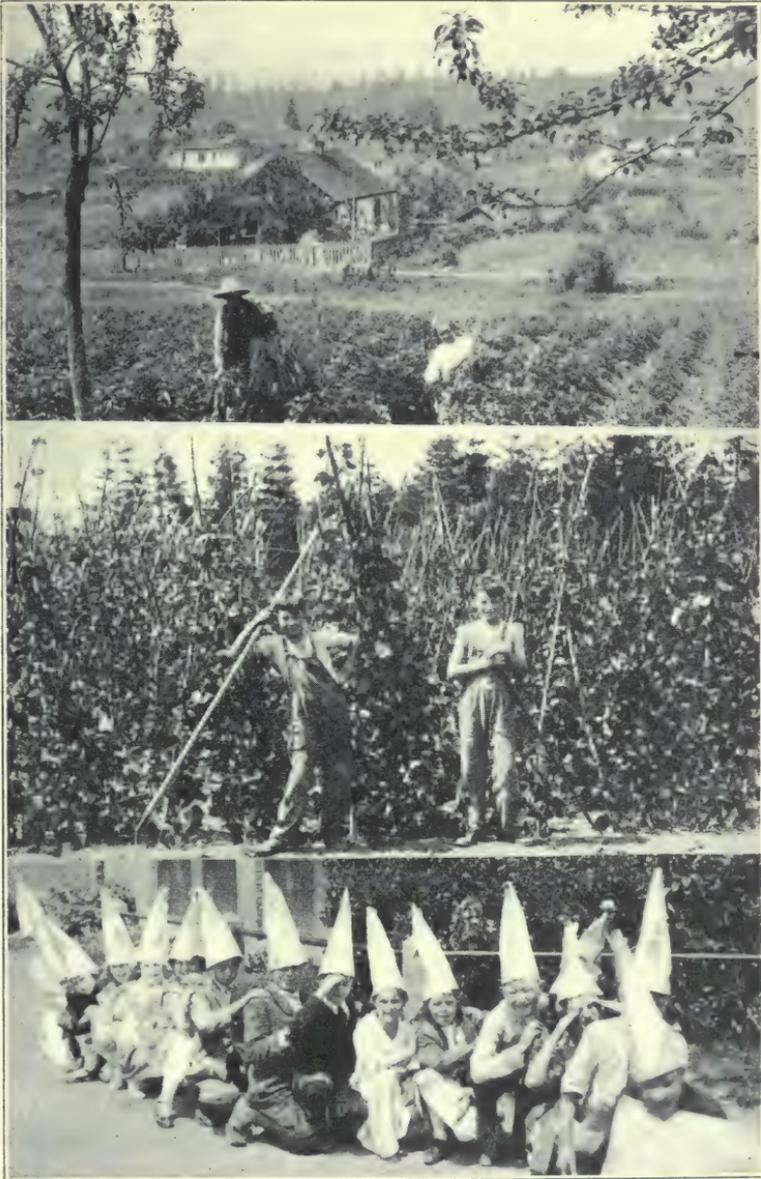
the majestic Olympics; to the east Lake Washington, and, beyond, the Cascades, and to the southeast The Mountain—Mt. Rainier—clothed in white—"a footstool for the Gods." But the season was on for visiting the home gardens of children from the fourth to eighth grades, so we literally "came down to earth," and in the five weeks that were left of the season for us we each visited five hundred gardens.

Altho the long axis of the city is twelve miles, its distances seem mainly vertical to one afoot, as the glacial action left this a hilly region. Thruout the city the soils are largely sand and clay—glacial material—except in the post-glacial river valleys where there are rich alluvial deposits. With soils that were either sand or stiff, pasty clay the new gardeners had a job on their hands, and those who had been at it for several years still had some problems. The work is organized on the U. S. Garden Army plan, and we were glad to have the company of a garden lieutenant whenever our rounds coincided with his, or occasionally he would go along as guide.

With the use of fertilizers, water, and industrious cultivating almost any crop will flourish in even the poorer patches, and in the rich soils the growth is truly wonderful.

Some addresses lead to the outskirts of the city, where the land is still only partly cleared, and it is on such hikes that ones sees a great deal more than gardens. One day we found ourselves at the edge of a steep wooded ravine. A passer-by told us that our street was at the bottom of that "gulch" and to follow the steps. But the steps were only an encouragement to start and the rest a slide of some two hundred feet. As a reward we found the home of some mountain beaver, and there was still further reward awaiting us. At the bottom of the "gulch" an old log road disputed right of way with a half-hearted stream, as it led between a row of shacks. A stranger was a curiosity, so there was no difficulty in locating "Jimmy's garden." His mother, however, had wrestled with the half-cleared slope until it was ablaze with color—sweet peas, marigolds of all kinds, poppies—what a riot! Shasta daisies, forget-me-nots, nasturtiums, dahlias—a kaleidoscope of color well displayed by the somber setting of firs and cedar.

Another day found us at the other end of the city pushing thru underbrush of salal and Oregon grape to the top of a bluff which shelves out several feet below, and there was our shack and garden,



1. Charles has the help of his small sister in this quarter acre of potatoes, and, in his words, he "hands her a dollar now and then."
2. These twins are justly proud of their crop.
3. "Katching Katerpillar Krusaders," University Heights School, Seattle, Wash.

so we just "dropped in." A fine little Norwegian family were making a start—and a wonderful site they had selected. The trees had been cleared to give a view out across the Sound to the Olympics rising high beyond. The boy was gathering hazel-nuts, but came back to show us his garden. It was a first attempt and the soil was mostly sand, but he had added some leaf-mold and was justly proud of his results. How those people loved their woods! We explored a bit. There were some Lewis woodpeckers busy at a tall tree, and then from another corner came the old familiar cry of "thief, thief." And a thief he is, for here he has stolen the blue-bird's cloak and wrapped himself well in it. Then, to disguise he wears a hooded helmet of deep iridescent purple—a stylish, striking thing, for how could a jay be otherwise, and the Steller jay will not be outdone. Hilding knew where the robins had nested, as well as the thrush, and had several stories to tell us of the little ones. That was his world and he loved it, and everything that grew and lived there. We hope that that love of the out-of-doors, that pride in his garden, will be a lasting influence, and one that will be a determining factor in later years whenever there is to be a choice between a house with some out-of-doors attached and an apartment. We want to make not only gardeners but home lovers.

We found many fine gardens as indications of real industry. A seventh grade boy who lived in one of the houseboats which fringe the Lake at certain points, had caught large masses of muck that float down the Lake at times, and had filled in a goodly portion of his shore-line, to be rewarded with some extra fine sweet pea blooms. Robert, who lived at the top of the hill, had pushed many a wheel-barrowful of such richness up to his garden—and a fine garden he had despite the fact that he had a "job" during vacation as well. Many families relied almost entirely on their young gardener for vegetables, and were well supplied. Charles, aged 14, not only played the main part in the family garden of one and a half acres, but with the help of his smaller sister, he worked a quarter acre of potatoes, and for such help he reported that he "handed her a dollar now and then." There is no strong insistence on the child doing the work entirely alone, in fact a garden is a good ground for the seed of helpfulness, and the family garden is heartily encouraged.

Last summer there were some six thousand gardeners enrolled from the fourth to eighth grades inclusive—more than enough to

keep the nine teachers busy—and when the Autumn Garden Exhibit took place in each of sixty schools, the exhibit rooms were overcrowded. Again and again we heard the remark, "How much better quality than last year." and how much larger the exhibit is. Not only were fresh vegetables exhibited, but the canned fruits and vegetables which in most cases the girls had raised as well as canned. Awards were made on the basis of quality and effort, and those entries receiving blue ribbons were sent to the High School to which that school was tributary to be a part of the agricultural exhibit there. In that way another tie was made between the grade and high school work.

NATURE GARDENS IN NEW YORK CITY

VAN EVRIE KILPATRICK

Director

The School Garden in New York City is now being interpreted as the outdoor laboratory of the school. All nature teaching functions in the garden. The natural and physical sciences present a sorry expression indeed without the complete organization of all the outdoor educational opportunities. Every school garden is therefore the garden of a particular school. It is primarily the place where the pupils of that school learn through direct application about the natural world.

A number of New York City schools program classes the year round to the garden work. When the seasonal work cannot be done outdoors the more instructional work is taught indoors.

One of the first efforts of the school garden department has been to organize for a broader interpretation of gardening. The raising of a few hardy vegetables by children is only a first step.

The school garden—the outdoor laboratory of nature—is the use of every outdoor facility for nature application. The school garden is raising vegetables, flowers, shrubs, vines, rabbits, chickens, etc., at the homes of children. It is applying landscape gardening to the front lawn of the school grounds, vegetable gardening and small-fruit gardening in the rear of the school grounds. School gardening is the use of vacant lots, city property, and park property.

Indoor gardening in the schoolrooms is becoming more and more popular. Eight thousand first quality paper white narcissus bulbs have been grown in the elementary schools of Manhattan in order

to try out, on a large scale, the cultivation of bulbs in the schools. This experiment was most successful.

There are more schools with school gardens in New York than in any other city, but there are also more pupils with home garden opportunities than in any other city. In the early season 92,000 circulars encouraging pupils to buy and plant seeds in their home gardens were circulated in the schools. This would indicate that in the schools of the outlying boroughs there are doubtless 100,000 children with opportunities for home gardening.

It is estimated that the season's produce reached a total value of \$33,153.30. The early tabulations showed \$6,797.46 worth of vegetables taken from the school gardens during the summer.

Twenty-two teachers conducted the gardens of seventy-three public schools. Over 3,500 pupils had garden plots and during the summer took an average daily produce home of \$135.95. The value of all these vegetables was computed after counting or measuring by the teachers in charge, and reporting the value of the amount taken out of each garden weekly. For example, a quart of beans was rated 15 cents; a head of lettuce 10 cents; a carrot 2 cents, etc.

It is not difficult to understand when children secure so much valuable food every day that the attendance is very nearly 100 per cent. based on at least once a week cultivation. But in many shaded gardens, particularly in Manhattan, where very little produce was procured, the attendance was maintained through the natural interest of the child to cultivate a living plant.

Do We Need School Museums?

ELIZABETH K. PEEPLES, ELIZABETH DYER

Teachers of Nature-Study, Washington, D. C.

Are you one of those unfortunate teachers with a taste for travel and a correspondingly ill-filled purse? Then partially satisfy that taste by having your pupils make a school museum. Whatever it lacks in intrinsic value, rarity or beauty will be made up by enthusiasm of the collectors, the joy of proprietorship and the never-failing happiness of seeing the project grow.

First of all there is the high adventure of producing out of nothing a case to hold whatever the children collect. In accomplishing

what seems to be impossible there lies a mighty charm. An old bookcase, shelves donated by an interested parent, or best of all a case of open shelves built in the carpenter-shop by the boys have each been used by the writers to house the nature collections of various schools.

One has but to outline to the children a plan of action. They do the rest. While studying trees they bring wood sections, pieces of bark, dry fruits, pressed leaves, and pictures. Intent upon birds, they specialize upon feathers, deserted nests and food charts. The underlying rocks of the region, cocoons, bagworms tell the story of garden interest.

Organization lies beneath the success of all great enterprises so the Museum Committee must be formed as well as the Committee on Dusting. Two pupils from each grade are sufficient to keep the museum in order and equally important, in the foreground of class consciousness. In one building the success of the museum has been almost wholly due to the enthusiasm of the chairman, a cripple, a victim of infantile paralysis, a rare spirit with the ability to make those around him forget his handicap. He selected the most prominent place in the building for the location of the museum, just opposite the main entrance in the first floor hall. As the nature-study teacher entered the building one morning, she found him on the floor struggling to replace the lowest shelf. "The museum has had a nervous breakdown, but it will recover soon." And it did, a little better arranged than before. Three times for various causes that same cripple had occasion to rearrange the collection and each time he has set himself the task of making it more satisfactory. "This is all very well for you, Richard," said the teacher one day, "but what about the other children? Do they get anything out of it?"

The reply was most reassuring. "This is their favorite parking place. Everybody is crazy to belong. They worry me to death to increase the membership."

The visiting nature-study teacher, who travels literally with her hands and arms full, welcomes the help of a school museum for the interest that keeps alive her work between visits. Under more favorable conditions where there is a teacher in charge for all grades of a building the possibilities are unlimited. In one such place known to the writers, the first donation was a fine collection of models of prehistoric animals made by a scientist in the com-

munity. This was followed by the egg of the ostrich and the dark green one of the emu laid by these animals in the Zoo. To quote from the report of this teacher, "Here's a piece of petrified wood." "Do you know if this is gold on this rock?" "I can bring some cotton from Georgia" "I have a coccanut right from Florida, that my aunt sent me with a stamp stuck on it. May I bring it?" A very active tortoise, found on the way to school was our first live contribution. So one after another all kinds of specimens came usually with questions as to their identity, which were sometimes answered simultaneously by teacher and pupils. We have our exhibition of bird boxes. During Kindness to Animals Week, a voluble parrot, white mice, a chameleon, a litter of puppies, wide-eyed bunnies, a six-toed cat, baby chicks and tortoises came to school in the morning and returned home at the close. As this laboratory is in the center of the building and a thoroughfare for many classes the pupils have more than class time to view the collections. One large table is set aside for current donations and is always a magnet of attraction. Bulletin boards made by a parent are filled with contributions of pictures, magazines and newspaper clippings of the out-of-doors. One after another, my every ready helpers have made shelves to add to the tiers which hold our museum. With a bird corner, an insect corner, and sections for rocks, shells, seeds, tree and wood specimens, we have reached our capacity." Looking back on my own schools I cannot help but feel that the future of my boys and girls will be richer and happier for the intimacy they are gaining with the great heart of nature."

From a museum like that described above to an out-of-doors room is but a short step if the room is available and the teacher has continued interest. To many, this is a new idea. Picture this room at the Washington Normal School. Scrub pine hides the walls and gives the impression of the pine grove. The floor is strewn with leaves renewed from time to time. A large sand board has been converted into a mossy bank upon which the partridge berry creeps; hepatica blossoms and just now skunk cabbage peeps through the dead leaves as it does in the swamps outside. In one corner are mounted specimens of winter birds, a feeding table and a simple bath. In this environment the little ones of the kindergarten, first and second grades are given their nature lessons. A group of little ones from a downtown school visited it one day and asked, "Is this the real country?"

School museums should lead to a more intelligent use of public ones. Watch the average sightseer passing through a city or national museum. He is overpowered by the wealth of material; sees but little and understands less. He passes through its doors with a vague conglomerate of historic costumes, Egyptian mummies, tropical birds, etc., mentally bored and physically tired. As in travel, he gets out of a visit to a museum what he has to interpret it with. Therefore in youth he should learn that a museum is to be used as a reference to enlarge his knowledge on definite things; not to show him the world in a nutshell.

Be Patriotic, Vote for a National Tree

The American Forestry Association whose headquarters are at Washington, has recently launched a campaign to secure widespread expression of what shall be our national tree. Editors throughout the United States are being asked to print the ballot and to urge the schools of their respective cities and towns to send their votes to the Association. By such method, however, a voter may send in his ballot marked "elm," "oak," "walnut," etc., and know very little about the tree. Education of the voters is necessary so the Association applied to the Superintendent of Schools of the National Capital for the co-operation of the teachers. This was granted and the work of educating the children and the public was assigned to the Nature-Study Department. This department has eight teachers who visit the sixth, seventh, and eighth grades every other week for a forty minute lesson.

For two years tree study has been the nature unit for the eighth grades. It was, therefore, deemed best to make an intensive study, in that grade, of a small number of trees that are commonly planted along streets or are found in the suburban sections, and through these children, educate the grades below. The white oak, pin oak, American elm, hickory, sycamore, apple, tulip, dogwood, sugar-maple and white pine, were the trees selected.

A visiting nature-study teacher with but forty minutes once in two weeks would find it difficult to take classes out-of-doors for the study of the complete list. The larger part of the teaching, therefore, had to be done in the classroom but if one of the candidates was available nearby, then out-door study was the method used. To teach trees indoors in a very limited time so that children can

recognize them in the open requires careful lesson planning that children may be inspired to independent research and it also demands the use of much illustrative material on the part of the



Have you voted for a national tree? Charts illustrating the uses of Pine.

Courtesy of the American Forestry Association

teacher. By means of branches of trees; their fruits; pictures; wood sections and pieces of bark, the distinguishing characteristics of one, sometimes two trees were taught in a period. A spray of each tree was left with a committee of children to press and mount on herbarium paper by the time the teacher returned. To secure

sufficient material for so large a number of children, permission was obtained from the city's tree planting department to carefully cut what sprays were needed from the street trees. Pictures were obtained from the U. S. Forest Service; wood sections and bark specimens from wood piles in suburban sections where real estate operators were "improving" land by felling trees.

To insure that the children would know the trees in the open, at the close of each lesson assignments to be completed before the nature-study teacher's next visit were left with committees of children. All teachers know, however, that children's committees need the inspiration of the classroom teachers. The busy eighth grade teachers of Washington always found the time to give this inspiration. A few local examples will illustrate the assignments.

There are magnificent elms in the White House Grounds, the Ellipse, the Capitol Grounds and Franklin Park. Visit one of these places and learn its shape.

The nearest sycamores to the Ross School are on Eleventh Street. Are they desirable for street planting? Find out why they were pruned so severely last spring.

There are three kinds of hickories around Washington, the mockernut; the pignut; the bitternut. Find the nuts of each. If you are a good Scout you can.

Learn the names of the five commonest apples for sale in Washington markets.

What is there about dogwood that is the cause of its destruction? You know its berries. Go to the Zoo before they fall and learn its bark.

Name all streets that are planted with oaks within five blocks north, south, east and west of your school. Find the circumference of the largest oak in the section, measuring four feet above the ground.

Other assignments were given that would send the children to books. The public libraries decidedly felt the pressure. A few illustrations of these will be sufficient.

Does the elm grow in sufficient number of states to warrant making it the national tree?

There are pecan trees at Mt. Vernon over a hundred years old. Find something of historical interest about them.

The name dogwood is odd. Is there a reason for it?

Are pines strictly evergreen? How did they acquire the habit of keeping their leaves in winter? How is turpentine made?

Describe the following apples so they can be recognized by people not acquainted with them: York Imperial, Winesap, Stayman Winesap, Grimes' Golden, Ben Davis.

Speak of the advantages and disadvantages of a fruit tree being the national tree.

The apple lessons were particularly delightful to city children who had never thought of apples by name, or difference in eating qualities.

As this educational campaign progressed, the interest of the children led them to make articles in miniature showing the use of oak, pine, hickory, hard maple, walnut, etc., photographs and diagrams of street planting in the vicinity of the schools; brush sketches in ink of trees suggesting devices for their use on coins and government letter heads; historical events connected with the elm modelled in clay. So much material had been gathered that when, near the close of the campaign, the American Forestry Association asked that a greater number of children than the eighth grades be granted the voting privilege, an exhibition for the education of the new voters was quickly and easily arranged. The children were asked to place on large mounting cards material that would illustrate their choice for the national tree. These charts were exhibited at the Wilson Normal School for four days before the vote was taken and the public asked to use them as a means of education and then vote. Thousands of people visited the exhibit, boys and men in great numbers. The interest shown warranted extending the exhibit three days.

Three minute speeches on the value of the tree candidates as a national tree were delivered by the children of the eighth grades to the children of the grades below and to the visitors at the exhibition. The American boy or girl feels his country's call deeply, be it a call for war service or a call to vote for the national tree. Speakers in the recent presidential campaign did not take themselves more seriously than these youthful speakers. The speeches were earnest, sometimes poetic, full of patriotic appeal to vote for a truly American tree and, best of all, a determination that the voters should know reasons for their choice. It was not always the boy who spoke "longest and loudest," as one boy expressed it, who carried his audience, but the boy who clearly and logically made his points. 18,000 votes were cast, 7,037 for the oak, but no figures can measure the interest in trees and their conservation that has spread through the homes of the city.

If you want a thoroughly enjoyable spring nature unit start a campaign for the national tree. It will take about two months to do it well. List your local tree candidates; study them in the open, historically, commercially. Put your speakers on the stump. Ask one of the leading papers of your community to print the ballot and send your returns to the American Forestry Association, 1214 Sixteenth Street, Washington, D. C. Interest in trees and their conservation is slow in growth. This is strictly an educational campaign to quicken this growth and well worth the science or nature-study teachers' best effort.

The American Forestry Association is taking a nation-wide vote to determine what shall be America's national tree.

I vote for.....
 Name
 Street
 City..... State
 School

Forward to the American Forestry Association, National Tree Voting Department, 1214 16th Street northwest, Washington, D. C.

Campaign Speeches for the National Tree

THE DOGWOOD

Now devoid of berries and leaves, the dogwood stands before us this new year of nineteen-twenty-one as a candidate for our national tree.

Our national tree should be one of great beauty. Is there a tree more beautiful than the dogwood? You say the oak is more stately. But can the oak boast of beautiful white flowers in the spring, and dark red leaves and berries in the fall? Its flowers and leaves are known and loved by every nature loving man, woman and child. Trees are our main source of beauty and without beauty this would be a dull, work-a-day world. The dogwood is the most beautiful of all trees. The already beautiful scenery along the roads of the United States, improved by the planting of dogwood trees, would, fifty years from now, be the envy of all nations. Artists, fully appreciating the beauty of the scene, would paint it and these paintings would go far and near, convincing the world that we are greater lovers of beauty than money.

The dogwood berries furnish food for forty-seven different kinds of birds during the fall and winter. If that isn't a good argument for the dogwood will someone in this audience kindly tell me what is?

You may say this: "We have been told that people pick and destroy so much dogwood that it is rapidly becoming extinct. We don't want that kind of a tree for our national tree." Before red, white and blue became our national colors did they mean much to the colonists? Would they have thought anything of cutting, tearing or tramping upon them? But what would we think of a person who would do such a thing now? The same thing would hold true if the dogwood became our national tree. People would soon learn what a terrible thing it would be to harm even one of its flowers.

We people living around Washington and Baltimore should be particularly fond of the dogwood. And why? Because literally speaking it grows under our very noses. What good would it do us to have the redwood of California for our national tree?

The dogwood has very little commercial value but this is all the more favor in it. Why take a tree that has extensive commercial value? Money plays too large a part in the lives of modern Americans. Take the dogwood so we can make it a truly ornamental tree. The dogwood is a tree that stands for all that America stands for—the white of the flowers for purity, the red of the leaves and berries for valor and the whole tree for justice and in closing I wish to say:

These arguments were made by one, by me,
But it lies with you to elect the tree.

MARTHA MENDALL,
8B, Ross School,
Washington, D. C.

THE HICKORY

Friends and fellow-classmates, I have come before you to convince you that the hickory is the tree that should be made our national tree. Do you realize that the hickory is the only one of the nine candidates that is an all American tree; that nature has caused eleven of the twelve kinds of the hickory to grow in the United States? If nature has done this we can at least repay her by selecting the hickory as our national tree.

The most important of the hickories are the shagbark, mockernut, bitternut, pignut and pecan.

The shagbark is a tall stately tree seventy to ninety feet in height, unmistakable on account of its rough flaking bark which shags off in large plates. The nuts of the shagbark are the hickory nuts of commerce. It is said that there is more nutrition in a shagbark-nut than there is in any other nut. The experiment of cultivating the shagbark would be an interesting one, certainly it deserves as much attention as the English walnut. The wood of the shagbark is heavy, hard, tough and close grained and it is used for agricultural implements, ax handles, wagon stocks and baskets. It is said that a block of hickory is as strong as a block of wrought iron of the same size. The shagbark grows in the United States from Maine to Florida and as far west as Kansas.

The mockernut grows to a height of one hundred feet. It gets its name on account of the shell of the nut being thick, hard and difficult to crack. It grows in New England and in the south and west. Its wood is used for the same purposes as the shagbark and it is of equal value.

Michau calls the pignut one of the perfect American trees. It is stately and beautiful in outline. The pignut received its name from the first settlers who on seeing their hogs eat its fruit with such relish called it the pignut. The pignut makes a beautiful lawn tree and would be planted everywhere if it were not for its name. The range of the pignut is the same as the other members of the genus.

When we go to discuss the hickory's opponents we find that the oak was worshipped by the early Greeks. It was dedicated to Jupiter by the Romans and played a part in the religion of the Britons and Germans. Does this sound American? The elm thrives better in England than in the United States. The dogwood is rapidly becoming extinct. If the dogwood supplies food for forty-seven species of birds, the hickory supplies food for 91,972,000 people. The apple caused so much evil in the beginning of the world that we do not want our streets lined with reminder of what man might have been. The sycamore was used by the Egyptians two thousand years before Christ to bury their mummies in. Ancient Egyptian caskets and a modern American national tree do not go together.

In summing up the points of the hickory we find that it is stronger than the oak, that it has the beauty of the elm, the stateliness of the tulip and the symmetry of the pine. Friends, I ask you why a tree with all the good points of its worthy opponents cannot be our national tree? The decision lies with you.

The hickory would make a good emblem for America for it is a beautiful and strong tree as the United States is a beautiful and strong nation.

If Andrew Jackson was proud to bear the name of "Old Hickory" to the White House, we should at least be proud to select the hickory for our national tree.

And when you go to cast your ballot remember this slogan, "An American Tree First."

WARREN SUMMERS,
8B, Ross School,
Washington, D. C.

THE ELM TREE

FRANCIS MARSHALL
8B Force School, Washington, D. C.

Oh! Thou Elm so very high,
Your only rival is the sky!

Tall, majestic, ever great,
In no matter what the State.

Our very heart you take away
When lighted by the sun's bright ray!

How can you help but be admired
When every grace you have acquired?

You are a sample of nature's art:
A secret of God, to us, impart.

You have gotten, by some device
The blessing of all Paradise.

To you none other can compare,
Oh! thou spirit of the air!



A home garden in Duquesne
and the gardener

Near the end of the season in the
children's gardens in Duquesne

Children's Gardens in a Steel Town

LENA S. THOMAS
Ithaca, N. Y.

The City of Duquesne is situated on the west bank of the Monongahela River and is about half an hour's ride by train from the City of Pittsburgh. It is essentially a manufacturing town, its growth being the result of the location there of the Duquesne Steel Co. founded by Andrew Carnegie himself. The material prosperity of the city is dependent for the most part on the prosperity of these mills.

The town might almost be completely divided into two sections, those east and west of the tracks of the Penn. R. R. which runs north and south the length of the city. To the east of the tracks are built the company's mill and to the east of the tracks dwells a badly congested foreign population.

I have been told that in the years before the play-ground and gardens became an established part of the community life there, it was quite an unsafe place to walk the streets. That condition must have long passed away for I have never experienced anything but genuine welcome from these same foreign people.

It can truly be said of this town that fully one-half does not know how the other half lives. Children from the west side are forbidden by their parents to go below the tracks, and many grown people who have lived in Duquesne all their lives, have never been in the lower section and have no conception of its conditions. That these conditions have been improved greatly in the last ten years is no doubt due largely to the Welfare Activities of the Steel Corporation.

In 1913 the Welfare Department determined to add gardening for children to its other activities, and a teacher was obtained from Cornell University to direct the project.

The land selected for the experiment was some belonging to the Steel Co. located in the slummiest part of Duquesne, bounded on the east and south by the tracks of the Union R. R. There are trains loaded with hot slag constantly passing and repassing along this track and a constant shower of hot cinders is expelled from the engines all over the gardens below. On the west an alley that forms the back boundary line to a row of tenement houses extends the whole length of the gardens. This land was at that time pure clay, and covered with as fine a collection of tin cans, bottles, rags, old wire bed springs, and miscellaneous litter as could be found anywhere in the U. S. A., the reason for this being that Duquesne has not taken over the task of collecting its garbage, but allows it to be done by private individuals who charge by the week or the barrel, which of course results in its being dumped on all vacant lots. Well, the Steel Co. had this land cleared and filled in with good loam. Then they fertilized it and the gardens were planted upon it.

The children who worked these gardens were gathered thru the medium of the public school, but practically every child lived in this congested district below the track, was born of foreign parents, and some member of the family worked for the Steel Co. This was not a condition necessary to membership, but simply the result of the location of the gardens and the occupation of the population of most of the town.

After establishing these gardens, they turned their attention to the town in general and established six small community gardens as they were called, as model gardens in different parts of the town. These were taught by volunteer women of the town who in turn received instruction from the Supervisor provided by the Steel Co. There were six of these gardens laid out in individual plots 4 x 4

feet and accommodating about eighty children. While the two gardens on the Steel Co. property were respectively 100 by 120 feet and 100 by 75 feet and accommodated about 150 children (plots 10 ft. x 10). The writer had the pleasure of visiting all these gardens in 1913 and was delighted with them.

Oddly enough the next spring a call for a teacher for these same gardens resulted in the selection of the writer of this article, who has remained there until the present time.

The second year I was there we cleaned up and fenced another lot on the Steel Co. property. This accommodates about thirty children being divided into larger gardens usually about sixteen feet square. These are reserved exclusively for the use of the older and more advanced children, those who have made a good showing in the smaller gardens, winning garden or vegetable prizes. There is a great demand for these larger gardens. They happen to be situated on much richer ground, so the growth of the vegetables is quite luxuriant, and being so large they will produce enough to almost feed a family, of course they are a great help when "We have six boarders." So its woe to the child who neglects and thus loses a large garden, his parents have no sympathy for him.

The Steel Co. pays all the expenses of the gardens on their property, including the building of fences, toolhouses, repairs on them, furnishes tools for all the children, all the seeds used, plowing, fertilizing, etc. They have never been asked for anything in the way of equipment that they have not willingly furnished. They have piped water to each garden and this year have improved the system by laying pipes thru them so several hose may be attached and used at the same time. During the first three years they furnished a laborer whose services could be had at any time during the year. However it was decided that it was better to make the children feel that they themselves were entirely responsible for the appearance of the gardens. Now we have a laborer to lay out the paths making the individual plots. This takes about a week in the spring. After that the children do every bit of the work, unless in case of sudden emergency after heavy storms.

We have storms there that fill up the gutters and cause the flooding of the gardens, sometimes they are covered with water a foot deep for three days at a time. If the vegetables have got most of their growth little harm is done. But if the storm comes while they are small many of the individual gardens are spoiled

I do allow the parents to help, in many cases, especially when at the beginning of the year, I have many new and young children to teach all at once. The women are very eager to do this, they want the vegetables. Most of them have always done gardening in the old country. They will transplant a large beet with wonderful success. They don't bother to cut back any of the leaves and the beets don't wither after transplanting.

During the war our Community gardens were turned into School gardens. Additional land was given for our use. The size of the individual plots was enlarged, and every effort made to give each child an opportunity to do his part, who wished land. The school superintendent of Duquesne, Prof. Wolford, has always done everything possible to promote gardening in Duquesne. He and the school board co-operated with me in every way, the board voting to pay six of its teachers by the hour to assist me in teaching home and community gardens, and we enrolled over five hundred children as members of the U. S. Garden Army. The Board furnished seeds for the Community gardens and high school boys were excused during the last period that they might come out and dig paths for the smaller children.

It might be well to explain here that all my garden children are below high school grade. In a town like Duquesne all the children go to work for money the moment they reach the age when the laws of the state permit them to, and as a rule every foreign child works during vacation that can get a job of any kind. During war times many children earned as much as grown women had before. So the temptation to work was much greater. So only the smaller ones were left to garden.

Since the war our Community garden work has been reduced to a minimum again. This is greatly to be regretted for many reasons. But it seems best because of the constant pilfering that occurs on unfenced lots. When one set of children work all the growing season to produce a crop and then have it harvested for them by a passer-by it produces a reaction of feeling against gardening that is not conducive to harmony. Therefore this year we had just two community gardens with 36 children. I did not ask the School Board for a teacher for them but took over the task myself. All the work on these gardens has been done after six P. M. when my other work was finished. I spent three evenings a week at these gardens during the season.

This year the garden work for the season began on April 5th, the first Monday after Easter. The first week was spent visiting the schools and giving the usual talks to the children between the 3d and 7th grades. These talks described our plans for home and school gardens during the coming season. Children were urged to do all they could toward cleaning up their own and their neighbor's premises and to keep them clean.

Following the custom inaugurated last year, a Registration Day for gardens was held, in the City Hall. Owing to very severe cold and rainy weather only 100 children registered. But the usual crowd appeared for gardens on opening day.

From April 5th to April 22d it rained six days each week, Sunday being the one fair day. No out of door work was accomplished but plans for the laying out of the gardens were made, seed and new tools ordered. Paths were made by the 29th of April and we had the children out digging in their gardens after school, by working till 9 P. M. that evening we got 60 gardens planted. Saturday we worked in the other gardens till the same hour. Saturday being the only time we can have the children for the whole day, we have to do all we can on them. All the rest has to be done in the little time we have after the schools close at four P. M.

By May 7th most of the individual gardens in the Company gardens were planted. By May 8th lettuce and radishes were showing above ground in all of the gardens. From May 10th until public schools closed in June there were more or less children present every single afternoon after school. If things were not large enough to be worked among or it rained, we cleaned up around outside the gardens. I am proud of the record we made this season, in spite of many rainy days early in the season there was but one on which I did not go to the gardens and I always found some children, if only a few, who would be waiting in the rain, saying, "We have waited you so long." It might rain so hard we had to go home or it might be so wet we could only walk around to see how things were growing, or later in the season gather some vegetable, but I made it a rule always to be there, and open that garden for a little while. It keeps up the interest and keeps the children in the habit of thinking they must go to their gardens. Children's memories are short and many of these children are "retarded" or mentally lacking in development. They do not understand reasons for coming some days and not others but they can follow a routine.

This is well illustrated by Steve Wranish and his garden which was No. 63. I was all summer teaching Steve that his number was not 3 but 63. At the last he would say 3 but could think of the 60 when I insisted. Speaking of Steve reminds me that I had at least 10 children this year so mentally deficient I could not teach them the difference between flowers, plants, or weeds. Two were so hopeless I had to take their gardens away and put them out. They would pull up anything. And when I think of the others, I wonder that we had any gardens at all.

After public and parochial schools are closed for the summer all garden work begins at 8:30 A. M. The new time is very disadvantageous to garden work in some ways. Gardens are so cold and wet mornings and it takes them so long to dry off, we have to work many times when the ground is unfit, to get our work out of the way before the swimming and other play ground activities begin. (Our gardens border on the playgrounds).

This was a splendid year for beans and beets, we never had nicer ones and every thing else did well. It seems to have been a good garden season in spite of the preponderance of cold weather. In fact I never heard so many people say "How nice your garden looks." They really are beautiful. It is partially due to our new system of water pipes which enables us to do the work more thoroughly in much less time.

With the exception of a few children who are habitually troublesome, it is the consensus of opinion among the playground teachers and myself that the people in the vicinity of the playgrounds and gardens are really improving very much. The gardens are not destroyed as they used to be and there was comparatively little thieving. It is a noteworthy fact that the garden situated next the bunk houses full of colored people and with many colored people living in the tenements near it, has suffered scarcely at all. What thieving is done, is by the white foreign people. It is also interesting to see the gardens that were planted this year in the yards along the alley bordering on the garden. I counted eleven individual gardens fenced off, some of the fences being old beds springs. Five years ago they believed nothing would grow there.

There has always been a popular belief in Duquesne that the gases from the mills and the dirt from them would kill all vegetation and that it was a useless task to try to make anything grow. Our gardening propaganda has done much to correct this idea and

now I doubt if any place of its size contains more gardens than Duquesne. Gardens are the rule not the exception, wherever there is space for them. People have found that all hardy vegetables and flowers will grow there if given a little care. That the soil there is pure clay and requires time and heavy applications of manure and matter to make humus has been the great drawback, a garden can not be made out of it in one year. Many people get discouraged after the first effort.

The smoke and gases discharged from the mills do form a dirty oily coating over the leaves so thick that they look almost black. They become so dirty that it is not a pleasure but an unpleasant task to cut the flowers we raise. Whatever I wear while doing it becomes as black as tho I had been working in it for a month. I always have to wash the flowers before giving them away. We raise only hardy blossoms like Zinnia and sunflowers, of which there are many varieties as beautiful as chrysanthemums, and which attract to our garden humming birds and yellow warblers; before raising the sunflowers I never saw any birds but sparrows in the region of the mills. Now they are a constant wonder and delight to the children.

We also have a constant stream of butterfly visitors and I think all the caterpillars known to man come to feed upon our produce. I think probably this is because ours is the only feeding ground in that part of the town, at any rate we have ceased to enjoy them. To us they mean only more hard work. We put on arsenate of lead till I am ashamed to ask the mill to buy any more. It seems to me that we never yet got on a nice coating of it that one of our torrential rains did not come and wash it all off. The children are many of them superstitious. They call it a sin to kill the worms. I talk till I am tired trying to explain that it is a choice between bugs and vegetables.

Sometimes a chance toad comes visiting the garden. The children know that the toads eat the bugs and there is mad rivalry trying to keep that poor toad in their individual garden. They forget that it is a sin to kill bugs then.

Before the war there were scarcely any colored families in the vicinity of the gardens, the scarcity of labor resulted in the bringing in of a large colored population as laborers in the mill. There has been a large bunk house built exclusively to house them. It is on a bluff at the north end of my gardens, looking almost directly

down over them. Following these, many of the tenements in the immediate neighborhood became filled with them. One day I was asked if I allowed colored children in my gardens. I said certainly if they were willing to work and behaved well. I now have about twenty colored children on my list.

FLOWER DAYS

Following the custom of previous years, two Flower Days were held this year. The first Thursday, June 11th, was for the benefit of the Children's Hospital of Pittsburgh, roses were just blooming and we were sent large quantities of them as well as iris and peonies. The flowers were very beautiful, and we had three tubs full. We



Children with their bouquets ready for the children's hospital

directed a number of girls to make these into bouquets. Before sending these to the hospital we had some pictures taken of them. On Monday, August 16th, we had one for the sick and shut-in of Duquesne. So many flowers were sent us that our short list of sick townspeople was soon exhausted, and four market-baskets as full as we could pack them were sent to the McKeesport Hospital. Bouquets were also sent to the Duquesne sick in the Pittsburgh hospitals. I think the last flower day brought the most liberal response to our efforts that we have had in several years.

VEGETABLE EXHIBITS

These are held each season, there being an exhibit for each kind of vegetable fast as it matures. The Steel Co. gives on the average about sixty-five dollars a year as prize money, eight prizes of

\$2.50 each being given for the best gardens, the rest of the money going for prize money at the vegetable exhibits. Each prize varying from \$1.00 to \$.50. The number of prizes given varies with the number and quality of the vegetables exhibited. Usually there are eight \$1 prizes.

This year the radish exhibit consisted of 127 exhibits of 15 each. Four \$1 prizes and four \$.50 prizes were awarded. Our bean and lettuce show consisted of 167 exhibits. The beans being of unusual quality and quantity this year. Sixteen prizes of \$.50 each were given, to reward as many children as possible. We had such a quantity of fine beets, that we gave two shows on two successive days, one on the upper playground and one on the lower, at the same time that the playground teachers gave their seasonal exhibit. There were 200 at the first and 171 the second time. Our carrots and a little of everything else we happened to have growing were shown as general exhibits at this time. Four prizes were given for the best general exhibits.

Our money is given in the form of thrift stamps in the hope that it will induce the children to save the money. The actual results are disappointing, most of the children turn them into cash in one way or another, and the money is spent to buy some article of clothing. Many of the children lose their books before the summer is over. People who live in one or two rooms, perhaps a family of six, have few places where they can keep things safely. Even their bank books get buried and lost in that way.

HOME GARDENS

Each year we emphasize the importance of these, especially now that our Community Garden space is so reduced. On Registration Day twenty children signed for home gardens, this number was afterward increased to 65 representing 50 different families. I attempted visiting these children once a month, and oftener if they lived near me. I made my first rounds in June, and altogether made 113 visits. Many of these gardens are satisfactory, many are not, many drop out in the course of the season, for vacations and other reasons. Many are encouraged to start who never would otherwise. One little girl planted peanuts and the whole family learned that the leaves folded up in the evenings.

I value my home garden work most for the opportunity it gives me for getting acquainted with the people and seeing how they

live, learning what they think, finding cases that can be helped by reporting them to the proper agencies. Especially for the chance to inform the people of the garden work that is going on in the town and of enlisting their sympathy. It is invaluable as a means of "entree" into all classes of homes. All people love to talk about their gardens.

This year the Steel Co. gardens were divided as follows:

Garden No. 1	80 gardens 10 x 10 ft.	Open every Mon. and Thur. A
Garden No. 2	48 gardens 10 x 10 ft.	Open every Tue. and Fri. A.
Garden No. 3	16 gardens 22 x 22 ft.	Open every Wed. and Sat. A.
Garden No. 3	2 gardens 14 x 10 ft.	
Total area in gardens		.47 acres.

ENROLLMENT

No. 1	79
No. 2	48
No. 3	18
Total attendance for season	2821

CROP REPORT

June

Radishes 1778 doz. @ \$.05	\$88.90
Lettuce 26 bas. @ \$.50	13.00
672 cabbages @ \$.10 per doz	6.72
581 Kohlrabi @ \$.10 per doz	6.72
75 tomatoes @ \$.01	.75
	<u>\$115.28</u>

July

Lettuce 17 heads @ \$.05	\$25.85
Lettuce 188 bas. @ \$.50	91.00
Parsley 394 bunches @ \$.05	19.50
Beets 849 qts. @ \$.10	84.90
	<u>\$227.45</u>

August

Beets 285 doz. @ \$.10	\$28.50
Beans 121 qts. @ \$.10	12.10
Parsley 266 bunches @ \$.05	13.30
Kohlrabi 154	1.20
	<u>\$55.10</u>

September

Beets 540 bunches (6 per bu.) @ \$.10	\$54.00
Beans 133 qts. @ \$.07	9.31
20 doz. Kohlrabi @ \$.10	2.00
Parsley 97 baskets @ \$.50	48.50
Celery 16 baskets @ \$1.00	16.00
Corn 93 ears	3.00
Carrots 300 bu. (6 per bu.) @ \$.10	30.00
Total crop value \$560.64.	\$162.81

CHILDREN'S CIVIC CLUBS

WASHINGTON, D. C., March 30, 1920.

To the People of Anacostia:

We, the children of the Ketcham School, have formed a club. Its name is the "Green Grass Club."

We have a president, secretary, treasurer, and a reporter, also we have different committees and each committee has the name and color of a bird or flower.

We also have badges. On our badge you will find these letters G. G. C. which stand for "Green Grass Club."

If you see any one of us we will help you in any way we can. The object of this club is to keep the school lawn clean and your lawn clean and our home lawns clean so as to beautify Anacostia.

Our method of working is to work ourselves and to get the other children interested and to get you interested.

Soon we will come and talk the matter over with you.

Yours truly, THE CHILDREN OF THE KETCHAM SCHOOL,
March, 30, 1920 George Haskins, Reporter, 6B.

Clubs similar to the above were formed in every sixth grade in the Washington schools last spring. "The Green Crusaders." "Watch Your Steps." "Give The Grass a Chance," were some of the apt names selected by the children. These clubs learned how to prepare the ground for a lawn and how to take care of it. In assembly instructions were given to all the members of the school and their co-operation asked not only in the care and protection of the school lawn but the respect for the lawns in the neighborhood of the various schools. Wilful offenders were dealt with by committees from the sixth grades. A stubborn case in one building where a boy repeatedly crossed a neighbor's lawn was cured by a committee escorting the boy home from school every day for two weeks.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN
ELEMENTARY SCHOOLS

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Editorial

THE SCHOOL GARDEN OUTLOOK

Readjustments that always follow wars have dealt harshly in some places with school gardens. Necessary economy, mixed with the feeling that production does not need emphasis, has resulted in their curtailment or elimination. Philadelphia—a pioneer in children's gardens, so successful that they attracted attention in all parts of this country, England, and France—has abandoned them. While Cleveland, in strong contrast, realizing their educational value to be of greater importance than the value of crops, has doubled its budget that it may secure the best of teachers for nature-study and gardening.

The vocational trend may be too strong in some sections to please those who look upon the garden as the school's out-of-door laboratory, but by one method or another the school garden is becoming a stabilized part of the course of study of progressive schools.

THE TRAIL SCHOOL

"Your power of seeing mountains cannot be developed either by your vanity or your curiosity, or your love of muscular exercise. It depends on the cultivation of sight itself, and of the soul that uses it."—*Ruskin*.

While planning your summer vacation, do not forget our national parks. If you want to feel yourself a part of the real wilderness, Glacier Park in northwest Montana will satisfy you. If you are strong of muscle and have the power to "peg away" to the end, clothe yourself in khaki and walk the trails. They are as broad and as wide as city sidewalks and far safer for travel alone or in small companies. Horses may be hired if you cannot walk but the trail walker is not bound to a guide who must report at a certain place at a certain time. Nor is his appreciation of the marvelous views about him dimmed by the fear that all four feet of his horse

will not stay on the trail at the edge of a precipice two thousand feet sheer.

Camps of log or stone with comfortable beds and good food are located from fifteen to twenty miles apart, a distance that in rarer atmosphere may easily be accomplished in a day if one has given careful thought to the comfort of his feet. On a walking trip one's pleasure is a state of feet.

Trail acquaintances are never forgotten. Bear, deer, mountain goats, bighorn sheep, porcupine and marmots are not inclined to tarry. You are richer for having seen the ptarmigan, the water ouzel, the magpie, the mountain bluebird and the white crowned sparrow. Flowers are everywhere; meadows and hillsides are wild gardens. Dogtooth violets and spring beauty in July are coming through the snowbanks by the millions. Paint brush, lupine, angelica, squaw-grass, gentians are in the profusion that one expects in a wilderness.

Trail acquaintances are not, however, confined to wild life. Western friendliness is the keynote of the trails and the camps, even though the majority of the people one meets are "easterners who have gone west and loosened up" as we heard it aptly expressed. We have spent hours with delightful chance companions and have never known their names nor from where they came. The marvelous peaks of the layered rocks, changing color as the sun's position changes; the deep blue and green of the glacial lakes make all akin in their awe and wonder of the works of their Creator.

One thing the government yet needs to do for the traveller in the parks is to make it possible for him to know the things around him and how they came about as far as man knows. Enos Mills in the Rocky Mountain National Park, has solved the way to do it in his Trail School at Long's Peak Inn. Rooms have been set aside where the flowers, trees and rocks are named and where the usual and the unusual in them are tersely described. Such a place in every park will add much to the education of the people who pass through. An expert nature guide himself, Mr. Mills has quickly recognized such ability in others. To him belongs the credit of training the first woman guide licensed to take parties through the park.

To A Bluejay

A flash of blue,
A scolding cry.
Who is it darts across the sky?

Upon a twig,
Above his nest,
He sings, and sings, and sings his best.

"You thief! You thief!"
He calls aloud.
Yet, he's the one thief in the crowd.

The bluejay calls,
The bluejay cries.
'Tis he, who darts across beneath the skies.

ELIZABETH L. LANGENBECK,
7th Grade, Powell School,
Washington, D. C.

Mister Crow

Dew in the morning,
Spring's in the land,
Old Mister Crow
Is here with his band.
Shiny and saucy,
The old fellow I saw,
Down in the corn field,
"Caw! Caw! Caw!"

Sun hot and glowing,
Summer is here;
Crow hunting breakfast,
Hop, grasshopper dear:
Farmer is coming,
Calls you a pest;
Fly, Mister Crow,
Fly to your nest.

Snow on the mountains,
Winter is here,
Everything lonesome,
Everything drear;
But up in the tree top,
My old friend I saw,
Saucy and cheery,
"Caw! Caw! Caw!"

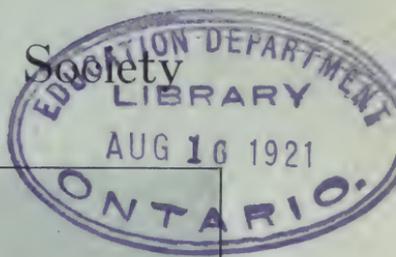
JOHN LECKEY,
7th Grade Morgan School,
Washington, D. C.

NATURE-STUDY REVIEW

Devoted to Elementary Science in the Schools

OFFICIAL ORGAN OF THE

American Nature-Study Society



Three Days in the Mountains

Photo by D. C. Stebbins

See p. 202

The Camp Number

APRIL, 1921

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THE NATURE-STUDY REVIEW

VOL. 17

APRIL, 1921

No. 4

The First Nature-lore School

W. G. VINAL

The summer camp is evolving a nature-study method of its own. It is not class-room science. It is not camp botany. It is not information at the expense of inspiration. It is not naming birds and trees. It is coming to be called nature-lore instead of nature-study. It is a spirit unto itself. It is an atmosphere that one must experience before he can impart it. It is an active love for nature.

The National Association of the Directors of Girls Camps at their Boston Meeting in the winter of 1920 voted to hold a Nature-lore School for Camp Councilors during the last of the following June. Mrs. Charlotte Gulick of the Luther Gulick Camps and Miss Laura I. Mattoon of Camp Kehonka, with Mr. William G. Vinal of Camp Chequesset as Chairman were appointed as a committee of three to work out the idea.

This school was held at Camp Chequesset, Wellfleet, Massachusetts, Down on Cape Cod from June 22 to June 29, 1920.

Chequesset is located on the coast where earth sculpturing is written simplest and largest. Lake shore lines are interpreted by Cape Cod cliffs and bays. There are also young rivers and meandering streams, bog deposits, glacial drift, shifting dunes, and primitive peat.

Scientists know Cape Cod as the meeting place of plants and animals. These forms find their way there from the cold north and the sunny clime of the south. Many mountain plants venture into the cold bogs. It is cosmopolitan nature, an ideal spot for the naturalist.

The program varied with the spirit of the weather. It consisted of:

A Half Day Around Camp—Gardening, notebook, nature games, leaf printing, bird calls, microscope, tow-net, aquarium, vivarium.

score cards, maps, rainy day nature-study, weather, library methods peculiar to camp nature-lore, camp museum, decoration, nature photography.

A Half Day in the Fields—Making friends with birds, scanning the shore, conserving wild flowers, protecting the forest, exploring swamps, gathering minerals, reading hills, traveling by compass, path-finding by map, surveying ponds, observing lower plants, hunting small animals, foraging for food, cooking out-of-doors, observing the laws of nature.

Evening Features—Hearing noted naturalists.

Nature-lore School for 1921

THE REVIEW is glad to announce that the Nature-lore School will be held the last week in June at Camp Aloha, Lake Morey, Fairlee, Vermont. Aloha is noted for the training of its councilors and graduating them as camp directors. The course will be run on a similar plan to the 1920 conference. Those interested in spending a profitable week studying nature under specialists should apply early to Mrs. Edward Gulick, 77 Addington Road, Brookline, Massachusetts.



CHEQUESSET GIRLS INVESTIGATING AN OLD, OLD STORY that reads like a myth. This tree trunk is only seen at low tide. When it grew this spot was an upland. A peek into one of the notebooks would help one realize that "truth is stranger than fiction."

Round Table on Camp Nature-study*

DALLAS LORE SHARP

Do you advise the use of the Notebook? You don't know what you think until you put it down. A notebook helps to be accurate. I am poverty stricken about a story I am writing as I did not take notes when in Georgia. It has held up a book. Writing is thought and feeling and not knowledge. I use notebooks in camp. The notebook habit is a mighty good habit.

What is the most essential characteristic of a nature councilor?

You cannot do it well unless you feel it honestly. It is an instinctive love, a natural love. The real love of out-of-doors includes not only the love of the rose but the snake. One ought to experience the great silences. Take groups out in the dead of night. Take them out in a downpour. Call a butterfly a butterfly and not a fairy.

How would you start nature-study in camp?

The work ought to be done in groups. Segregate according to training or experience. The economic side is appealing to the young boy. Recalling favorite literature is a good way to get started. Adventure or a camping expedition causes a good many to go. The sport side, as fishing, and the collecting idea, as insects may be a starting point. Throw out a challenge, as—Can you collect the 138 flowers in your trip to Maine as Thoreau did? Search for a rare thing, as an orchid.

How can one get an interest in nature?

Peter Bell.—“A primrose by a river's brim
A yellow primrose was to him,
And it was nothing more.”

Peter Bell had been to school to a botanist. This is a serious thing. One has to be poet born to appreciate nature. Most of you were poet born but died at twenty. The use of the How-to-know book is only the beginning of the interest. This is a round about method. It limits the field of activity. Kingsley says, “He is a good naturalist who knows his own parish thoroughly.”

*This is not an article written by Professor Sharp, but a compilation—made by permission—of notes taken from his answers to questions asked at a Round Table at the Nature-lore School held at Camp Chequesset. We believe that the notes are accurate but Professor Sharp is not responsible for them in the same way as if he had written the article.

Why do college graduates fail as nature councilors?

Athletic councilors can be found by the thousands but not nature councilors. The job of the college graduate is to get the campers to know five ferns, five insects, five flowers, etc. The college graduate thinks that you have to put nature in alcohol and stain it, and look at it through a microscope. Biology is now on the scoring of intestinal parasites of a flea. Professor Charles Eliot Norton recently told a literary club about a student who could not come any more to a class in aesthetics. He did not have time on account of his research work.

What is your opinion of stories not true to nature?

There is nothing in ancient or modern mythology as wonderful as the truth. There is no ring tailed screamer or invention of man as wonderful as that invented by nature. I have lived in the woods all my life and have never seen any extraordinary animal. I have seen three legged muskrats but they were caught in a trap.

But the children do not believe these things?

The real trouble is that the authors in the preface swear that they are true. These animals are humans with coats of feathers and furs. These things never happen out-of-doors and they never will. There is no reason for not reading them. They all start the same—with an extraordinary animal. If the book takes the children out-of-doors, well and good. This is a day of movies and they can understand such things.

What ought we to give the children to read?

At the back of all great literature, art, and music, is the out-of-doors. Nature gives it virtue. One is not educated unless they have read: Story of the Dog of Flanders, Tanglewood Tales, the Round Table, Wonder Book, Aesops' Fables, few of Hans Christian Anderson's, Mother Goose, Alice in Wonderland, and Water Babies. I would give them books by Burroughs, Gilbert White, and Jeffries.

“Where Should Nature-study Come on the Program?”

MRS. CHARLOTTE GULICK

The Luther Gulick Camps

Until we introduced gardening we had no stated time for our nature work. Gardening gave an excuse for it. To learn nature lore per se is not interesting to many children. Many people believe that those who want to be studying and labeling every thing are not the true lovers of nature. I have a friend who dislikes to take a walk with anyone who must identify every bird he sees or hears. It robs him of the joy of the bird itself and its song. The love of knowledge and the feeling one acquires through contact with nature needs to be recognized and taken into account. Many children hate learning names and yet enjoy the objects they meet. It is a delicate matter to handle. We can so easily make them dislike what we are trying to make them love if we make too much of a list making occupation of it. Learning about nature should come naturally and joyously. I know of a father who loved the sunsets and morning mists and mountain tops and was constantly taking his little daughter with him expecting her to have on these occasions the same thrills which he had, but she dreaded to go with him and he was heart broken because his little daughter did not love what meant so much to him. He was expecting her to have experiences beyond her years. So it seems to me that we may easily do harm—that there is considerable danger in this matter. It is better to know one tree and love it than to know a dozen and not love one.

So, as I said before, gardening gave us many excuses for learning about nature. Nature's secrets were unveiled unconsciously. While cultivating the garden they heard the indigo bunting singing, and looking up saw it perched on the tip top branch of the apple tree. Of course they were delighted and wanted to know what bird it was. And when the bees were buzzing around the corn tassles they wanted to know what was happening, giving a wonderful opportunity for explaining one of nature's beautiful secrets. Near the garden we have an old farm house which we have converted into a living museum. When a storm comes up it is the natural place to gather. In the house there is a complete collection of bird skins of all the birds the children will see during the summer, there is a microscope and there are beautiful slides

which they adore looking at. Last summer they were shown the circulation of blood in a frog's leg and the feathery wing of a butterfly. Many a happy half hour was spent with the microscope. We have the necessary apparatus for drying specimens and mounting the same. The younger children adore taking home carefully mounted specimens of butterflies and beetles. Some years we have collected material for the use of nature study in the public schools of New York.

In the farm houses are also boxes covered with netting where caterpillars are being carefully fed and watched until they spin their cocoons, ants of various kinds are there being fed and watched from day to day. The girls wander about this room and learn just by seeing the things about them.

Keeping bees came naturally to camp when we had to conserve sugar, not that we profited much in this way but it gave another excuse for learning a wonderful art.

Our camp is divided into units of twenty to a unit, five councilors and fifteen girls. In the morning after assembly a unit goes to the farm, half of the unit has horseback riding and the other half gardening and nature lore. They then turn about, the girls who had horseback riding now have gardening and the girls who were gardening have the horses. It makes a happy combination. In the afternoon another unit goes to the farm and the same program is carried out. It enables each girl to have this experience three times each week.

Besides these hours at the farm we have a set of walks, bird walks, a swamp walk, a shore walk, when we go to the ocean, a deep woods walk, a cross country walk, a roadside walk, a trail walk and the kind of a walk one would take with a five year old.

Back of all this we have established two ranks in nature lore, which the girls may attain during the summer. We have a printed list of the honors which they may win. These lists serve as pegs upon which they can assemble what they learn. From the list are selected those which they must learn to attain to the ranks. The first rank is that of a Toddler. This name may seem queer but it is to impress upon the girl that she is not learning nature lore for herself alone. There will always be toddlers asking questions and the easiest time to learn how to answer these questions is when she herself is young. What opportunities are lost by not being able to answer simple questions asked by a little child!

The second rank is that of Walker. This name also has an inner significance. We want to make walking an art.

We are constantly adding to and taking away from our requirements as we get more and more experience and notice how the girls respond to them. The object being always to make them love what they are getting.

Special occasions are always coming, as when we hiked around the lake (forty-five miles and a half). Instead of a mob of thirty going together they were divided into units of six each. Each unit had a captain and special things were assigned to each unit to observe and report when the trip was over. A record was kept of birds heard and seen, of flowers, trees, cloud formations, constellations seen at night, etc. Beautiful artistic "counts" were presented to the assembled camp soon after the trip, and a prize was given the unit giving the best report. Another year a pair of cedar-waxwings nested so near that we could easily see all that was going on. A record was kept of the number of feedings and what they consisted of from early dawn until dark. Last year a porcupine came at night and gnawed at one of the underpinnings of a bungalow to which we objected. It was shot and next day dissected. The quills were interesting but not nearly so interesting as when our nature teacher showed the lungs filled with air, which she did by connecting a glass tube to the air passages and blowing into it. It was a beautiful sight. Every one was fascinated. Then the taming of chipmunks has always interested our girls. Every morning their little visitors come and if the girl has not been too greedy herself she will have saved some peanuts and have tucked them under her pillow for such an occasion.

So when I am asked "when does nature study come on my program" I cannot answer it. I wish that every director and councilor could go to the nature study conference in June. It seems as if all of us should have this great love so inbred in us that children may catch it just as they catch measles or chickenpox. One child can give measles to many and I believe that any one of us may become the radiating center from which this precious inheritance may begin. It cannot be scheduled. It begins at early dawn and goes through the day and into the night. It must be lived, it is a spirit, one either has it or hasn't it.

What we are trying to give our girls in eight weeks is what Henry Turner Bailey says is the birthright of every child.

Counsel for Councillors

Camp Chequesset, Down on Cape Cod

W. G. VINAL

NATURE-STUDY LEADERS

The question often arises,—Am I suited to leading nature-study trips? or, How can I train myself to become a nature leader? The following notes will help individuals solve the problem.

Do you take walks in the fields and woods? Or do you prefer the movies?

Are you willing to say "I do not know"? If not you will not enjoy leading children. Those who know most say "I do not know" with most ease.

Do you use "big words"? Names are only a means to an end. Never require the learning of scientific names. Use a popular language.

Do you tell true to nature stories? Has your experience been rich enough to enable you to round out a study now and then with a true story? Or is your story telling limited to nursery rhyme and faking.

What kind of heels do you wear? The kind of heels one wears proclaims deep facts about one's innermost self. People with common sense wear low heels. Out-door leaders should have common sense.

Do you carry a jack-knife? Guides, tramps, fishermen, boys, scouts, do.

Will a dog follow you? There are people whom a dog will not follow. A dog makes friends. He knows them. Do you make friends with dogs?

Will a chicken eat out of your hand? This is a true test of worth.

Can you whistle? This joyful pastime is not a monopoly for boys. A whistling girl is an asset to any community. Can you imitate bird-calls?

Do you teach nature-study? Are you so impressed with its value that you cannot help imparting it to others? "All foreigners" you say? "All Americans" I say. Have you tried it? By what right have you not?

Did you ever see the sun rise? Probably not if you went somewhere every night last week, and the same the week before that, ad infinitum. A regular "mania" for going. Sharp contrast

to "early to bed and rise". To see the sun rise once and then again because it is so beautiful is true culture.

Did you ever sleep out in the open? Fearlessness of nightly spooks is absolutely essential to good sense in the day. If you can have a good time sleeping on the rough ground you have one quality of a naturalist.

Do you attract groups of people around you? A councilor must attract. It is not sufficient "to get along" with people. How do you attract?

How far can you go into the woods without discovering something? Thoreau used to worry if he had gone a few feet without seeing news.

Are you a campfire leader? If so, you are interested in girls and nature.

Do you shrink from cows, toads, snakes, and earthworms? Do you add school girl superlatives when you retreat? If you feign fear it is because adults taught you the example. To pass this along is a crime.

Can you throw a ball like a boy? This is a test to your early love for the out-doors. I wish there were more tomboys. It is a compliment.

Do you ever feed the birds? This shows an active or superficial interest.

In what way do you protect wild life? Do you leave the wood-lily where it grew? Do you go around or through a beautiful plant collection? Do you pick bunches or sprays? Have you stepped over or on worms? Why?

Are you always dwelling on the beauties of some other place? You should not to do this unless you can see something beautiful where you are?

Did you ever climb a tree? You should once even after twenty.

What pets have you had? What became of them? Why?

Did you ever dig in the soil with your hands? A child has this interest.

What collections have you made? And why did you make them?

Are you a college graduate? It is not necessary, to be a successful nature leader. Many of the most successful ones are successful in spite of their education in school. They were taught in a woods-school.

Do you object to a tan? How much talcum powder do you use to avoid this?

Did you ever go out into the rain for a walk? Did you really enjoy it? Will weeds or seeds or slips grow for you? Explain your answer. How would you dress for a hike? No hat, huge muff, low shoes, muffler, hobble skirts, bright colors, etc? etc? etc?

NATURE-STUDY EQUIPMENT

Aquarium

Half-barrels are good for water plants and fish.

Battery jars for glass aquaria—Whitall, Tatum Co., New York City.

Fruit jars make good small aquaria.

Home-made glass aquaria may be cemented together. See Hodges "Nature-study and Life."

Bee Hives

Observation Hive with protection when not observing. The A. I. Root Company, Medina, Ohio. "How to Keep Bees," Comstock, same Company.

Blackboard

Home-made blackboard—use linoleum in wooden frame. Paint black.

Bulletin Board

Use natural color art burlap. Andrew Dutton, Canal St., Boston, Mass. Twenty-five to thirty cents per yard. Note: All prices are liable to vary.

Charts

Use unbleached muslin. Camp Kehonka uses curtains on rollers.

Birds

Audubon Society, 1974 Broadway, New York City.

Miniature Bird Pictures, 80 subjects, 3 x 4 inches, 1c. each.

Game of 52 Wild Birds; Game of 35 Wild Flowers, 35c. each.

Post cards in natural colors of Wild Birds, Animals, etc.

Seventy-five leaflets, 43 colored plates, 41 outline drawings, 97 half tone illustrations, \$1.75 postpaid. One hundred fifty colored lantern slides, 80c. each. Bird Charts No. 1 and No. 2 especially recommended.

International Harvester Company, Extension Department, Harvester Building, Chicago. Mimeographs Copy of Helps in Bird Study sent free. Working drawings for making things, 1c. each: 1. Wren House. 2. Bird Feeding Station.

3. Nesting Box for Robin. 4. Plant Protector.

Mumford, A. W., 160 Adams Street, Chicago, Illinois.

Birds and Nature Pictures, colored, 25c. each.

National Geographic Society, 16th and M Streets, Washington, D. C.; "200 pages illuminated with 250 matchless subjects in full colors, 45 illustrations in black and white, and thirteen striking charts and maps." \$3.00 post paid in United States.

Perry Picture Company, Malden, Mass., 300 bird pictures in color. size 6" x 8", 2c. each. Special prices on large orders.

State of New York, State University, Albany. Birds of N. Y. \$1 set.

Winnetaska Bird Charts, Dr. John B. May, Cohasset, Mass.

Cards $5\frac{1}{2}$ " x $3\frac{1}{2}$ " with outline drawings, legends, and notes on habits. Eighteen land birds, 4 each of wading, swimming, and birds of prey. 30c. per set post paid. Recommended for field work.

Clouds

Charts of cloud forms: (a) Blueprints, 16" x 23", 5c.; (b) Classification of clouds, colored, 20" x 24", 25c. Free through Congressman or U. S. Department of Agriculture, Weather Bureau, Washington.

Geography (Pictorial)

Land, water and air, 48 sheets, \$1.00; United States (Prelim.)

(48 sheets) \$1.00. Pictorial Geography, Dept. B, 16 and M St., Washington.

Insect Breeding Cages

Simple cages covered with mosquito netting. Have sods, soil, or potted plants inside. Adapted to studying the life histories.

Leaf Printing

Need the following material: printers roller, tube of printers ink, photo-mount roller, piece of glass or old slate, and paper. See Comstock's Handbook of Nature-study for directions.

Maps

Most valuable is the Topographic Map published by the U. S. Geol. Survey, Washington, D. C. Obtain Monograph 60 by Atwood, Salisbury.

Maps

Outline maps, made by means of mimeograph, are most valuable. This is especially true of the immediate locality.

Minerals

A collection of the minerals of the region and exhibits of the local mining industries should be in the Camp Museum. Twenty minerals and 20 rocks in compartments, \$4.50, Chicago Apparatus Company, 32 S. Clinton St., Chicago. Also Ward Nat. Hist. Est. Rochester, N. Y.

Museum

Making a case is a good manual training project. Use vials for seeds and soil. Labels. Exhibits of local industries.

Riker Mounts for insects. Kny-Scheerer Co., 225 4th Ave., New York.

Notebook

The Comstock Publishing Co., Ithaca, New York is putting on the market a loose leaf notebook especially adapted to nature-study in the field. It also has pages for accounts, music, and photos. The name of the camp or school will be printed on the outside. Every camper should have one of these notebooks. Price about \$1.25, at least as near cost as market conditions will allow.

An indoor or rainy-day notebook printed by Mr. Marion Weston, R. I. College of Education, Providence, Rhode Island, is especially recommended for this phase of nature-study. Five to eight outline drawings per page, 40 pp. 8½" x 5½", 8 pages flowers, 8 tree leaves, 14 birds, to be colored. Other pages to be printed. Set with index pages and cover, 50c. postpaid. Separate pages 2c. each.

Pictures

Perry Picture Co., Boston, Massachusetts. 7" x 9" pictures in natural colors of birds, animals, minerals, fruits, etc., 2c. each, assorted as desired. No order for less than 25c.

Thompson Blue Prints, Syracuse, New York. Subjects general.

Stereopticon Lantern

Acetylene burner and prestolite tank for camps without electricity.

Tree Survey

Send for Horticultural and Pomological Investigations, B. P. I., Form number 219, U. S. Dept. Agriculture, Washington, D. C. Instructions for taking a Bird Census, U. S. Dept. Agric., Bureau Biological Survey, Henry W. Henshaw, Chief, were published in 1914 and 1915.

Trees

Trees in Silhouette, by Henry Turner Bailey. Published by Atkinson, Mentzer and Company, Boston, Mass., and New York City.

Forest trees, each picture 9" x 12", consists of 3 pictures. Price 1 set, 8 sheets, 24 pictures, 40c. Three sets \$1.00.

Camps and schools wishing to help the cause of nature-study and humanity are asked to send material to Mrs. Northup, School Nature League, 25 Norfolk Street, New York City.

These sheets mean time, labor, and expense. They are printed for the good of the work. Please freely accept and in return freely give of your ideas and experiences in nature-lore. If you hear of a good thing pass it along. That is what we are doing.

—For the cause of nature-study.

THE CAMP NOTEBOOK

A long and varied experience of taking notes in the field has led to the conclusion that a camp notebook must be:

(1). *Looseleaf*

- a, as each camp and camper will have individual needs and desires;
- b, so that only the pages needed for the trip scheduled are inserted;
- c, so that the pages of the previous trip may be safely filed at camp;
- d, in order that the pages may be arranged at the end of the season and neatly bound.

(2). *Handy size*, to be carried in a pocket or attached to a belt.

(3). *Standard size*, so that printed directions, identification charts, outline drawings, tables, etc. can be inserted or transferred to all field books.

(4). *Firm, smooth covers*, that they may be used for a drawing board or a writing desk in the field.

(5). *Durable*, to stand hard usage on the hike.

Camp directors will appreciate the fact that the Comstock Publishing Company has found such a book and is at the same time placing on the market the pages asked for by each camp director. Such a cooperative policy bodes well for all concerned.

One of the most successful pages is the tree chart which shows in a compact space the outlines of leaves of our common trees. It is a page which is typical of other key sheets to be published. The bird outlines, already well known in schools, have been adapted to this "coat-pocket" edition.

Several camps have tried out the scheme and the following notes describe its use at Camp Chequesset. The idea was so successful that the directors of Camp Chequesset wish to have other camps share the benefits, not that they will do it the same way, but that they may start according to their environment and individuality. Our slogan is "The Nautical Camp for Girls" and all our doings whisper of the sea. Mountain camps will readily translate these breezes from the shore into the airy vernacular of the mountaineer. *Page One, The Topographical Map.*

The government topographical map is the best map for use in the field. It may be obtained from the Director of the U. S. Geological Survey, Washington, D. C., at \$6.00 per hundred. The Survey publishes a key map that shows just which areas have been mapped. It has also selected a set of 25 maps that illustrate an interesting variety of geographic features. Some of this set have descriptive texts printed on their backs. The set can be purchased from the Survey by any one for \$1.00. In ordering, use a money order or certified check.

The map is most conveniently used when cut into sections and mounted on cheese cloth. The section most often used would be the area about camp. If the camp is located near the center of a three mile radius one may cut out a rectangle measuring $7\frac{1}{8}$ inches by $6\frac{7}{8}$ inches, and have a folding map that fits into the notebook. Using the lines of longitude and latitude as a starting place, and mark off the map into inch squares. Each inch represents approximately a mile. Number the lines and thereafter places may be located by their latitude and longitude.

We now have ready one of the most useful pages of the notebook. Safe pioneering, the compass and trail, and real scouting are based upon it. The description of two ways of using the map at Camp Chequesset may suffice to indicate the possibilities.

(1). *The King's Highway:* The old King's Highway was once the route of the saddle horse and the stage coach. This was before the railroad and the state road ran down the Cape. The roadway is then pointed out on the map. The campers are now told that

ye old highway has been abandoned to trees and bushes which are rapidly claiming their right of domain. It takes a good scout to follow this hidden trail. For a short distance it is seen in old wagon ruts,—then keener searching for hub bruises or blazes on



CHEQUESSET CAMPERS SKETCHING AN OLD SEA CLIFF. Scouting is not limited to the footprints of today. Note the Indian shell heap (A) in the right of the bank. The dark line (B) in the cliff shows the contour of the original hill top. Where once was an ancient valley (C) is now a hill or sand dune (D). The original hill (E) was deposited by the glacier. The exposed roots of the bayberry (F) and beach grass (G) show that the cliff is retreating. When written in story form this makes an interesting chapter in the past geography of the shore line of Wellfleet Bay.

tree trunks,—or just sheer luck with the compass along the valley they must have “follered”. The frontiersman never had a grander opportunity for a battle of wits. You will note that this byway is crossed by longitude 70 degrees and by latitude 42 degrees and 55 minutes north. Between these two points is an advance guard. Squads will be sent at twenty minutes intervals with messages for the Captain of the guard. As a parting word of advice remember that haste makes waste, the fox is cunning, and sheep follow a leader without thought.

(2). *Bellamy's Kettle*. Long, long ago Bellamy's Pirate ship was wrecked at South Wellfleet. The inhabitants of the Chequesset country harvested the plunder of old coins, flintlocks, and kettles. Each year one of these copper kettles is hidden near camp. One time the kettle was concealed at the lowest point on the camp grounds. This proved to be at the bottom of the pond

by the garden. The discoverers found something worth while jingling in the kettle. They were coins found on Billingsgate Island and given to the camp by Mr. Nye as medals for the winners of this game. This year the kettle has been buried with a "big secret" on the highest summit northeast of camp. Find the kettle and bring it back to camp without being captured. You may study your contour maps and work out the best method of locating and moving the trophy. For each person disturbing the camp routine, such as lateness to a meal, a point will be taken off the final score of that team. The captain of each team will appoint a place for you to meet for council and maneuver. The success of the expedition depends upon strategy. Compasses, field glasses, pedometers, etc., may be obtained at the camp library.

The Page of Tree Leaves. (A few suggestions for use). On these trips the contour map and the tree page are carried in the notebook.

(1). *Tree Spying.* Stop at a tree, such as the wild black cherry. Each one identifying the tree by use of the leaf chart within three minutes time is given a point. For each mistake a point is subtracted. At the end of the trip add the scores and announce the winners.

(2). *Tree Scouting.* Appoint leaders to choose teams. Tell them to study the oak leaves on the chart and then at a given signal give them three minutes to obtain a white oak leaf. The tree given should be known to be nearby. At the end of three minutes blow a whistle. Those back in their places with a white oak leaf (no more, no less) score a point. Next send them scouting for a red oak acorn, a balm-of-Gilead bud, and so on. The team scoring the greatest number of points represents the group of best tree scouts.

(3). *Tree Trailing.* Hide messages "en route" and send out companies 30 minutes apart. The messages may read as follows: Take the valley trail to the east until you see a large yellow willow. In an abandoned flickers home is a note. Read it carefully. This note may read,—Within sight of this spot is a silver poplar. As far from the tree as it is high and in the direction of its noonday shadow is buried a message on birch bark. Please leave this scroll as you find it. The group following the directions farthest and in the quickest time wins the honor of the trail.

(4). *Tree Cribbage*. This may be played for a time when on a long hike. Assign a numerical value to certain trees. One group may take one side of the road and the other the opposite or the points may go to the side recognizing the tree first. In this case it leads to a long range recognition by form. (Trees "en masse" and silhouettes suggest interesting rainy day projects for the notebook).

Taking the Notebook on Special Trips. As an example of this sort of use of the notebook we will describe our trip called,—“To the Hermitage”: Every bailiwick has its hermit. Ours is a grizzly sea-dog who has taken to land some two miles from the coast. He is a Thoreau-like individual reminding one considerably of that famous naturalist who walked the length of the Cape some three-quarters of a century ago. The present recluse has squatted on the site of his great grandsire's claim and his tract reaches unto the shores of the same pond. From the cedar swamp in back he has lugged, dragged, and rolled in turn the logs for the framework of his hut. The adz, an heirloom, has again played its part and the timbers have been slowly hewn into shape for the sills and rafters. A clump of lilacs, he will tell you all this, marks the east bedroom of the old homestead—long since tumbled and gone. Of the old days—naught remains to suggest ancestral fortitude or thrift but scraggly apple trees, decrepit, gnarled, and windblown, with a few belichenèd fence rails.

Our equipment for this trip is the notebook with a map, two pages of drawing paper, two pages for notes, colored crayons, a reverence for the crudities of pioneer days, an eagerness to hear and understand a backwoods language,—a woodsy speech which has all but disappeared, and a desire to express the experience in writing and in sketch with an understanding heart. Following a preparation in spirit it was suggested that the campers might like to make a list of the evidences of an early homestead, the methods of a pioneer, the reasons for believing that he has a love for nature, and quaint expressions. What greater wealth of material could one wish for a future school essay (if one can forgive such trespassing) or, if the spirit of the letter has not been killed, for the very joy of writing literature (note spelling with a small l).

Note, then, that every camp region has its hermit. Hermits vary. It ought not to be necessary to say “know your hermit”. Hermitages vary as also does the region thereabouts. Therefore,

every camp has an experience unto itself with respect to hermits. Not only that but every individual camper has a different reaction to the experience. The stories and drawings therefore show an individuality of response. A few of these are selected at random from the notebooks. These quotations have not been changed. They are borrowed from the personal property of the owner for a definite cause and not for criticism. And let it be emphasized that nature councilors are not to trespass on this private property with a red eye or a red pencil for spelling, split infinitives, or vertical twists to the penmanship. The number of poets and writers killed off by this method will never be revealed but let us not kill the spirit in camps. And as Mrs. Comstock says in her *Handbook of Nature-Study* "These books, of whatever quality, are precious beyond price to their owners. And why not? For they represent what cannot be bought or sold, personal experience in the happy world of out-of-doors."

Mr. Dyer (The Hermit). From the field book of "Bumps", age eleven years, the youngest girl at Chequesset.

"His grandfather settled here years ago. The pond was named for him. The lilac bushes and the fruit trees indicate the great age of the place. The Hermit has planted boughs on the north side of his corn to protect it from the cold. He also made a wheelbarrow with much patience and care. He has made a little bird house on the top of a stick driven into an old stump which has been there for many years. He has some timbers left from those used to build his house. Back of his house he has made a chicken coop of pine boughs. He has placed boards on either side to weigh the boughs down and keep them together. He shows his interest in flowers and trees by planting and taking care of both. Around his garden is a fence to prevent the deer's (they are seen frequently in this region) from eating all the beans over night as they did one year. Years ago the house used to be almost up to the water's edge but the new house which Mr. Dyer made himself is back much farther. Mr. Dyer seems to take an interest in camp girls and is not a bit timid about answering questions."

Photo Mount Sheets: These are special sheets for snapshots. These little "pleasantries" like the principal on compound interest, double in value in a few years. Is it any wonder that this book, probably Volume I of the author, becomes so highly prized as years roll on?

The Bulletin Board is an important adjunct to the notebook. At the end of a trip a few of the best and most original sketches, stories, poems, snapshots, and collections are exhibited on the bulletin board. This bulletin board is not a place for drying or airing ideas. It is a live place because it is newsy. Yesterday's hike differs from today's story and tomorrow's game. The blackfish are playing in the offing,—It is a kind of whale,—Watch for any proof? The bluefish are running down the Bay,—Ten fishermen are wanted on the wharf at 3 p. m. Beach plums are ripe,—Follow Barbara right after breakfast. The sand pipers are hatching,—'Nuf sed!' Poultry men sign here for turn to collect the eggs. There is always something going on. It is refreshing. It is a medium for the exchange of ideas and more than one good resolution is made to an ideal (not idol) at this shrine of activity (not sanctum sanctorum).

Nature-study Forms (Bird, animal, and flower plates).

A resolution was made at Chequesset that no study of plant or animal life should be made except it be alive and in its native haunt. It is surprising how many of these opportunities are waiting for the one who looks for them. When ordering our supplies for the camp notebook we limit the order to the living things at hand.

Last June we knew that the barn swallow was feeding her young on the bungalow porch; that the chickaree had rented the mailbox in the pines; that a chipper, a robin, and a pine warbler were within 30 feet of the dining room door; that *Bufo* the toad was beneath the steps; that the blue-birds were rearing their second families in the boxes; that red perch would be caught at Gull Pond; that the squid, and the skate, and the hermit crab would be seen on the shore; that the swamp azalea would scent the ponds and *arethusa* dot the meadows. We knew many, many friends that would be at camp and because we knew these friends, we knew just which outlines to order from the publishers.

Then when summer came with a rainy day there were those who were anxious to color in the outline of the barn swallows as they fed the young under the eaves of the piazza. And just because someone was interested in doing this, others became interested. Then so many caught the spirit that it was quite the fashion. And just because it was not a school there were others who did not care or shall we say did not have to "join in". They had found

something more interesting,—perhaps they were reading Cap'n Eri, or were making fudge, or a pine needle basket, or were just gazing at the colors of a drift-wood fire. What ever they were doing it was genuine. And we believe that it was all making for a broader intelligence.

The pine warbler arranged her class room for a sunny day. She had built a nest in a small pitch pine about six feet from the ground. In this case a small table was moved to the side of the tree. Here a camper could sojourn with water colors or merely pause for a peep at the young on the way to mess. She who studied, the swallow might not care for the pine warbler or might have some other interest—and at the camp the interests are varied and many. Several passerbys so gained the confidence of the mother bird that they were able to stroke her—not a mean accomplishment in itself. And to that nervous little somebody from so far away this touching of a wild bird was a contact with something far greater—it was a momentary connection with steadiness of motion—better than notes or rubies—for therein was the foreglow of self composure and calmness. To all this the nature councilor must subscribe in vision and sympathy. What one should do on a particular occasion cannot be forecast. It is not preparing prescriptions nor is it dealing out patent medicines. It is furnishing opportunities for the love of the beautiful and timely suggestions for companionship with out door life. If in this the councilor be sincere her companions will be many.

Chequesset Nature-cards. Plate number VI shows another source of instruction. It is a story told by four pictures. These pictures are taken from the camp environment and arranged to tell an important truth or serial event in nature. The cards are given out as a surprise after having studied the phenomena or they may serve as a suggestive basis for the written description. In either case they form a bright spot in the complexity of future living when the writer has a minute to pause for nature reminiscences of camping days.

Garden Competition

This was a novel competition in establishing boat gardens in old seventeen foot dories sunk in the ground. The flower guide sheet, to be published for the coming summer, would have aided greatly in the game. Wellfleet is an ideal gleaning ground for such a fête.



CHEQUESSET NATURE CARDS. No. 1—*From Ponds to Reclaimed Land.* Questions: Cause of ponds? How do long ponds become round ponds? How are round ponds conquered by vegetation? Uses of meadows?

When the villagers turned their trade from whaling in the deep sea to quahauging down the bay the houses were gradually moved from the ocean side of the Cape to the harbor shore. The pretty posies if the old fashion gardens were abandoned to fate and now come camp girls scouting for the choicest bloomers to ornament their boat plots. Tansy, iris, spurge, house leeks, yuccas, and dusty miller were delegated to their proper places alongside the Hudsonias and stonecrops from the wilds. The opposing teams looked on with admiration as finishing touches were placed here and there before the arrival of the judges.

And then came the judges with their notebooks—the art councilor, the nature councilor, and a senior camper. The gardens were viewed most critically—with a fine tooth rake as it were. First the judges took notes as to color, then as to choice and variety of material, the arrangement and symmetry of form, how the material was planted, and then the originality. One crew had made a sundial while the other had purchased a sailor windmill and this was against them as they had spent money rather than ingenuity. And the idea of permanency,—one garden showed a tendency to run to plants that were in blossom for the time being. Even the trimness of the ground around the boats did not escape their scrutiny. Solomon's garden in all its glory could not have been surveyed as were both of these.

A Final Word as to Notebooks.

We have been dilating about the opportunities and some of the uses of note books at Camp Chequeset. If you are to use a similar scheme you must get on deck and look at the beauties of your own harbor. There are no more beautiful skies, no more sweeter song birds, no greater history, no stauncher patriotism in any harbor than at Wellfleet and these things are not better in Wellfleet than in your town. Some day we hope to come over the mountain and hear about the notebook on your side.

Due to large amount of material for this number, we had to omit a recommended list of books for camps. This information will be mailed upon request.



CAMP CHEQUESSET—The Boat Garden and the Winners

Learning to See and Hear

AGATHE DEMING

Camp Miramichi

Nature-study is so much a part of camp life that it is difficult to discuss the subject from the point of view of methods used.

Even if we had not been interested in nature, circumstances would have forced that interest upon us, because it is impossible to live for even a few weeks in the Adirondack woods without coming intimately in contact with one's neighbors of the forest.

At one time, when our kitchen was a canvas-covered building, open on two sides, we had nightly visitations from a family of coons who ate our cereal out of the double boilers on the coal range, and could not be discouraged by any weights which we placed on the lids. One night we treed three little ones in a big hemlock and routed the whole camp out of bed so that with the aid of flash-lights, and in spite of the threatening sounds made by the mother coon in the nearby woods, the girls might see at close range the beautiful little fellows with their pointed ears, black markings and eager, wild eyes. We had acquaintance too with a porcupine, but found him less attractive as he attempted to eat the kitchen itself, and destroyed a number of our young hemlocks. Squirrels and chipmunks made free with our out-door dining room, stealing bread and even whole oranges from the tables just before we came to meals. In our explorations we came upon the work

of beaver, and were often obliged to carry our canoes over their dams. We saw large poplars which they had felled and others partially gnawed through, and took delight in walking along the tops of their larger dams, as strong as man-made masonry. In the evenings we heard the resounding smack of the scout's broad tail on the water as he warned his colony of the approach of our canoes. In the early morning and at dusk the white throated sparrow and the hermit thrush sang to us.

In the northern Adirondacks we have not found traces of coon or beaver, but we were welcomed to our new camp site by a family of wrens which established themselves in an abandoned phoebe nest on the veranda of the main house. Two broods were raised during the same season the first year. Last summer they selected the camp post-office and to insure privacy began a nest in each of the eight compartments, finally completing one on the top row. We had an unusual opportunity to watch the whole process of nest building and then the feeding of the little ones and their first attempts at flight. Camp life is full of such associations and adventures.

In order to obtain tangible results from their observations the campers are encouraged to work for certain standards of our own making, and for the "coups" of the Woodcraft League. This does not mean that a girl merely learns by name ten or twenty-five or fifty flowers or birds, but that she can identify them in the field and knows something of their habits. The use of books or aid in identification and the making of smoke—or blue-prints for the preservation of a record, in the case of flowers or ferns, are encouragements to accuracy. Then, too, one girl may make her knowledge surer by helping another, and they give each other preliminary tests before taking the final one which entitles them to credit.

We have found the "scout reports", which are a feature of the Woodcraft Council, a valuable stimulus to the "seeing eye". The most interesting observations are often saved for the weekly council and there is friendly rivalry developed which does not, however, tend to interfere with accuracy as any scout report may be challenged in council and must be true to fact.

It is not only on specially arranged "nature walks" that campers become acquainted with nature. The chief prerequisites are eyes that see and ears that hear. Every trip that goes out from camp,

whether a hike of a few hours, an all-day canoe trip, or an afternoon spent in cutting a trail through the woods, brings back something of interest to the whole camp. A rare variety of grape fern was found by one girl on a mountain climb; one group while looking for



A Lesson in Learning to See and Hear at Camp Muranichi

a camping place came within a few feet of a bittern; first comers to the dip one morning found a loon near the dock, and at another time they saw a great blue heron resting on the raft.

Sometimes on our all-day trips one group will challenge the rest, before starting, to equal their record of observations for that day. In the evening a spokesman from each group is chosen to give an account of her trip, listing the observations of special interest, and judges are appointed to decide which trip made the best record. Before certain trips it may be decided that special attention be paid to birds or flowers or ferns, as the case may be, in order to improve the record of the camp along that line, and the records of the individual campers who are working for coups.

If the leader has in mind a definite object, as for instance to make sure that each child in her group shall be able to distinguish between the different evergreens of the region, she may play the following games on a hike. The leader should stand by a tree

near the trail and as the girls pass her in single file have each one whisper to her the name of the tree. Those who are right should then stand on the right side of the trail, the others on the left. When all have had a chance let one of the "rights" explain to the "lefts" the distinguishing features by which she recognized the tree. The next time the leader should select a different kind of tree, but in the course of the afternoon select the same kind often enough so that no child returns from the walk without knowing very well three or four trees, and something about them. Information which is useful to the girls as campers will stimulate interest and make the trees something more than names or part of the landscape. For instance, the fact that balsam boughs make an excellent bed and spruce do not; that hemlock stumps are an unfailing source of tinder for a campfire in any weather.

One of our camp traditions is that every group which goes on an overnight or longer trip makes up a sort of saga telling of all their adventures, which is sung to the rest of the camp upon their return. In these songs nature plays an important part. Mention is made of such things as the kingfisher that followed some canoes downstream, diving whenever he heard the splash of a paddle, evidently mistaking the sound for the jumping of a fish; of the great mass of cardinal flowers glowing on the banks of the same stream; of the white violets blooming in August in a clearing; of the deserted nests of a colony of herons on a mountain side; of the deer that stood near the tents of a camping party when they awoke one July morning; of the glorious Northern lights with their pulsating purples, greens and rose color, seen just before bedtime.

A favorite evening occupation at camp is the study of the constellations. The best time for beginners is early when only the brightest stars such as Vega, Deneb, Altair and Arcturus are visible. When the position of each is learned the others as they appear can be related to them and very quickly the campers come to know ten to fifteen star groups and something about at least one bright star in each. When on the lake at night such information may prove of practical value.

Among the night visitors to camp are the great barred owls which come near the tents in twos and threes and from some high branch send down unearthly sounds disturbing to the peace of inexperienced campers. The great horned owls too make their voices re-echo through the still woods late at night. During the

day around camp the trees are full of warblers, finches, thrushes and sparrows in their seasons, giving the children an opportunity to become familiar with their appearance and to learn their notes. A large birch near the eating porch is a favorite haunt for warblers and has caused us to form the habit of coming to meals armed with field glasses. The juncos are so tame as to eat crumbs off the floor while we are at table.

Once they have learned to see and hear, campers find twenty-four hours a day an all too short "Nature Study Hour".

Nature Work at Camp Kehonka

VIRGINIA FIELD BIRDSALL

"Afoot and lighthearted I
take to the open road."

It was with a sense of eager anticipation that I started for Camp Kehonka last summer, after a most inspiring week at the conference of nature leaders on Cape Cod. The camp is situated on the shore of New Hampshire's most picturesque lake—Winnepesaukee. All about, the country is rich in material for nature study. The lake shores are heavily wooded with hemlock, pine, fir, and birches. Following the winding trails along the shore one comes upon many a brook widening out to the blue waters of the lake. Back of the woodland is the open country stretching away to the unfolding hills beyond. Little wooded islands, like green ferneries, are scattered throughout the lake, making it a veritable "Waters of the Wondrous Isles."

Our first problem, at the opening of camp, was to arrange a locus operandi for our work. All the camp buildings—the shop, the loom house, the central lodge itself—were filled to their utmost capacity. The only available space seemed to be the front room of a small building known in camp parlance as the "Pullman". In a few days our "Treasure House," as we subsequently called it, was ready for its housewarming. We had arranged tiers of shelves in one end for our nature library, one long, low shelf for collections of nests and other "finds", and a table for our compound microscope. On the walls were hung our bird and flower calendars, designed and executed by the girls, on large sheets of colored cardboard. The best designs had been selected in open competition and were most successful. The central space was left in each

calendar for the insertion of the names of birds and flowers observed. Outside the house a long window box was placed to hold ferns and other plants brought from the woods, and on the porch a large square table held our aquarium and terrarium. Now—with a local habitation and a name—we were ready for work.

Our aim—first, last, and always—was to make nature study at camp a joy and an adventure,—never an irksome task. Having served for several years as head of an outdoor school where the woodcraft work was given prominence, I had learned to value the woodcraft council as an aid to nature study and decided to introduce it into our summer's program. The notice of our first council as posted on the camp bulletin board, was written in the Indian Picture Writing and read as follows:



The interpretation of the drawing is:

“On the Tenth Sun of the Thunder Moon (the 10th day of July) we shall take the trail by canoe to the hemlock grove on the edge of the water. There we shall hold a council. Scout reports of flowers, birds and wild animals will be brought in. We shall also have a poetry contest. If it rains the council will be held in the lodge.”

The council was opened by singing, with uplifted hands, the Omaha Tribal Prayer, after which scout reports were asked for. These were brief accounts of birds, flowers, or wild animals observed. The first scout to see any flower or bird “claimed” it in council and this fact was noted on our nature calendars. At the

end of the season the campers having the greatest number of claims were rewarded with bird and flower guide books. There was always great enthusiasm in bringing in interesting reports. Occasionally nature-poetry contests were held. Although the learning of poems was never required, there was always a large number of contestants. The poems were given in the form of challenges between two members of the same or of different bands, and the winner was decided by a vote. Poetry given in this way—under the open sky, with the sunset light shining from the "Promised Land" over the waters of the lake—took on a real meaning and led the campers to see through nature to the great Creator of all things.

One of the most interesting features of our summer's work was the weekly Kehonka Nature Exhibit. This was placed throughout the summer at the Public Library of Wolfeboro, a town some three miles distant from our camp. We started it as a sort of connecting link between the camp and the town and as a means of sharing with the townspeople some of our more interesting discoveries. Each week a committee of two members was appointed by the campers to assist the nature counselor in assembling the exhibit for the week. These exhibits took various forms. One week we showed all the evergreens to be found in the region. We gathered a fruiting branch of each variety, which we inserted in a small cross-section of the wood. Another week all the birches with their leaves, bark and fruit, made a beautiful collection. We had great luck in finding a variety of nests, among them some rather unusual ones; such as the ovenbird's nest, the sandpiper's nest, and a phoebe's nest in which bumble bees had made their homes. These nests proved to be one of the most interesting of our library exhibits. Towards the close of the season we proudly exhibited a number of bird houses made by the campers. These were of all sorts and sizes, made according to standard measurements, from a cunning little rustic wren's house to a huge birch-bark affair suitable for a screech owl. With each exhibit there went a short description written in technical language and with some appropriate reference to poetic literature. We were much gratified when our Kehonka Nature Exhibit was noted several times in the *Granite State News*, the town paper. But aside from this mark of appreciation we felt well repaid for the time and effort spent in this work by the real enjoyment which we experienced in our search for new material.

The limited space of an article of this nature leaves many points of interest untouched. We have simply noted some of the high spots. We should like to tell about some of our woodland pets—our “most dear” tree toad, for example—or of our observation ant nest. In these few paragraphs, however, one can give only enough to indicate the spirit of the summer’s efforts. This was that nature study should mean to these girls something bigger than the naming of ten ferns and twenty-five flowers and thirty trees,—something which would make their “hearts leap up when they beheld a rainbow in the skies” and would lead them to be,—like God’s good world,—“rugged and wholesome and true.”

Nature Study at Highland Nature Camp

ALLEN BARROWS DOGGETT

2331 Foster Ave., Brooklyn, N. Y.

The summer camps for boys and girls, scattered from Maine to Colorado, are nature’s own schools—with study halls by every road and lakeside, text books in every tree and opening flower, and hours that are set neither by the rising of the sun nor the fading of the stars. The Director of nature study, in any camp, may do little more than unlock the doors and introduce his or her students to a few familiar friends and faces; leaving, always, however, a strong desire to *know* and *see* more. Such a desire can hardly be awakened except by one who is familiar with nature and her ways and able to impress upon awakening nature—intelligence the beauties, the lovable qualities and the peculiar relationships of this or that tree or flower or woodland creature.

At our camp (Highland Nature), we began with the Juniors because they had the least acquaintance with nature. Some had seen little of real country before; they were eager to learn and had fewer interests in the more strenuous camp activities. We felt that every new experience should and would make a lasting impression upon their lives; they, in turn, would fill up the ranks of the Camp Nature—lovers, as they returned, year after year, and became interested, observing Intermediates and Seniors.

Our method was to take a little group of perhaps twenty (always about ten too many) for a walk, telling them that before reaching a certain bridge, a few hundred yards away, we should find at least

twenty-five different plants or flowers. This, of course, was an astonishing number to them and they would go about the hunt in a very unsystematic scramble. First they were called back to look at a little chickweed, with its delicate mouse-eared flower, that was just at their feet; near it they found a white clover, then a red clover, a daisy, an American plantain—which some recognized as “bird seed” and remembered how mother or auntie had gathered the seed whips for the canary bird at home. So we walked on, finding flower after flower until we came to a damp spot by the roadside, with some smartweed growing. All were invited to take a little bite of the leaf and chew it for a moment. The result was an uproar of laughing and screaming, while not a few leaves were gathered to be given to “best friends” later on.

As we came nearer to the water, there was some slightly marshy ground and here we picked a few yellow flowers which, when rubbed, smelled unmistakably of—mustard! Then the girls were asked to kick around a little in the high grass and sedges. Again, an unmistakable odor, but one of the happy associations, was promptly and excitedly recognized as “chewing gum”! Needless to say, we were in a marsh filled with spearmint. But this was not the climax of the expedition, although we had reached our quota, by this time. We soon ran across some jewel weed, or “silver leaf”. When the leaves were put under water and turned a most beautiful, pure silver, we almost had a riot and one of the girls, in her eagerness to apply the test, slipped into the water on all fours.

Every one of those common roadside flowers, introduced to that group that day, became well-remembered friends. On the train that took the girls back to the noisy, dusty city, the experiences of the summer were lived over again, and the names of the flowers, learned on that first nature walk, were recalled in lively competition.

This same method was carried out with the trees and larger shrubs. The difference between the leaves of the spruce and hemlock was noted; the different number of leaves on the several varieties of pine; the teeth on the poplars; the thorns of the thorn apple and locust; the bright red rootlets of the willows, growing by the water—all of these were new and wonderful to the younger campers. The witch hazel made the strongest impression, as they learned that what was used at home for sprains and bruises came from this curious-flowering tree.

The witch's wand or fork, for locating water or spring, was explained and trials were made. In the hands of a few of the older ones the wand did "dip"; and you know that when once it begins to "dip", there is no stopping it. We had a time of wild excitement and carried several of the forked sticks back to camp.

One of the most difficult lessons the Nature Counsellor has to impress upon young people, is to keep them from picking the flowers. The rarer they are, the harder it is to leave the flowers where Nature placed them. I remember, once, showing to a group the root of the Indian Cucumber. Later in the season—alas!—there were no cucumber plants to be found in our neighborhood. At another time, on one of our long "hikes", we had found a "blazing star". We left it where it was, and the following season, on a trip to the same place, one of the group seemed unduly anxious to go on ahead of the party. She told me, secretly, that she wanted to be the first to find the "blazing star" that we had seen—and spared—the previous year.

With bird study, the problem is a very difficult one. In the first place, we go to camp too late to see the birds as they come north to find their nesting places. Again, we often see but a flit of color and our bird is gone. It is very difficult to identify even our common birds from the positive, but mistaken, description of color and size, noted by the inexperienced eye. A strange and wonderful "red bird" may prove to have been but a bluebird or robin.

Of course there are a few birds that all may see and study: swallows, phoebes, robins, wrens and others.

An unusual experience of last summer was when many of the campers saw a "flock" of humming birds. Several of us had repeatedly seen, at a certain place, as many as five together; so we gave the promise of this quite unusual sight to Dr. Fisher, of the New York Museum of Natural History, who was our guest for the day. We went to a bank near the water, where a great mass of jewel weed was in full blossom, and there—exceeding our fondest expectations—we saw *nine* humming birds at one time. It was on this same walk with Dr. Fisher that I questioned the identity of a large bird, frequently seen near the spot we were passing, which I had hardly dared to call the bald eagle. To our great joy and satisfaction, at this moment, the great bird flew over us and, alighting on a pine tree not far away, was authoritatively

identified by our eminent guest. I afterwards saw this eagle several times on the Songo river; twice, on the same tall, dead tree, where he made a fitting top to a fine flag pole, which lacked only the American colors to bring our party to attention and salute.

Our most prized nature trips were made in the early morning. A "war" canoe was loaded with life-preserver cushions, a few boxes of crackers and six or more happy and excited children. We slowly and quietly followed the shallow shores of the river or lake and, although out after birds, we always saw much of interest in the way of cranberries, lillies and other aquatic plants.

Because it was quite near our starting point, we always passed an overhanging tree, where some kingbirds had made their nest. The mother bird was usually on the nest and the father, perched on a limb nearby. As we approached, the male bird would fly excitedly from perch to perch; then the mother would leave the nest and both would scream in fright and anxiety and sweep down towards us, so near that the children in the canoe had to be reassured and cautioned to ignore the noisy demonstration. One day we found the eggs gone and the nest slightly tipped to one side—the work, evidently of some woodland enemy who had no fear of the poor birds' loud but ineffectual methods of home protection. We did not visit the place again for some time; but then, to our astonishment, we found two eggs in the nest once more. Another pair of kingbirds, with whose home we were familiar, located in a little clump of bushes growing on a sandbar, quite a distance from the shore. We watched these birds from day to day; saw the eggs and then the young, as they grew and prospered, until they were big enough to fly. Then, as so often happens, tragedy overtook them. The distance to the shore was so great that, probably, all were drowned; for we found one little helpless bird in the water.

Other interesting friends in our bird study, were the sandpipers. They were always running along the shore and flying from point to point among the floating logs and tree stumps, in search of food. Their curious little "tip-up" or "teeter", from which they get their common name, is unmistakable. Our friend the kingfisher was often near, as his vigorous rattle told us. He often darted from his perch on a dead tree to get his early breakfast from the water.

Sometimes when we heard a crow in the distance and felt sure that we had not been seen by him, we would paddle into a little

cove and give the call of a young crow. Many times, the old birds, in groups of four or five, would fly above us to investigate.

A sandbar, about a mile from Camp, was usually the goal of these morning trips. Here we had reason to expect the great blue heron—and only a few times did we fail to see him. We always saw his tracks—as large as a man's hand—in the sand on the beach, or under the water where he had walked or stood to fish.

These trips, in the early morning, left on the young minds the most lasting impressions of the summer. When we started, before six o'clock, quiet was necessary, lest we disturb a sleeping camp; and quiet was willingly maintained, as our canoe glided noiselessly along, in order that nothing should be missed—neither sight nor sound—during that peaceful hour that seemed to be Nature's best. We always returned with some regrets to an awakened camp, with its shrill voices, its movement and its discordant sounds—even though the return meant—breakfast.

Second to the early morning trips, were a few taken in the evening, in the same way, with some of the Seniors, for the study of the stars—reflected in the clear mirror of the lake as brilliantly as they shone in the heavens above us. The stars we have always with us; and any clear evening we may call attention to a particular star or planet or constellation. The interest in camp always centers about the Dipper and Cassiopea, on account of their relation to the North Star. When on camping trips, sleeping in the "open", we go to bed, rolled comfortably in our blankets, seeing these constellations in a certain position. We wake up in the early morning and find them quite upside down, as they follow their path around the North Star. The few enthusiasts who are determined to be awake to see their first sun rise, find some of the winter groups, also, such as Orion and the Pleiades.

So the summer goes. Something is always waiting for us—an open-book, if we will but read.

We have little opportunity to study animals at H. N. C., for quadrupeds are not very numerous in our neighborhood. Porcupines, squirrels, woodchucks and an occasional skunk or mink, may, perhaps, be studied or only recognized. I once saw a mink carry off a young catbird; and, on another occasion, saw two little minks playing together like kittens. I was alone at the time, in a canoe, in the very early morning.

We found quite a number of interesting and beautiful snakes which some of the braver of our girls kept as pets for a time. Mr. Williams brought to camp his very unusual collection of snakes and, aside from the valuable information he gave us about his pets, he did much to remove the aversion—tinged sometimes with fear—that is the accepted attitude of so many young people in regard to these harmless and useful creatures, found in variety in almost all localities.

Perhaps the most unique experience of our summer came nearly at its close and was shared by a small group of Counsellors.

We were "off duty" at the time, and enjoying, in canoes, the quiet beauty of a smaller and less frequented lake than our own Sebago. In the party was one with unusual ability to imitate the calls of birds.

We had paddled clear across the lake to a cove that seemed to promise shade and absolute solitude, when we saw a large loon on the water, at some distance from us. The silence was broken by a voice from our canoe—that high, weird call that is so uncannily human when it comes from the throat of a bird, but in this case, was so *bird-like* that it deceived our friend in the water. There came promptly, from the loon, an answering call; then, a louder note from our canoe—and the dialogue or duet was in full swing. There was no sound but this strange, wild call, sent back and forth across the water. The loon, now joined by three others of his tribe, came nearer and nearer—answering more quickly and sharply as he approached. They came so near, at times, that some of our party began to question what would happen to our canoes should the excited birds close in upon us, in response to what might have been—for aught we knew—a challenge, or a call to battle.

Another canoe put out from the opposite shore, where a lone fisherman had established his camp. He hurried over to see what all this wild commotion might mean. He was in time to see two specks appear in the sky, circling nearer and lower, while they sent down to us a slightly different cry that was, apparently answered to their satisfaction, from the canoe, again and again. The birds in the water finally left us; but those above continued their circling and their conversation until our conspirator in the canoe lost her voice completely. One of the loons then sailed away over the tree-tops, with a dignity of motion that seemed to indicate his scorn for poor earth-bound creatures such as we. The other came

down to the water quite near us—the female, probably—as though to satisfy a very natural curiosity as to who and what we were. With great wings outspread she struck the water like a hydroplane, making a very noisy splashing on the surface, for some distance—a demonstration that we could see as well as hear. Turning her swanlike neck for a last scornful look, she took a graceful dive, in her own loon-ey way, and disappeared completely.

Nature at Teela-Wooket

MARY A. STILLMAN

In the day's order at the Teela-Wooket camps nothing is required except the setting-up drill in the morning. Sports and activities of various kinds are offered, and from these the campers choose such as appeal to them. Of course the riding, swimming and other sports have to have a regular time schedule so that they will not interfere with each other, but the nature work goes on all day long whenever anyone feels so inclined.

Our bungalow, delightfully situated upon a hillside which brings the windows on a level with the bird-filled tree tops has been set aside for nature headquarters. Half of this is the sleeping room of the Nature Councilors, and the other half is the nature workrooms. Here are books, pictures, and charts for reference; also an herbarium, collections of birds' nests, insects, cocoons, stones, etc. Here the girls bring their flowers, ferns and leaves, and also living specimens which they keep for awhile,—tadpoles, toads, salamanders, snakes, caterpillars, grasshoppers and helpless birds which have fallen out of nests.

These treasures often begin to come before the councilors are dressed, and the procession continues all day until just before taps. There are often from forty to sixty voluntary pupils a day, and when too many come at once to allow of individual instruction they divide into groups and teach each other. The interest in nature is not confined to the girls, but includes several councilors, bookkeepers, waitresses and others connected with the camp. Even the riding master has contributed maiden hair ferns, and the village minister a modest sphynx moth!

Besides the identification of specimens the work includes leaf-printing, the pressing of ferns and flowers, some Girl Scout nature instruction, and the coloring of Kellogg's bird and animal outlines.

Many field trips have been taken, sometimes just to see what could be found, but usually with a definite object in view,—to gather greens for decorating the camp fireplace, to pick raspberries for the table, to find rare ferns, to visit a gorge or a marble quarry, or to take supper upon the top of a favorite hill. On all the trips the girls are astonished to find how many interesting things appear along the way.

One little camper remarked: "If I had known that nature meant going out into the woods and seeing things I should have signed for it before. At school we have nature study all out of books and it is horrid. But I just love this! I live in the country where it is lonely, but if I can learn something here about nature I need never be lonely any more."

Very many girls who did not sign at first, thinking that they had not time for it, have found during the summer that they wished to take up nature work. They come with their specimens whenever they have leisure. Sometimes they become so much interested that they forget to go to their next regular appointment. Often and often they have said, "I had no idea that nature was so interesting!" or "Oh joy, I have fifteen minutes more for nature!"

In all the activities at Teela-Wooket, as a recognition of work accomplished, various kinds of insignia are awarded. The nature councilors have designed some insignia for their department which meet the requirements here and which might be adapted with slight changes to any locality. The finished token is a circle of white felt upon which is stencilled a six-pointed star. Each line is of a different color, representing a different phase of nature work. These bands may be won in any order, and are awarded as soon as any list is completed. The colors and what they represent are as follows:

Violet—25 flowers.

Red—25 birds.

Green—15 trees.

Yellow—15 ferns and club mosses.

Orange—15 small animals.

Blue—15 insects.

For special interest and for identifying more than the required number there is added a gold colored center (a brass split pin).

The campers are encouraged to bring in their own specimens, because in making the collections they have a chance to see the things in their natural environment. Sometimes the collections are posted and a test given to see how many names are known. Three hundred and forty tests have been passed during the season by eighty-five different girls. Eleven girls have made, instead of the required 110 points, from 122 to 187 points, and have been awarded the special insignia with the gilt center. These final stars were stencilled in an interlaced pattern more pleasing than the simple double triangle, and were awarded on banquet night with the other high honors.

One afternoon a bird pageant was given in a natural out-of-door theatre. Simple costumes of crepe paper were designed to portray the correct coloring of about thirty birds, and one especially talented camper whistled the bird calls as each entered. With music by the orchestra and glee club and a few folk dances interspersed, an enjoyable and instructive entertainment was provided.

The beauty of the voluntary system of nature work is in the joy which it enkindles. No obligation is laid on anyone who is not interested; but one who is interested may spend her leisure time profitably whenever the spirit moves.

Who can suggest a more delightful way to spend a few minutes than in watching baby hermit thrushes open their orange-lined beaks? The nests that were found included those of the house-wren, the robin, the junco, the song sparrow, the barn swallow and the hermit thrush. Caterpillars which spun their cocoons in the Nature Bungalow were luna, cecropia, promethea, polyphemus and dagger moth. Every new discovery brought joy, even the unequal balance of an elm leaf.

To one of the campers near the end of the season came a great sorrow,—a telegram brought the news of the death by drowning of three of her relatives. She said to the nature councillors: "In this crisis nature has meant more to me than anything else. I had to get away from people, but I went into the woods and found comfort." This gave them the greatest satisfaction of anything in their summer's work, for they felt that they had led the girls through nature to a realization of nature's God.

A Night With Nature

By A TEELA-WOOKET NATURE STUDENT

Last night I had a strange and curious dream:
I gazed at mushrooms circling through the air,
I wandered by a limpid, winding stream,
And gathered birds that grew in clusters there.

I filled my sweater pockets with the stars
That lay within the streamlet's pebbly bed;
Altair seemed bright until I chanced on Mars
Beneath a mossy rootlet, gleaming red.

I rode upon the graceful ostrich fern,
We flew above the earth, thru airy space;
Wild flowers nodded close at every turn—
The yellow water lily brushed my face.

Descending from my steed I watched the newt
Building his nest upon a lofty crag;
He filled it with the luscious maple fruit,
And decorated it with purple flag.

I carved the Latin names of all the trees
Upon their foliage; this labor done
Beside the winding stream I sat at ease
And knew that my insignia was won!

CAMPS DESIRING COUNCILLORS

CAMP WIGWAM

A. Mandelstrom, 230 West 107th St., New York City.

CAMP ALGONQUIN

Edwin De Meritte, 1404 Raleigh Ave., Norfolk, Va.

CAMP WILDWOOD

Sumner R. Hooper, Rockwood, Maine.

One for Ornithology, one for Biology, one for Nature Study.

Nature Study in Summer Camps for Girls

ELEAZER JOHNSON DOLE

The Tall Pines Camp, Bennington, N. H.

To correct a possible misconception let us at first emphasize the fact that a summer camp is not merely a playground. It is or should be a place for recreation and play, but it is also essentially an educational institution, such an institution as educators have long theorized and dreamed about, but have rarely succeeded in realizing. It is not a school, for formal instruction has no place in it, but it is a place for education in the literal sense of the word. The children are busied chiefly with out-of-door activities, such as hiking, games, riding, water and athletic sports, and nature study, with a portion of each day set apart for spontaneous play. Such institutions present several unique and important problems for the expert in education; unique because such camps are comparatively new, and important because they are bound to play a more and more prominent part in the training of children. In such activities as those mentioned above, the normal girl should acquire an interest in and love for out door life. Perhaps she will not show a love for nature, but if she does manifest a love for the type of life which the camp offers, the genuine love for nature will come later when the child is more mature. Now there is very little difficulty in developing an interest in camp life. Every normal girl already has it. But there are certain very good problems which the nature study instructor has to face in the development of his particular phase of camp activities.

It is the writer's opinion that nature study is one of the most important phases of summer camp work and he has an equally strong belief that too much emphasis can be, and generally is, placed upon it. Those of us who have tried to teach nature work have too often had the disappointing experience of having the children manifest very little interest in the lesson, or even turn away from it altogether. If we have wondered why, and been honest with ourselves, we have generally concluded that the trouble was with the lesson. In most cases it was too formal and reminded the children too much of school. In the case of other camp activities, the child learns to do things by doing them. She learns tennis by playing it. She learns hand work by doing it, and learns to swim by swimming. This is not possible with

nature work. She can not learn what a bird is by flying, nor how a grasshopper hops by hopping. She must be told how to distinguish an elm tree from an oak, and the problem is how to do it. Let the instruction be ever so informal, the girl soon realizes that her instructor is asking her to work with her head rather than with her hands, and rightly resents it. The writer of this article does not wish to be understood as advocating mental idleness during the summer, but it is his experience that a girl will not take a nature lesson presented as such and do it gracefully. She finds ample opportunity for mental activity in other lines and does not wish to burden her mind with the distinguishing features of different classes of birds and plants. Another factor which tends to make nature instruction in summer camps difficult is the use of the unfortunate term, "Nature Study". Courses of instruction in this subject are now offered in a large number of public and private schools, and when the girl comes to camp and finds the same subject on her list of activities, she generally concludes at once that she doesn't like nature. The psychological effect is bad.

We believe that these difficulties may be overcome, at least in part, by making the nature work largely incidental to other camp activities. The writer even doubts the advisability of including nature work as a formal part of the day's program. The instructor should be an almost constant companion to the girls, and should choose the psychological moment for talking nature. He should always be on hand to see a strange bird, a new flower, a misshapen tree, or other object of interest. Especially should he accompany the girls when they go away from the camp grounds to neighboring mountains and lakes where the flora and fauna may be different from that in the immediate vicinity of the camp. It may be that the camp grounds afford comparatively few things in nature which will attract the child's interest and attention, and those who come back to camp year after year will soon find nature irksome because they observe the same things again and again. More of our work in nature should be devoted to trail making, camping in the open, tramping through the woods, with a compass, etc.; upon these activities which may be grouped under the term "Wood Craft." We believe that this term is preferable to "Nature Study". These are the things which the girls desire. They are as far removed from school work as possible, do not call for any memory work,

and at the same time afford ample opportunity for acquiring an interest in out-of-door-life and indulging in as much love for nature as may be desirable. Of course, the details of such a plan would have to be worked out by the individual instructor. Modifications will be necessary to meet individual needs, but the plan is perfectly feasible. It will, however, require a great deal of thought and care on the part of the instructor. It is firmly believed that the results will be well worth the time and efforts devoted to elaborating the method.

The ideal nature teacher is a man. The writer is well aware that the women who are doing this sort of work are accomplishing a great deal of good, but it is nevertheless his opinion that a man is better adapted to nature work of the type indicated here than is a woman. It is conceivable that a man might teach embroidery as well or better than a woman, but a man in such a position would be an absurdity. The same sort of absurdity would exist, although in a much lesser degree in a woman teaching this sort of nature work. Not only is a man better fitted by nature, but he has better access to interesting swamps and hills, to caves on the mountain side, and to the tops of trees where bird's nests may be found. He may be very agile, but he will scarcely reach places which are inaccessible to the girls. He should not be a professional teacher, for in spite of his efforts to the contrary, such a man is generally an instructor rather than an educator. Neither should he be a trained naturalist. It is far more important that he should see Aurora in the sunrise than that he should explain the phenomenon as light rays reflected from particles of dust suspended in the atmosphere. Better than he should find elves in the woods and nymphs in the water, than that he should see nothing but decaying organic matter in the forest and find the water swarming with bacteria. Here again the writer does not wish to be understood as advocating the introduction of fairies into nature, but of the two extremes it is better that he should find the woods peopled with these creatures than that he should see in nature only the recurring processes of life, death, fermentation and decay. In other words the ideal nature teacher should have a genuine love for nature rather than a technical knowledge of biological and physical sciences.

Nature Study, Normal Schools, and Summer Camp Councillors

GRACE BROWN GARDNER

State Normal School, Framingham, Massachusetts

Probably no subject in the normal school curriculum has had a more varied career than that now designated by the general term of nature study. Natural history, which was taught in a desultory manner and at irregular intervals during the earlier years of the normal schools, early became differentiated into botany and zoology. These subjects were taught from a strictly scientific standpoint. Botany dealing largely with the analysis and classification of plants and the making of herbaria, and zoology with the structure and classification of animals and the formation of comparative collections. Later, with the aid of the compound microscope, these two subjects were studied in regard to cell and tissue structure. This technical work dealing largely with dead material was superseded by the study of biology, with the emphasis placed upon the life processes of living organisms. The constant change of aim and content in the subject is indicated by the nomenclature, "Biology", "Biological Science", "Natural Science", "Elementary Science", "Plants and Animals", "Practical Science", and "Nature Study". We find the collections of the earlier period giving way to field trips and excursions and living material in the school room, with the purpose of arousing in the pupil an intelligent interest in his environment. We find abstract ideas becoming concrete in the project method of teaching, and the community spirit developed in the home and school garden movement. Is it not possible to vitalize the subject still further by cooperation with the nature lore work of the summer camps?

In every normal school class there are some students who by reason of early training or natural aptitude are particularly interested in nature work. If such students are informed as to the possibility of fitting themselves for nature lore councillors, and are placed in touch with those seeking candidates for such positions, it should be of value both to the normal schools and to the summer camps.

Summer camp work enables the student to increase knowledge of the subject matter while enjoying a healthful vacation with inspiring companionship. It furnishes an opportunity to work

with children in groups, and acquire experiences that will be of value in later teaching. It often aids the student to secure a superior teaching position at the end of the normal school course.

Normal school students furnish summer camps with leaders who are young and inexperienced, but who are interested in children and who have had experience in working with them. Their whole course has fitted them for this leadership. Add to this an enthusiastic working knowledge of subject matter and an open and receptive mind, and the right personality should make an ideal combination.

The best time for beginning summer camp work is before the senior year. Pupils either have secured positions by June of the senior year, or must hold themselves in readiness to meet superintendents during the summer vacation. Under these conditions they hesitate to undertake new work, feeling the need for rest before the fall teaching. If, however, camp work has been done the previous summer the student may be willing to continue it.

The enthusiastic and fresh outlook on nature which the councillor can hardly fail to bring back from a well conducted summer camp should not only make the work in the normal school more vital, but through the normal school should vitalize all nature study work in the public schools.

Nature Study at Quanset, the Cape Cod Camp for Girls

MARY L. HAMMATT

Quanset began in 1905. In those early years we studied birds, had the Audubon pictures, and gave honors and prizes for the best lists. We mounted and named all the wild flowers of the neighborhood. Almost from the start we learned the poison Amanitas, as we did the poison ivy, so as to avoid them. On long mushroom hunts we gathered and named the more common edible mushrooms. I find that little mushroom suppers over the open fire appeal to the girl's imagination as well as to her palate. I always pass on every mushroom before it goes into the pan. Spore prints are interesting. Government bulletins, "Atkinson's Mushrooms", and later "McIlvaine" are aids to the beginner. The compound and the dissecting microscope are helpful always.

We used to chase butterflies with a net; we collected more or less; but many girls cringe at pinning an insect, and I am glad they

do. We watched the caterpillar spin its cocoon under glass; we kept this till the imago emerged. But better than this they have always loved to watch life in its habitat. They get so excited when they first see the pupa of the cicada climb up a tree trunk, crack down the back, and the winged adult crawl out. This they never forget (I find they can forget whole lists of flowers, ferns, mushrooms from one season to the next.) They will linger long at the spring watching the mudwasp roll up her ball of clay and fly off with it to her house (for which one must look, at once, of course). And the paper wasp does not escape the eye as it gathers its material from the old grey rail fence and pastes it on the community house not far away. Last year that house was under my lodge window, visible from within and without. (No, they never get stung). Inside the room I had a wasp's nest torn open to show the cells.

What a mad whirl in the air when the Quanset bees swarm! And what a stampede of girls for the bee yard! Why shouldn't they love that and the "secrets of the hive," and best of all perhaps, the fresh honey on warm biscuits! Mrs. Comstock's "How to keep Bees", makes everything so clear, and Maeterlinck is such delightful reading.

What young girl or boy lacks interest in the ever present ant hill, the turtle eggs found buried in the sand, the mosquito larvae and all the wonders of the pond, the box turtle that shuts up so neatly, the spider with her young swarming over her back, the hoot owl with her wierd cry, the nest of darling little rabbits, the snake that has just swallowed a frog, the dead weasel, in summer dress, found beside the path? This last the little girls smoothed and looked at, and then buried lovingly with all the ceremonies,—minister, choir and mourners,—headstone even. (We do not aim to make scientists of our girls. We just want them to live with nature, love it, and learn *from* it rather than *about* it.) The fat woodchuck living all too near the garden, is not forgotten. There are many to watch while the men drown him out of his hole. A nest of flickers in a hollow tree, and more seldom found, the Bob White's nest under a tuft of beach grass (a mother bird brought her whole little flock to feed close to our lodge once), the gulls on the island, their eggs and little ones,—on a never to be forgotten day; these are things that make a picture in the mind of a girl or boy. Why tell them or let them learn out of a book what the

long snakeskin in the field or the spider skins or the cast shells of crustacea will tell at a glance. Our girls, big or little, love to play with the *limulus* (Quanset's totem, by the way) turn him over, see how the spines and hairs of his legs lead the food down to his mouth which lies between them, and learn of his ancient lineage. One morning a host of squid had been chased up near our shore. Will the girls who saw them ever have to be told how the squid swims or how he protects himself? Ripple marks on the beach, miniature sand dunes, circles in the sand made by wind-blown blades of beach grass, magnetite grains drawn from the sand by a magnet,—all are sources of joy.

The Quanset "Nature Q" stands with our younger girls for a definite accomplishment, along "Woodcraft" lines.

The inspiration of the season last year was the visit of Dallas Lore Sharp, the naturalist, with Mrs. Sharp and the two younger boys. He gave us all such a delightful talk on the community life of the bees, their wonderful specialization for fatherhood, for motherhood, for work. How the girls gathered about the observation hive to see the queen, the workers, the grubs, the eggs, even the young bees emerging from the cell! They "adored" his bird stories—even ghost stories—and begged eagerly for more. And he took the whole camp across country on a hike to see a snowy heron with a broken leg, taken captive in a salt marsh and later sent up to Franklin Park. The fine, keen minded boys enjoyed the novel experience of sleeping on board our *Tioga* with our skipper. It was a delightful family,—and all too short a stay for our girls and for us all.

Nature Study at the Senior Quinibeck Camp

By GLADYS GORDON FRY

Six A. M. and most of Camp Quinibeck is asleep, but here and there from the bungalows appear girls who meet in a small group at the central house from where they set out with their teacher, Gladys Gordon Fry for the early morning bird walk.

Over one-third of the 150 girls chose nature study as one of their definite activities, from among the number of interests offered at Quinibeck, and these girls are divided into groups, each group having its appointed morning for the pre-breakfast stroll.

That walk to hear birds in song, with the dew on the grass with the sweet freshness of the sunrise air is one of the rare camp experiences.

After breakfast at assembly Mrs. Fry may make announcements relative to her work,—the nature studies that will be made on the coming all day hike, the weekly breakfast picnic, the evening class in the big skiff on the lake, those who have won honors in nature.

Mid-morning finds her with other groups—in the flowers and ferns—or perhaps again the birds or trees, the classes again being systematically arranged.

She is always in her bungalow during the afternoons at certain hours and there is a steady stream of girls who call on their way to the bathing beach. It is interesting to be behind the scenes at that time. One girl comes to pass on another 5 of the 28 species of ferns at Quinibek, a test for securing another point in her nature credit. Another comes to report a special bird, one of the 76 species found at camp—or to secure help in the identification of a flower. If the day has been rainy and the walks impossible the classes meet indoors and Mrs. Fry has unusual bird games with beautiful bird cards. And she has collected mounted flowers and ferns which she used to supplement her out-of-door work and her library is at the disposal of the girls.

The evening walk is a time of charm—the evening songs of the hermit thrush and bobolink—and it is an opportunity to meet another group.

No two days are alike—the camp program is too full—too many adjustments must be arranged with the various interests clamoring for each girls attention—but the regular walk hours—the afternoons at her bungalow insure each girl who is taking nature as part of her camp work, adequate attention.

When a girl has mastered 10 flowers, or 5 ferns, or 10 birds, or 5 trees she has won a point. Ten points are needed for the "N" for nature and when a girl has won that her name is posted on the Camp Honor Board as a candidate for the Blue Q. An "N" is one of the requisites together with various other activity credits for the highest camp honor, the white C. Q. for Camp Quinibek. Thus the incentive of competition and awards is added to the intrinsic interest of the nature study itself.

Nature Study at Adirondack Camp on Lake George

ELIAS G. BROWN, A.B., M.D., Director

From the founding of Adirondack camp, 18 years ago, the Director has felt that he could do nothing better for or that would afford greater interest and pleasure to his boys than to give them the opportunity, which camp life in the great out-of-doors should afford, to learn to really know nature, if only the right leader and method is supplied. For several years, under different men, various plans were tried; but little interest was shown by the boys. Analysis of our unsuccessful efforts to create an active nature department convinced us that our difficulty was due to our not having found a leader for that work who had the faculty of arousing enthusiasm among and leading boys, our not having a plan of activity under which definite but varied work would be done, and to the fact that the nature department had not been made to fit in or coordinate with our various other departments which were very active—athletics, aquatics, sailing, shooting, shop work, photography, music, scout work and trips. Working to correct these fundamental defects, we finally evolved a nature department which yearly interests such a proportion of our boys as to prove it to be well worth while.

The following principles are considered by the writer to be the important factors underlying the success of the nature study work in Adirondack Camp:

- Of most importance is an attracting leader.
- All nature study should be voluntary work.
- It should be conducted under a definite plan.
- There should be considerable variety.

During the season there should be credit given for work done, and at the close of the season special credits or awards.

The leader of the department must attract boys to the study of nature. Nature is interesting and the study of nature fascinates many boys when they get in it; but boys easily pass it over for the more conspicuous activities of camp life. To successfully draw any number of boys to the study of nature, above everything else one thing is necessary. Other departments or features of camp have special attracting features. For instance: baseball has its crowd and noise; shop work its things made that can be seen and admired and used; sailing, the sight of that beautiful

boat, and then the experience of excitement as she leans to the wind and pitches in the waves. But the study of nature is quiet. It is necessary that the leader in this line should have within himself the power of drawing boys—the personality. It is true that very different personalities may make successful leaders in this work, and we cannot state the necessary combination of qualifications; but we must have for the counselor in charge of nature study for boys, a leader with the right personality. We must not expect or require boys to undertake nature study—the work should be voluntary and they must be led to be interested in it. Then, too, we should have a definite plan, with considerable variety; for without a plan the work will be random and interest will not continue to be aroused, and without variety interest will be lost. Of course it is characteristic of human nature that credit for work done serves greatly to stimulate effort and sustain interest. With this end in view a bulletin may well be kept in this department as, indeed, in all others, showing the progress and attainments of all campers in nature work, with blank spaces opposite names of inactive boys. And the work accomplished should contribute towards the attainment of certain honors or emblems.

At Adirondack Camp we have adopted a plan of work for nature study that we carry out from year to year, notwithstanding an occasional change of the counselor in charge; but within this plan there is abundant opportunity for the counselor in charge to work according to his own special knowledge and interests and ability. Under our plan we specialize in the study of birds during July and in the study of trees during August. Wild flowers are studied every summer and special credits are given. Of course, birds, trees, and wild flowers do not absorb our entire interests at any time. Birds are studied usually by small groups going out before breakfast, trees by groups going out for short periods whenever it is advisable to organize such trips. With wild flowers it is our object to learn to recognize as many as possible, to know the most interesting facts about some of them, and to understand the typical structure of a flower. This work is done either on definite trips or on quiet informal rambles. But the bulletin and the definite records kept and the desire to obtain credits and camp prizes serve to keep this apparently informal work from being neglected.

Each evening, at a certain time and place, the nature study counselor meets a group of interested boys for a nature "talk".

There is a definite outline of subjects to be covered; but this is departed from whenever a question by one of the boys makes it seem advisable to take up the subject of that question. This method gives added interest. Often the subject is one on the list, in which case the leader checks it off. It is not at all necessary to follow any order in these informal but most interesting evening "nature talks". Almost every day the nature study counselor conducts a walk for the purpose of illustrating in the fields or in the woods the subjects or object brought out in the evening group; or the reverse takes place—the ramble serves to suggest a subject for evening talk.

A room is reserved for microscope or other instruments, and for specimens and collections, and gives a place for some of the more careful work that some boys wish to do.

A nature library is maintained, and for quiet hours, or the occasional rainy day, the books in this collection are much sought.

The counselor in charge of nature study will have special subjects that he, rather than another man, can interest boys in, as in the study of the stars or the weather, and he has abundant opportunity to add his specialties to the regular outline of the course that we have adopted.

Many a grown-up, needing rest and recreation, finds that when he goes "to the country", he is unable to get much pleasure from the out-of-doors that should give him renewed health, because of a lack of knowledge of nature. Sometimes it may be of supreme value, often it can be of great pleasure and health to one to have a considerable knowledge of nature. With the object of adding to his future happiness and well-being, and of giving him an added interest in camp, by the above outlined plans and methods we have perfected our nature department, so that now every year a large number of boys become drawn to and learn much about the too often hidden "secrets" of nature.

Stop, Look and Listen at Camp Cowasset

KATHERINE WATTERS HENRY

During the summer of 1920 I had the very pleasant opportunity of being the nature counselor at Camp Cowasset.

It was such a joy to see how surprised the girls would be when after a few trips away from camp that right at the door or within a

few feet of their tents or their bungalows they would find so many friends nodding cheerfully at them if they stopped and looked.

As my specialty is birds, moths and butterflies, I was very much disappointed to find so few birds, due to the havoc of the Gipsy Moth caterpillar. The eight weeks that I was there I could find only 43 different birds.

We were very fortunate to have several birds build their nests right near the main bungalow.

Within 20 feet of the bungalow Mr. and Mrs. King raised their family of four. The parents were very conspicuous as the flag pole was a short distance from their nest. Those that are familiar with the characteristics of the kingbird, know why they spent so much time on top of the flag pole before they visited the nest. I cannot remember a time that we had drill but that one of them would be perched on top of the flag pole. They never forgot to stop, look and listen, watching us as though reviewing our progress, then dart to report to their family of four. One morning I missed them from the pole but during the day I discovered that they had moved their family a short distance away to a scrub oak. There they were all lined up on a branch. The four close together line formed often as we were during drill, when the following command was given. "Right about face." One evidently hadn't heard the command. They remained in that tree five days.

I had never been fortunate enough before to find a peewee's nest. I considered it a rare find and treat to discover a family of them near the main road leading out of camp, a very short distance from the main bungalow and near the stable of the riding horses. Peewees are also found more in high dry woods where they build their little moss-covered houses on horizontal boughs at quite a height from the ground. This one was near the road leading from Senior to Junior Camp, on a horizontal branch about eight feet high. The girls could climb up into the tree to see the baby birds. The question that bothered us was how could these baby birds stay in such a small nest. They were so crowded and seemed to hang over the nest, which is a wonderful creation, composed of plant fibres, quilted together and ornamented with lichens.

I was also keenly disappointed in not finding any night flying moths—not one did I see—even the butterflies were conspicuous by their absence, just a few mourning cloaks, cabbage, and red admirals.

But the flowers! I never saw so many different kinds and such wonderful ones.

The girls that wished to work for their nature point were required to be able to recognize 25 birds; 25 flowers; 15 each of the following: trees, insects, small wild animals, moths and butterflies.

The birds, butterflies and moths were what gave them the most trouble as they were so hard to find when we walked over two miles from camp; but as we led such a busy life that was not often permissible.

I am very sure that there were very few spots on the Camp grounds but what at any time you could find at least twenty different kinds of flowers blooming within a radius of 20 to 30 feet. Such wonderful ones! Such joy to stop and look. I found 132 different kinds while there and at least 20 that I did not know or find in any of my books. Remember please that that was during the months of July and August. What beautiful ones must be there in May and June, also in September and October.

O, that more people would learn what wonderful joy and happiness there is in being able to recognize the friends of the woods and field. Just learn to stop, look and listen, a habit worth while.

Nature at the Tall Pines

By STELLA MAYO BROOKS

One could hardly imagine a more beautiful environment in which to arouse interest in nature than is found at The Tall Pines, Bennington, New Hampshire. Here within the camp grounds are found the sky warbler and the noisy sandpiper, the delicate lady slipper and the sturdy daisy, the low fern and the lofty pine. With such surroundings the problem of the nature worker resolves itself into the question of the place of that subject in camp life. Its primary object should be the opening of untrained eyes to the beauty about them with the ultimate purpose of awakening an interest in that beauty, which should add to the true enjoyment of life. Most of the girls who enjoy the privilege of summer camps come from the city where noise and confusion dull a mind naturally awake to the beautiful, and make indifferent a mind closed to the quiet places of nature. Who can have witnessed this apathetic attitude and not have longed to break through that apathy?

The avenues of approach open for development are many. To one, nomenclature may make the appeal, to another, structure. Again, there is the relation of the simple to the complex among plants; and the points of similarity between a unicellular plant and the same type of animal offer interesting analogies.

To a girl new to the laws of nature, routine nomenclature of ferns, trees, flowers, and birds becomes monotonous unless some idea of the relation of individuals can be brought to her. Walks, the aim of which is to acquaint her with different plant societies and on which she learns that a plant of the roadside society would live most unhappily in a bog society, give names a meaning to her. Blazing trails afford the lure of the new and introduce her unconsciously to the flora of the deep woods. The life history of a fern or moss plant, couched in simple language, may reveal a phase of life entirely unknown to her, wonderful because of its minuteness. The capsule of the moss awakens interest when its purpose is known.

A means of gaining interest which has been found satisfactory with the girl who has become familiar with names is the use of the microscope to relate the simple to the complex. For the older girl the structural likeness of the pleurococcus, the spirogyra, the moss, the fern, and the flowering plant can be made to suggest interrelation. To the younger girl, wonder at the revelations of the microscope makes its constant appeal.

Thus gradually there can be established a plant by which to bridge the differences between plants and animals. The comparison of a protozoan and an alga of the one-celled type serves to connect these two groups. A simple explanation of the physiological functions, Lases of many questions asked by the new student of nature, tightens the bond of relationship. Protective resemblance and mimicry form another fascinating link. From this it is but a short step to the absorbing life histories of our lower animal friends. A walking-stick or a hill of ants may introduce an interesting lesson. And it is true that knowledge of the less obvious increases the ability to appreciate the obvious.

Few girls can spend a summer at camp and go away quite so impervious to the beauty of a stony brook, to the grace of an elm, or to the song of a bird as when they came. Names may still be meaningless to them, but the development of the power of appreciation must remain and that is the purpose of vacation nature study.

The Nature Work at Aloha Club*

YOSHI KASUYA

"We'll meet under the birch tree." Miss Shearer never ended her announcement without coming to this birch, and we girls could not do anything without first gathering under the big high tree near the bungalow, and say how-do-you-do to the little birch family up among the branches. Yes, this birch-tree was everything to us, and Miss Shearer, who was as tall, as steady and serious as the birch, and yet her speech as full of humor and inspiration as the whispers in the foliage, was our leader, friend and everything. And we girls were just as happy as little birds or daisies when we were engaged in "Nature work."

"Come to the fern-walk!" was the first call of nature when we went up to the club with our minds as blank as white paper toward nature. We had seen things, it is true, but not with our mind's eye. Miss Shearer called and we followed; we just couldn't help it. There was some charm in nature work, we did not know what. Well, what do you think we saw? Ferns, of course? Yes, but can you imagine how many kinds of ferns we found? Miss Shearer picked up one after another, and showed us the peculiarities of each. Our eyes rolled, our mouths were wide open. At the end of the pleasant walk in twilight through beautiful woods, over trickling streams, our hands were full of ferns, and our minds treasuring seventeen names of them. How rapturous we were! I brandished some Ostrich ferns and felt as triumphant as the Roman Conqueror. I decked my tent-mates' hair with dainty lady ferns, and how I purred the seventeen names into their astonished ears!

"A tree-walk? What fun!" We whispered to one another when the walk was announced. And one morning all the trees about the camp had a nice visit from us. The Balsam firs were caressed, the Aspen poplar talked with us, and at least fifteen other trees crept into our hearts. And how proud we were when we could tell which was pitch and which was white pines!

*NOTE: This article was written by Yoshi Kasuya, a Japanese girl from Tokio and now a sophomore at Wellesley. She received highest honor in nature work at Aloha Club in 1920. This young lady has been in this country a little over one year. The article is printed just as it came from the writer and we feel that it is remarkable not only for its English but for the appreciation that it shows for nature.

"Do you know all the flowers hereabouts?" This was a gentle hint from Miss Shearer, and almost all the camp were out on the road down the hill, eagerly learning the names of the beauties. When you see pretty dolls, you have a vague sense of pleasure. But when you make a step forward, and find their names, you feel as if those dolls were partly in your possession. So it was with us, with flowers. We had liked flowers but we had not cared for wild ones. But now, when we looked at each one of them carefully and found a sweet and interesting name attached to it, such as jewel-weed or Jack-in-the-Pulpit, we could not but cherish it with fondest affection. Twenty-five was the number of flowers which we had to identify in order to get a cross on the chart, but how could we stop there? There were hundreds of them waiting for our visit. And it is not strange that Miss Shearer was besieged by girls with some unknown flowers and thousands of questions about them.

Then came a bird-walk. At dawn, when the delicate pink in the east, peeping from the purple mist, was gently waking up Lake Catherine, and when the mountains were still in deep slumber, wrapt in dreamy haze, we were up walking,—no, not walking, for we put one step after another as softly as we could. All was quiet, and we never felt ourselves so calm and so full of sweet sensations. From far, a long silvery note with an exquisite tremor broke this blessed quiet. "A white-throat sparrow," somebody whispered. Then, as the day broke and the trees gradually emerged from thick purplish gray vapor, a heavenly chorus of little birds began to fill the balmy air. We listened and we learned how to distinguish one note from another, and thus each tree inhabitant, of the Catherine Shore was fixed in our minds with its characteristic note.

The Plant Association. That was one of the most charming subjects of study. This sounds quite solid and scientific, but it is nothing but a pleasant trip around and on the lake to see which flowers have what kind of neighbors, which plants are very fond of water by place and so forth. Thus when the trip was made, even the most inconspicuous liverworts were visited and their tiny spore cups were admired just as much as butter-cups.

Our nature walk was not limited to the knowledge of flowers, ferns and birds, but by and by our aspiration went high up into heaven, and finally the little twinkling stars became the sources of inspiration. One evening we all lay down on the soft grass, and

we were charmed by the stories of Great Orion and Pleiades and many other constellations and those diamonds in heaven at once became our intimate friends.

This is not all. We had countless pleasant trips in search of nature's mysteries. I have to write pages and pages if I try to tell you how we happened to get acquainted with some new born babes in a bird's nest, or who produced masterpieces of sketches or who wrote as wonderful a song as Wordsworth. We were so happy all through summer,—we the girls of nature work. And I am sure the old birch tree near the bungalow must miss the cheerful little friends in middies and bloomers.

A Porcupine at Weetamoo

By FLORENCE GRISWOLD

Yes, that was the largest porcupine I have ever seen. If I remember correctly, it was soon after breakfast one Saturday morning that a "mile-away" neighbor stopped at Camp with the greeting, "There is a big porcupine down the road a ways. Don't you want to see it?"

Most of the campers were putting their tents in order for inspection but the big gong soon called them to the bungalow. Such an opportunity to study a real live porcupine was not to be missed, and soon the entire camp was half way to the scene of action.

We saw Mr. Porcupine walk slowly across the road and disappear. Our exclamations of regret must have frightened him for in a moment he came into sight part way up a rather small tree. He climbed with ease and considerable rapidity. As two brave girls hurried forward to the tree for a nearer view, some one excitedly exclaimed, "Don't go near. He will shoot his quills at you." No one took time just then to make known the fact that that theory had been exploded. All were intent upon watching the porcupine. No unnecessary words were passing back and forth. The watching was done in almost breathless suspense.

Someone shook the tree and Mr. Porcupine easily climbed over onto the limb of a bigger stronger tree. One of the men brought a pole and drove him from one branch to another until at last he went on one so small that his weight bent it down and he was forced to drop to the ground.

How much we wanted to keep that porcupine and try the effect of our camp spirit upon his disposition. It was not to be. He had been wounded. All decreed that he must not be allowed to suffer.

Nature Study at Camp Hanoum

Nature study at Camp Hanoum is very informal in presentation. It is rather made an aspect of other camp activities—tramps and hikes, mountain climbs or canoe trips, though frequent nature walks are organized, to search out and identify the flowers, trees, ferns and birds that are so abundant in the Vermont hills. Over night parties, stretched out on ponchos and blankets, study the stars from the hilltops.

Last season a naturalist and forester lived among us and stimulated our interest, not only in identification, but in all the practical side of wood-craft—the kinds of wood most useful for certain kinds of fires, and for shelters, and which trees to cut and which to spare, and why.

Among the younger children, the Nature study took the form of games. Sometimes two groups, starting out in different directions, would meet in a specified time and compete for the largest number of specimens of ferns, flowers and tree-leaves gathered and correctly identified.

Another favorite game of the little children—clues—gave training in other lines than mere Nature lore. The group was told where the first clues would be found,—perhaps in the lowest crotch of a big tree. Here they would find a paper saying, “next direction at the foot of oak tree, 100 feet east.” Here another clue would direct, “look under cinnamon-fern by elm tree, 200 feet due north.” Long trails could be laid, the clues always to be replaced for other players. The training in judging distances and directions was very valuable to young children.

The children are encouraged to bring in specimens of lichens, fungus, abandoned birds' nests, geological specimens, insect galls, caterpillars, butterflies and moths,—whatever they see that interests and attracts them. These specimens are collected in a little museum very popular with the children.

Three Days in the Mountains

D. C. STEBBINS, Hiking Counselor
Camp Wildwood, Bridgton, Me.

Very much the same feeling comes over me each year as we are preparing for the Mt. Washington trip. We had watched the mountain for days from the Lodge porch. We had lived in an atmosphere of excited anticipation. At last the morning arrives. And at four-thirty sun time, fifteen sleepy maidens are just beginning to feel that it's going to be a cool, bracing day. A couple of hours after we are rolling away from camp in the "Reo" toward the land of the mountains—through the quaint old town of Fryeburg which is just rousing to its morning activities as we pass through, to the blue mountains all about North Conway,—then on and on, and always more mountains till we are almost at home among them. By the time Jackson is reached we have had our first view of Mt. Washington. The long up grade from Jackson to the Pinkham Notch is to me one of the most thrilling parts of the ride, especially as one looks up at the Summit House on the brow of the mountain, so clear and cold and high. We stopped at the falls of the Ellis River, climbed down the Glen and looked up at the pure white stream which tumbled sixty feet from its rocky channel into an Emerald pool at our feet, and then in a series of lesser cascades passes out of sight down the valley. Then, on to the Glen House, where we stopped to look up at the solemn array of peaks, Washington, Jefferson, Adams and Madison. This is the spot to get one's bearings. At one-twenty we had finished our luncheons, and had begun the ascent of Madison by the Valley Way. The heat and hardship of a mountain climb is forgotten when one comes to a rushing stream. Twice we crossed Snyder Brook, and drank and cooled ourselves in its waters. All the way up to the Madison huts we were never far from its course. The huts were reached about six o'clock, and here we found the source of the mountain brook, great clear springs in the solid rock, sending out little purling rivulets which ran mysteriously under the low scrubby growth and finally gathered together into the rushing stream which had refreshed us earlier in the day. After a pleasant supper and a quiet night's sleep in the huts we were ready for our climb the next day over the Peaks. The trail, six miles, is entirely above the timber line, and marked by cairns. We all took turns following the trail, which is most interesting as one has to look sharply all the time. We stopped frequently as we wound up over

the side of Adams. We were in a different world all that day. Now our attention was caught by wave after wave of blue mountains. Now cloud and shadows, again, we stood at the edge of some ravine, and listened to the wind sweeping through the trees hundreds of feet below us, and heard the sighing rush of some river winding its way across the floor of the ravine. After a day filled with joyous exertion we were at last climbing Mt. Washington, our goal, the Summit House, in full view. That ecstatic feeling familiar to all mountain lovers at the end of a long, hard day, shone in each face as we heartily ate our suppers. We were not favored with a sunrise from Mt. Washington, but the trip was crowned with a descent thro Tuckerman's Ravine. The previous day had been one of widest views and far horizons, the last day gave us an intimate acquaintance with a mountain ravine. It is one thing to stand and look down a ravine, and another thing hour after hour to slowly make one's way down its precipitous sides, now and then pausing to look up at its menacing walls. Thousands of little streams flowed over the rocks, sometimes on our very path, bright splotches of mountain flowers were found on some high rocky ledge. When we reached the bottom of the head wall we found the snow arch. We had great fun, making snow balls, but were careful not to get too near the arch. At Hermit Lake Camp we stopped to eat our luncheon at half past two. It was good to hear the fire crackling in the fire place as we broiled our bacon. After a short rest we continued the descent, through the forest now. The five small brooks we had seen on the wall of the Ravine, were now a magnificent stream and we stayed a long time at the Crystal Cascade. By six o'clock we were down and had rejoined the girls who had left us in the morning to go down by the carriage road. Our ride home in the evening was delightful, we enjoyed our supper at the Pine Tree Tea Room in North Conway, and arrived at Camp about ten o'clock.

In a little newspaper "Above the Clouds," I once found this poem. If you read it carefully I think you will find that it reflects much of your own feeling:

"The mountains lift their lofty heights above the land,
Silent, mysterious, beautiful, complete they stand,
Clothed in new splendours as the passing hours unfold,
Of morning's purple shadows and the sunset's gold.
Gazing I pause and wander on my lonely way.
Till from those lofty peaks a still voice seems to say,
Cast off thy bonds of self that hold thee to thy sod,
Come to the mountain heights if thou wouldst know thy God."

Daddy!
They say Camp Wigwam
does more than it says



DR. CLYDE C. FISHER, in charge
of the Nature Study at Camp
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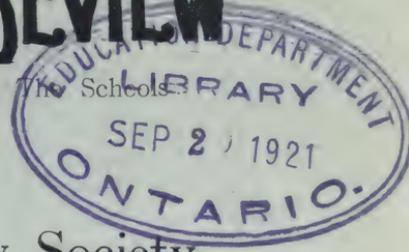
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MAY and SEPTEMBER, 1921

VOL. 17 Nos. 5 and 6

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THE NATURE STUDY REVIEW

VOL. 17

MAY and SEPTEMBER

Nos. 5-6

The Cornell Rural School Leaflet and Nature-Study

DR. E. L. PALMER,

Cornell University. Copyrighted 1921 by E. L. Palmer.

As stated in the February 1920, REVIEW, the *Cornell Rural School Leaflet* is a periodical published by New York State through the Department of Rural Education of the New York State College of Agriculture at Ithaca, N. Y. Its aim is to provide guidance and subject matter for the teaching of Nature Study and Humaneness and to furnish a background for an intelligent appreciation of agriculture.

Each of the four numbers issued during the school year are sent to the rural schools of the state through the District Superintendents. The first number of each year is a teacher's number; the others, children's numbers.

The Review this month presents an outline of study for which the above mentioned leaflets provide the subject matter. This outline should be of general interest and use even to those who do not receive the Leaflets. Unfortunately the editions of Leaflets are so small that the publications are not available for free distribution except to the rural schools of New York State. It is hoped that at some later date the material may be made available in a revised form for more general distribution.

Space does not permit the publication of any of the stories of the "story section" of the Leaflets. This is immaterial as other stories may possibly be used satisfactorily in their places.

One of the "landscape and cut-out picture" sets is published in this number and directions for their use are given. An example of the "fifty interesting things" section cannot be included in this number for lack of space but one of the "life history charts" is given.

A NEW OUTLINE IN NATURE STUDY, HUMANENESS AND
ELEMENTARY AGRICULTURE.

A plan of study which may be followed in a system of schools in a city is not practical many times in a one room rural school. But aside from the fact that the same material is not always easily available there is really no reason why a plan of study which can be put into practice in a rural school should not prove satisfactory in a city school system. For these reasons, it would seem best that any plan of study which is to be more or less uniformly followed throughout the State should keep the problems of the rural teacher in mind at all times.

A rural school consists of children of varied degrees of maturity and preparation. A city school consists of a selected group of children with a more or less uniform preparation. It is obviously, easier for the city teacher to plan and prepare the work than for the rural teacher to do this. If the rural teacher can plan the work so that all of the pupils may be kept busy at the same time on a given subject, so much the better. If but one preparation is necessary to care for the needs of eight different grades at once, then, it is better yet. This outline is an attempt to so simplify and organize the sources of information available to rural teachers that nature study may practically take care of itself.

An ideal nature study lesson might be one based on anything of interest found on a trip or brought into school by any child. Few teachers could give a real lesson under the circumstances which would arise following a practice of this sort at the present time. With the help of the outline which follows, this ideal may possibly be more nearly approached than has been possible in the past.

One lesson gives us but a meager idea of the possibilities of any branch of learning and in order to best appreciate the subject it should be approached from many angles. For this reason, a bit of guidance in the selection of material will possibly produce better results than if teachers are allowed perpetually to follow our own inclinations. This idea of "guidance" is not new. Too frequently, however, it has been carried to such extremes that it has developed into "requirement." Requirements are often more or less odious and frequently seriously besmirch an otherwise interesting field of knowledge.

The requirement that we teach in nature study five certain birds a year, for example, may make it easy for the teacher to dish out an allotted amount of information to the pupils without much difficulty. But the fulfillment of this requirement too frequently leads to book study rather than nature study. This same practice also has the disadvantage that nearly every bit of information which goes to the children must in some way come through the teacher. Teachers will find their work much easier if instead of trying to teach nature study to the children, they let the children teach nature study to themselves. With the help of the Leaflets which have been and will be published this should not be difficult in the rural schools of New York State.

Teachers sometimes make the mistake in thinking that they are required to know everything and *teach* everything published in the Leaflets. This is no more so than that they should teach everything which appears in a dictionary and should know the definition of every word in the dictionary. No one would deny that a dictionary is one of the most useful of books and it is hoped that the Leaflet may prove to be a more or less attractively organized nature study dictionary with the ideas expressed in terms which may be understood and appreciated by individuals as young as the youngest school child. The "cut-out pictures" and "story sections" of the Leaflet, for example, can teach to the younger children in a simple way the more serious-minded facts which the life history chart presents in a more orthodox manner to the older children.

Graded Nature Study.

There is one danger which may arise from an attempt to grade nature study work arbitrarily. Some teachers may think they should teach only the work outlined for the third and fourth grade whether or not the children in these grades had had the work on the same subject for the lower grades. Generally, it is wise to start the whole school with the work outlined for the first and second grades. The children in the higher grades will of course finish this sooner than will the primary children. They can advance to the work outlined for the third and fourth grades. The older children should finish this work sooner than the children of the third and fourth grade and can proceed to the work out-

lined for the fifth and sixth grades. The still older children in this group can finish this work more quickly than the younger ones and go on to the work outlined for the seventh and eighth grades. In taking up a new subject, all must begin as "little children."

A Type Nature-Study Period.

If the children in your school have never used the material in the Leaflet according to any system, it is well to consider the following suggestion showing how a lesson may be taught to a whole school at once in such a manner that all may be kept busy.

Suppose for example at the beginning of the nature study period some child reports that on his way to school he saw some rather small birds flying around in the air. After he tells all that he can about the birds the teacher may for guidance refer to the outline given at the end of this article. One page of this outline deals with birds and it will be seen that a part of this page deals with birds found feeding in the air. Under this section, reference is made to Volume XIV, No. 4 of the *Cornell Rural School Leaflet*. This means that that number of the Leaflet should be a source of information for studying birds that feed in the air just as the M section of the dictionary gives you guidance for information concerning words beginning with M.

A copy of Volume XIV, No. 4 of the *Cornell Rural School Leaflet* has been sent to every rural school in the state and should have been left in the library. Those schools whose teachers requested additional copies have enough copies for each child. Under these circumstances it should be safe to imply that every rural school has access to this material.

Volume XIV, No. 4 of the Leaflet contains a chapter dealing with birds found feeding in the air. These birds are called the ceiling cleaners. This chapter may be read to or by the pupils and should give the school some clue as to what the bird seen might be. It may be decided for example that it is a barn swallow. So far at least the lesson may be carried on by the school as a whole.

Reference to the outline at the end of this article suggests that the use of the cut out pictures will give profitable work for

the children of the first two grades. These children, and others if they wish, may cut out the swallow and place it on the landscape where it belongs in accordance with the directions accompanying the landscape.

The children in the third and fourth years can do what the children in the first two grades have done and in addition select some one page in their nature study notebooks. On that page they will keep a record through the year of birds seen feeding in the air and in particular some one bird like the barn swallow which they themselves have selected. This notebook will contain the date when the birds were first seen, when and where they nested, when the first young were first seen and when the birds were last seen. It is not necessary that every school in the State select the barn swallow for this study. Any bird of the barn swallow type will do. The Leaflet has given help in the study of the barn swallow and chimney swift and it may be easier for the teacher to use these examples but *any other* bird of this type will be satisfactory. This gives greater opportunity for you to teach from the material at hand and is bound to make the work interesting. The "Fifty Interesting Things" section may prove of assistance in guiding the observations of these children. In a bird lesson like the one under discussion the questions dealing with birds may be considered.

The children of the fifth and sixth grades should keep a notebook as did the younger students. After they have made all the observations they can independently they may refer to the Life History Chart section of the Leaflet and fill in the gaps in their own record. They may incorporate their final conclusions in a story about the barn swallow in which they emphasize the things which they themselves have seen. They should be able to appreciate the work that these birds do in keeping the open air free from insects and should have some idea of how the birds are particularly fitted for the work they do. The use of the birds to nature and their relation to other living things might well be understood.

If the children of the seventh and eighth grade have had the work, just outlined for the lower grades or if they have completed it more quickly than their younger schoolmates they may go beyond the work outlined and study the relation of these birds to man and to agriculture particularly. If desired, they

may construct martin or other bird houses and should do all they can to encourage useful birds to lighten the labors and increase the profits of the farmers and gardeners of the community. Any laws dealing with these particular birds should be known and assistance should be given the authorities in making these laws effective. Any impression that the laws are imperialistic should be dispelled by an appreciation of the common-sense back of them. It will not be difficult to see the common-sense side if the program outlined above has been followed.

At the beginning of this section it was suggested that the topic for study come from some child who had seen something interesting. It may come with equal appropriateness from a child whose garden is being attacked by insects. The outline shows appropriate work for the younger children while the older child is being helped with his problem.

All of this work may be taught at one time to a group of children of varied ages and in different grades. Since all of the material necessary to teach such a lesson is available in every rural school in the State it is only natural to expect that a program of this sort can be put into practice.

So much for this type lesson on birds found feeding in the air. Lessons on other nature-study subjects are outlined in a similar manner and should be understood without great difficulty.

The Work of Different Years.

It should be obvious that if we divide the children into groups of two grades each and follow the system already outlined that there will be needless repetition if no effort is made to prevent this. For example, a child who enters school this year and studies a barn swallow this year would next year be in the same group and study the barn swallow again in the same manner. To prevent this, the outline suggests two groups of birds found feeding in the air and suggests that one of these groups be considered one year and the other the next year. In either case, the chapter in Volume XIV, No. 4 of the Leaflet would be an appropriate introduction. One year you would consider birds like barn swallows and chimney swifts that are seen for the most part on the wing. The next year it might be well to study the other group which includes birds like the phoebe and kingbird which fly up from a perch to capture their food and then as a rule return

to their original perch. The third year of a child's school work he would return to a consideration of the group studied the first year and he may or may not study the same example of that group. The fourth year he would return to the group he studied the second year, and so on through the eight years.

Agriculture and Home Making.

A wise decision was made when it was advised that the seventh and eighth years of work along nature-study lines be largely agricultural. The plan outlined organizes the work for the seventh and eighth grades so that the whole field of subject matter works in nicely. This work may or may not be done as organized project work. The types selected are chosen with the view that they will lead up to some home-making or agricultural project. The study of sugar-producing plants in nature study creates an excellent background for the use of sugars as food in a home-making lesson. The study of rabbit tracks as nature study in the lower grades creates an interest in rabbits which may be reared as projects or served as a portion of a well balanced meal. It is neither necessary or advisable that any rural school take up all of the projects outlined for the seventh and eighth grades. The outline merely shows how any of the nature study lessons may be associated with an agricultural or homemaking project. It will probably be found wise to have the girls confine their work to one project and the boys to another and allow them to work on these projects during the nature study period, providing their services are not needed in helping the teacher with the younger children. We all learn by teaching and the older boys will grow in ability and power by making birds baths, bird houses and feeding stations for the school. The older girls will learn additional things about the part of the landscape birds care for if they help the smaller children with their cut-out pictures.

Humaneness.

The New York State law requires that humaneness be taught in the schools of the State and it includes a clause to the effect that the assistance of state money may be withheld from those schools which do not live up to this requirement. Many teach-

ers have asked how they are to teach humaneness and what they are to teach about it. Any boy or girl who knows the life-history story of a wild creature whether it be bird or beast will treat that creature in an infinitely more humane manner than if he knows nothing about it. Children and others hate to be preached to. Preaching would be unnecessary if teaching was correctly done. The material outlined in these nature-study lessons should create a spirit of humaneness in your school. Humaneness is common sense and most human beings will develop common sense providing they have a chance. Common sense demands fair treatment for all creatures and practice of the Golden Rule. If a generation of children with greater common sense can be developed, the ideas of conservation and patriotism will take care of themselves. But first of all to have common sense in matters of this sort, the teachers must have some knowledge and the present outline should help them to gain it.

The Required Work.

Instead of requiring that certain animals, birds and insects be studied each year, this outline requires that at least one example of each type be studied at some time during the year. One lesson may conveniently consider one or two types and with a minimum of two lessons a week through the year there should be no difficulty in covering the ground. Much of the work may be conveniently co-related with geography, drawing and language and suggestions to this end are incorporated in the outline.

This outline has not been drawn up for the sake of making extra work for teachers. It has been developed to grant the requests for assistance which have come from rural school teachers actually in service in rural schools in New York State and in Iowa. The system is not a dream which ought to work. The ideas have been tried and found *not* wanting. Without exception the plan has had the approval of teachers and superintendents who have looked it over and if the rural teachers of the state in their work find any way in which it can be improved or can point out any particularly weak spots you are asked to write me about it. Without question, it can be improved. It must not be judged too quickly. The plan must be given a fair trial and the teachers may count upon the cooperation of the Supervisor

of the Leaflet in making their teaching a success. The cooperation of the teachers will help to perfect a plan which will make the teaching of nature study easier for the next generation of teachers and more profitable and interesting to the children of the schools of the State.

How The Landscape and Cut-out Pictures May be Used.

This section is designed primarily for use by the children of the lower grades. They may need some assistance in preparation from the older pupils but they seem to be helped more by this section than by any other except possibly the story section. The landscapes are designed to help teach the children to recognize various forms of living things and to know where these forms are most commonly found. A sandpiper is a part of our concept of the shore of a waterway and a bat a part of the sky at dusk. The placing of the pictures of these creatures in the proper place on the paper landscape helps fix the observations which the children may have made out of doors. It fixes them in a manner different from what results from merely the spoken word.

To make a landscape the following suggestions may prove useful.

1. Remove the parts of the landscape from the back of this number being careful not to tear the more or less brittle paper on which they are printed.
2. Trim off the right hand margins of all sections except those which will make the right hand part of the landscape.
3. Paste the proper sections to their right hand neighbors using the untrimmed left hand margins as a region of attachment.
4. Trim off the lower margin of the pasted upper section and paste these sections to the untrimmed upper margin of the lower sections.
5. Paste the whole landscape smoothly to some good tough wrapping paper.
6. Cut a number of horizontal half inch slits through the landscape and paper in various parts of the landscape.
7. Color with wax crayons or water colors.
8. Mount the whole landscape on a good stiff card pasting it down around the border only. This leaves an unpasted area between the card board and the wrapping paper.

9. Mount the life history chart on the back of the landscape. Mark a narrow black frame or border around the whole landscape using ink or crayon or passe-par-tout.

10. Mount the animals, on good stiff wrapping paper or cloth; then paste them to a thin but tough card.

11. Cut them out leaving a vertical flap at the bottom about a half inch wide and an inch long.

12. Color the pictures with crayon or water-color.

13. Paste the printed name on the back of the animal or bird or fish.

14. Paste an envelope to the back of the landscape to hold the cut-out creatures when not in use in class room work.

Use of the landscapes.

The landscapes would not justify inclusion in the Leaflet if the "busy work" attendant upon their preparation were their only merit.

The landscapes have been found effective when used as games and when used in a more seriously-minded manner to teach by personal experience facts which might otherwise be more quickly, though not necessarily lastingly, learned from the experience of others.

One method of using the landscape is as follows. The best landscape in the school is hung on the wall in the front of the room. If a child reports in the nature study period that he saw a rabbit or rabbit tracks in the woods he is allowed to place a paper rabbit there. It remains there until some child sees a rabbit elsewhere than the woods. The paper rabbit is then placed in the new locality. The same practice is observed with the other animals and birds. Sooner or later it will dawn upon the child that certain creatures confine their activities to certain more or less definite parts of the landscape. When they have come to this conclusion as to a number of forms they are ready to go on and find out how the forms under discussion are particularly fitted to maintain an existence in that part of the environment in which they are found. The life history chart on the back of the landscape will always be handy for the teacher to check up on the children's observations and avoid the drawing of any seriously erroneous conclusions.

NATURE-STUDY OUTLINE

HOW TO USE THIS SECTION

1. Read the article on A New Outline for Nature Study, handbook of Humaneness, Elementary Agriculture and Home-making (preceding pages.)

2. Turn to the page following these directions and open the infolded page.

3. Decide in which group of topics on these pages the subject you wish to be assisted in should be found. For example, a squirrel would appear on the mammal study pages under the group of mammals found in trees.

4. See if the name of the particular creature you desire to study is included in the list of topics under the group. If so, you may find additional help in the number of the Leaflet, reference to which is made either after the name of the example or after the group name. For example, 13-3 means that in Volume 13, No. 3 of the Cornell Rural School Leaflet you will find a life-history chart and other information which will help you with your problem.

5. To find appropriate material for any particular grade, select the grade from the list on the left of the infolded sheet, read through the infolded sheet and under the appropriate topic.

6. Material of assistance in various projects may be found under the following columns. These suggest nature study material related to each organized junior project. (See lower sections particularly.)

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Clothing,- 19, 26, 29, 35.

Gardening,- 1, 2, 3, 17, 21, 22, 25, 31, 32, 33, 34.

Potato growing,- 1, 2, 3, 15, 22, 25, 31, 32, 33, 34.

Corn growing,- 1, 2, 3, 15, 22, 25, 31, 32, 33, 34.

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Pig raising,- 16, 29.

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Rocks	Soils	Erosion, hills and valleys	Deposition
Collect different kinds of pebbles at a brook or in the road; which of these are the hardest and will scratch others		Notice how after rains the roofs and high places are washed clean of dust and fine dirt; notice the color of brooks following a rain	
	Make mud pies of different kinds of soil including sand; some soils stick together better than others; appearance of gravel and mud walks after a rain		Notice how gutters get clogged with waste; slush in the spring should illustrate conditions favorable and unfavorable for deposition
Besides a difference in hardness rocks are "put together" differently, in layers which separate solid and uniform and made up of glistening parts; collect each		Notice how running water cuts its way through mud and sand or snow and ice; find in the mud, valleys, hills, divides, gorges, and other land and water forms; work of frost	
	When stocking your aquarium note how much muddier the water is if you have garden loam instead of sand on bottom; note variety of things in soil		Does swift water or slowly moving water fill in more rapidly; are large particles placed together with small ones; where is soil deepest
Crystal study, using salt, sugar, blue vitriol; life story of two rock types; relation between nature of brooks and kind of rocks; minerals as food		Why stones have to be picked off hillside farms; find influence of this on the value of the farm and upon the products of the farm; what prevents erosion	
	What animals do you find changing the nature of the soil; how do angle worms for example change it; what kind of plants grow best on certain soils		Influence of sediment on value of farm lands and products; land formation by sediment; (14-1) "Ooze and Slime;" plant and sediment relationships
Determine from soil maps the rocks lying under your farm or home garden; need and source of fertilizers		Why not cultivate straight up and down hillside; study geological survey maps of school district; plan drainage on farm value of trees on hillside	
	Prepare soil for garden and crop projects properly so as to supply plants with a ready supply of food and water		Plan ponds on your farm which will make good fishponds, swimming ponds, or watering places

EARTH STUDY (concluded)

5 EARTH AND THE UNIVERSE, VOLUME 15, NUMBER 3		6 PLANTS, VOLUME 13, NUMBER 4	
Earth study and local geography	Star study and moon study 13-3, 4; 14-1, 2; 15-1	Underwater plants, 13-4; pond weed, 13-4; water lilies, 13-4; eel grass, 13-4	Marsh plants, 13-4; cat-tail 13-4, 14-3; pickle-weed, 13-4; cow-slip or marsh marigold, 13-4
Learn to locate your seat in schoolroom; learn to tell others how to go to your home from school or to some one else's home		Collect and identify at least one of these; note how weak stems are	
	Keep track of appearance of moon at different times of month; learn a few myths and stories about moon and stars; recognize one constellation		Collect and identify at least one of these, more if desired; stems usually stronger than in water plants
Map of the school district showing location of your farm and the farms of your neighbors		Note air storage and food storage areas under water; note nature and position of flowers if present	
	Be able to locate north star and at least three constellations; notice change in position in seasons and at different hours of night; notice different appearances of the moon		Note air storage and food storage areas; means of seed dispersal; enemies
Where water from creek in your district goes or what are nearby stations on the railroads or state roads; see geological survey maps and others		Determine reason why flowers are commonly at surface; relation of these plants to water creatures as food and protection; make mounts	
	Give some idea of consecutive movements of moon; the signs of the zodiac and their meaning		Relation of plants to animals and insects; methods of pollination; importance in making marsh landscape so different from others
Devote time to regular geography work		Establish plants in your schoolroom or personal aquarium; determine how many creatures can prosper with the amount of plants present	
	Devote time to regular geography work		Summarize uses of forms (cat-tails, for example) to man in weaving, as a possible food source and in other ways

LIFE OF WATERWAYS

⁷ PLANT EATERS, VOLUME 14, NUMBER 2		⁸ PREYING CREATURES, VOLUME 13, NUMBER 4; VOLUME 14, NUMBER 2	
May flies, 14-2; water boatmen, 14-2; midges, 14-2	Black flies, 14-2; May flies, 14-2	Dragon flies, 14-2; damselflies, 14-2; backswimmers, 14-2; water scorpions, 14-2; giant water bugs, 14-2; punkies, 14-2; diving beetles, 14-2; whirligig beetles, 14-2; snakes, 15-4	Stone flies, 14-2; water striders, 14-2; dobson flies, 14-2
Note adults and if possible immature forms and where each is found; study method of locomotion in aquarium or outdoors; where forms are found		Decide upon part of pond where selected form is commonly found; note any peculiarities in position or use of eyes and legs, identify conspicuous stages	
	Notice adult and immature stages; adults common in air; larvae common and conspicuous on rocks in moving water mostly		Type of water in which forms are most commonly found; head up or down stream; movements and how made
Method of breathing if conspicuous; enemies and means of escaping them; food and, if possible, how obtained; difference in swift and still-water types		Note means of collecting food and kinds of food; enemies and how avoided; connect immature and mature stages	
	Enemies of each stage and means of escaping them; food of adults if evident; homes of larvae or means of staying on bottom		Food and means used in capturing, holding, and eating it; peculiarities of structure and reasons for them; enemies; connect stages
Relation of these forms to others in your aquarium; will they eat others or will others eat them; helpless stages		Relation of these forms to other life in same environment; relative abundance of these forms and plant eaters	
	Relation of these forms to other creatures including man; value as food to fish; means of getting food		Relation of these forms to other forms in same environment; relative abundance; decide upon usefulness
Stock aquarium with these plant eaters for the rest of the school or put in time making a school aquarium (see Volume 14, Number 1)		Study additional forms or put in time constructing or stocking aquaria for the school	
	Study additional forms or put in time making a flowing-water or still-water aquarium		Study additional forms or put in time constructing or stocking aquaria for the school

LIFE OF WATERWAYS (concluded)

9 WASTE EATERS, SCAVENGERS; VOLUME 23, NUMBER 4; VOLUME 14, NUMBER 2	10 DIRECT ECONOMIC INTEREST. VOLUME 13, NUMBER 4
Fresh-water shrimps, 14-2; drone flies, 14-2; frogs and salamanders, 15-4; clams, snails, turtles, 15-4	Scavenger beetles, 14-2; dobsons, 14-2; caddis worms, 14-2; crayfish, suckers, 13-4; leeches
Forms found commonly in waters well-supplied with decaying plants or animals; means of locomotion, peculiarities of form if any	Pike, 13-4; pickerel, 13-4; bass, 13-4; white-fish, 13-4; other still-water game and food fish
Recognize at least one form which cleans up waste in moving waters; notice peculiarities of locomotion if any	Type of water in which different forms are found; form of body; type of mouth and size and type of food; use of fins and tail in swimming
Means of collecting food in different stages, peculiarities of mouth or other parts; enemies and their avoidance; connect stages	Type of water in which forms are found; read "A Dare but Play Fair". type of food
Food and means of obtaining it; peculiarities of structure and their advantages; connect stages; enemies and protection from them	Eggs and nests and care of young in certain forms; enemies; list things in pond contributing to food supply of these fishes
Relation of these forms to other animals and to plants in ponds, in destroying waste and in making food for larger forms; rear tadpoles if convenient	Nests and egg laying; enemies and protection from them; list of other things found in streams which serve in giving a food supply
Value of forms in cleaning up waste material; relative abundance; decide upon usefulness and number to be allowed in an aquarium	Dependence of abundance of fish upon food; decide upon improvement of food producing areas in nearby ponds; breeding habits
Emphasize great value of forms like frogs and toads and lesser values of snakes, clams, snails, and the like; stock aquarium	Dependence upon clean waters; cooperate in reporting violations in water contamination; locate fish hatcheries in state
Study additional forms and put in time stocking or building aquaria	Learn game laws and relation between laws and breeding season; cooperate in reporting violations; learn that laws are common sense; fish as food in foods; protect
	Learn the game laws; cooperate with game warden; save trout in drying streams; locate suitable places for planting young trout; salmon industry

WOODY PLANTS

II SUGAR PRODUCERS	I2 FAT AND OIL PRODUCERS, NUT TREES
Maple, 15-2; apple, 15-2; cherry, 15-2; peach, pears, plum	Spice bush, 15-2; sassafras, 15-2; birch, 15-2; poison ivy, 15-2; witch hazel
Form of tree and shape of leaf; type of fruit; abundance of selected form in school district	Recognition of plant by means of leaves or by fruit, twigs, or bark; general form of plant, whether shrub or climber or tree
Form of entire plant; shape of leaf; identification of fruits; recognition of flowers and in some cases of bark	Recognition of plant by leaves, fruits, and bark; general shape; use of fruits as food; nature of wood
Additional examples; flowers when and how produced; seedlings; year's growth as told by twigs and wood	Recognition of additional forms; of year's growth; of the fact that poison ivy does not affect us all alike
Recognition of last year's growth; decide upon which year's growth fruits are borne most abundantly	Protection of fruit; use of fruit to animals; use of animals in planting seeds
Enemies of these trees and effect of weather upon them; product chart showing wood, leaves, fruits and other things; leaf prints	Make leaf prints and a mount showing wood, fruit, flowers, bark, and, if possible, oil
Relation of insects to the plant; nature of injuries caused; decide upon treatment as was done in insect study; make leaf prints and product chart	Relation of animals and insects to tree; recognize injuries caused by fungi; recognition of wood; leaf prints and product chart
Estimate of value of fruits or sugar produced in school district; help in planning spraying campaigns; use of sugars as foods in food projects; canning	Recognize value of some of these in landscape work; plan to have at least one planted on grounds Arbor Day
Prune vines and shrubs intelligently; treat for insect pests and for fungous diseases; use of sugars in food projects; canning work	Plant one of this type somewhere in your school district on Arbor Day; make of most useful foods in food projects

WOODY PLANTS (concluded)

13 TIMBER AND PULP PRODUCERS		14 ORNAMENTALS
Pine, 15-2; hemlock, 15-2; spruce, 15-2; fir, 15-2; tamarack or larch, 15-2; red cedar	Cottonwood, 15-2; ash, 15-2; elm, 15-2; willow, 15-2; basswood, 15-2	Catalpa, 15-2; juniper, 15-2; arbor vitae, 15-2; wild rose, barberry, yew
Recognition of plant by means of cone, needle, twig, general shape; use Christmas tree as a lesson		Recognition of plants by form, by leaves, or by other parts
	Recognition of plant by leaves, form, and bark; use cut-out pictures to fix shape in mind	Recognition of plants by form, by leaves, or by fruits or flowers; means of getting above ground
How trees avoid being broken by snow, how they heal wounds in their bark; seeds inside cones; kinds of cones		Recognition of leaves, flowers, and fruit of form; beauty in the landscape caused by these plants
	Note means used by tree selected in spreading fruit; recognition of flowers and time of flowering	Recognize additional examples in this or other types; get notes on time of flowering and bearing of fruit
Relation of squirrels to the seeds; necessity of protecting seeded areas; product charts and mounts; pollination		Relation of these forms to insects and pollination; relation to plant diseases, if any; seed dispersal; product mount if desirable
	Relation between weather conditions and life of the plant; use of trees in paper production and in protecting watershed product chart	Dependence of plants upon others; beauty of these plants and need for their preservation
Plant at least one and if possible more trees of this type in your district on Arbor Day; how much land in your district is idle which might produce timber		Conduct campaigns against shrubs which serve as hosts for undesirable fungi or insects; set out one or more desirable forms Arbor Day
	Plant one of this type in your district on Arbor Day; how much idle land in your district might be producing paper pulp?	Set out one or more of these plants on school ground and aid in their protection

NON-WOODY PLANTS

15 STARCH PRODUCERS, INCLUDING GRASSES	16 PROTEIN PRODUCERS, LEGUMES
<p>Wild rye, 14-3; wheat, 13-1; oats, 13-1; corn, 13-1; rice</p>	<p>Cat-tail, 14-3; potato, 13-7</p> <p>Alfalfa, 13-1; sweet clover, 14-3; clovers</p> <p>Beans, 13-1; peas, 13-1; Lesson 124. Farm Crops Series, Cornell Reading Course for the Farm</p>
<p>Recognize plants and seeds of at least one of these; see suggestion Volume 13, Number 3, p. 110; recognize tassel and ears if present</p>	<p>Recognize at least one clover by its leaves or flowers; type of ground where the kind of clovers is found most commonly</p>
<p>Recognize plants by leaves at least; notice part storing food</p>	<p>Recognize by plant and seeds; types of plant; bush and pole beans and peas including sweet peas</p>
<p>Work done by each part of the plant, roots, stems, leaves, fruiting head; survive because of abundance; plant seeds and note stages in growth</p>	<p>Recognize other kinds; notice nodules on roots and type of roots; compare stems above ground in different clovers; recognition by leaves, seeds, and flowers</p>
<p>Work done by each part; how these plants reproduce themselves, but rarely by seed; list plants you know are planted by cuttings</p>	<p>Plant sweet peas or garden peas or beans and watch development of seeds; value of cultivation; identify additional types.</p>
<p>Relation to animals, as forage and grain; relation to the soil; pollination; diseases; weather and growth and pollination; test germination; judge ears</p>	<p>Relation of plants to insects; pollination; honey production; fertility of soil; type of soil adapted to clovers</p>
<p>Relation of plants to animals; kind of soil best adapted to each plant; relation to insects and plant diseases; selection of seed potatoes</p>	<p>Relation to insects; study plant lice and lady beetles on sweet peas; diseases; proper planting and harvesting methods</p>
<p>Carry on corn project; see project manual; use of starches in foods as shown in food projects; canning corn in projects</p>	<p>Use information in animal projects in determining proper rations; in crop projects in determining crop rotation; in bee projects use as forage</p>
<p>Carry on potato project; see project manual; use of starches as foods as shown in food projects</p>	<p>Carry on bean project; see project manual; use of proteins as foods in foods projects; canning of bean products; time projects</p>

NON-WOODY PLANTS (continue d)

17 MINERAL FOOD PRODUCERS		18 MEDICINE PRODUCERS AND POISONOUS PLANTS	
Wild carrot, 14-3; chicory, 14-3; wild salsify 14-3; radish; and other root crops	Wild lettuce, 14-3; pepper grass, 14-3; cabbage, lettuce, asparagus, celery, onion	Curled dock 14-3; rattlesnake root, 14-3; motherwort, 14-3; burdock, 14-3; mullein, 14-3; ginseng	Poison hemlock; black nightshade, water hemlock, 7-1
Recognize some one plant of the above either by leaves, flowers, or roots, or by whole plant		Recognize one of these plants in summer and winter condition; get some idea of whether they are annual, biennial, or perennial	
	Recognize one or more plants of this group by the most conspicuous part; if eaten, which part; type of ground on which most commonly found		Recognize as many of these as possible; not necessary to emphasize poisonous qualities too much; merely point out danger
Plant seeds and watch development; notice that when food is crowded into root, seeds are not being produced and that food in root is used in producing seeds		Study selected plant in seedling, flowering and fruiting and other stages; plant and grow some one kind	
	Recognition of seed as well as plant; means of sprouting of seeds; nature of roots, stems, leaves, and flowers		Continue to recognize additional forms; parts of plants most to be avoided; places where each is found
Determine ideal conditions for growing these crops, or of eradicating these weeds; insect and other enemies and how controlled; use to all animals		Method of seed dispersal; pollination; insect and other enemies; possible use of plants as cover for other living things	
	Means used by plant in spreading seed normally; insect and plant diseases as enemies and means of control		How poisons can be counteracted if taken accidentally; animals which suffer because of these plants
Carry on garden project; see project manual; use of mineral in foods in food projects; canning of garden products in canning projects		Use of plants to man; devote time to projects of any sort; raise ginseng as an independent project	
	Carry on garden project; see project manual; use of minerals as foods in food projects; canning of garden products in canning projects		Devote time to projects of any sort; eradicate most plants likely to prove dangerous to the community

NON-WOODY PLANTS (continued)

19 FIBER PRODUCERS	20 ORNAMENTALS
Dogbane, 14-3; flax	Milkweed, 14-3; velvet weed, 14-3; hemp
Goldenrod, 14-3; yarrow, 14-3; St. John's-wort, 14-3; daisy, evening primrose, 14-3	Heptica, trillium, spring beauty, adder's tongue, mandrake, violet, pansy, ferns, mosses
Identify at least some one fiber plant; notice how tough is bark of dogbane, for example	Recognize as many beautiful flowers of open field as possible; learn where to look for them
Recognize at least one of above group; type of ground occupied; color and shape of flowers and time of flowering	Recognize as many woodland flowers as possible; report time of flowering but practice preserving flowers rather than picking and destroying them
Identification of plant at different seasons and stages; most common stages; method of reproduction	Identify plants in winter and summer, as seeds, seedlings and mature plants, roots, stems, flowers, and other parts; time of flowering
Recognize different stages in life history; nature of stems, roots, fruits, and other parts	Follow some one form through the year identifying it by roots, flowers, leaves, and fruits; study other forms if desired; how commonly reproduced
Seed dispersal; pollination if possible; if flax is used discuss use of seed as food; enemies and how discouraged	Seed dispersal; if possible, pollination; enemies and why plants can survive their attacks
Pollination if possible; seed dissemination; enemies and how warded off	Insect visitors, pollination or spore dispersal; seed dispersal if seeds are produced; protection of plants in winter
Use of flax as fiber in clothing projects	Plant a few ornamental forms at unsightly places on school grounds; plan to have some flowering throughout the year
Use of fiber plants in making textiles in clothing projects	Transplant a few desirable forms to school grounds and plant in appropriate places

NON-WOODY PLANTS (concluded)

21 COVER FOR WASTE LAND, VOLUME 14, NUMBER 3	22 WASTE ELIMINATORS, VOLUME 14, NUMBER 3;
Pigweed, 14-3; ragweed, 14-3; white vervain, 14-3; teasel, 14-3; lambs-quarters, 14-3; bull-thistle, 14-3; horsetails	Narrow-leaved plantain, 14-3; heal-all, 14-3; peppergrass, 14-3; dandelion; shepherd's purse
Identify as many of these as possible either in winter or summer condition or both	Potato blight; powdery mildew, potato wart, 14-1; wheat rust; oat smut
	Shelf fungi; toadstools and mushrooms; bread mold; mother of vinegar; bacterial growth
	Notice that some plants do not thrive well; notice their appearance
	Recognize a few of these weeds by any means desired
	Notice growth of fungi on decaying logs or in woods on decaying plant material, also on molding clothing
Identify plants particularly as seedlings in your gardens; learn to prevent weeds from going to seed; identify by leaves, flowers, or other parts	Some seedlings may die suddenly; if possible find cause; if there are stages on other plants like barberry stage of wheat rust note it
	Grow some one kind in a corner of the garden through the year; notice time of flowering and manner and method of spreading seeds
	Point out that decay is necessary to create room and food for growing things; some decays desired and some not desired
Decide length of time from germination to maturity; method of seed dispersal and, if possible, of pollination, forage, and protection for some animals	Learn how some one plant disease spreads and how it may be controlled, examine stubble in fields and plants in deserted gardens for sources of trouble
	Compare weeds grown unhindered in open with weeds crowded together, as to size, strength, and appearance; use of roots in holding soil from washing
	Conditions under which decay acts most rapidly; how it may be controlled; results of decay and use of products and bi-products
Point out in garden projects that weeds require hoeing and hoeing; helps conserve moisture in soil so weeds help garden; weeds should not be allowed to seed	Influence of plant diseases on crops raised as projects; campaigns to control spread of plant disease in school district
	Point out in garden projects that weeds plowed under when green make a more or less desirable fertilizer; also point out undesirable qualities
	Role of fungi in bread-making and canning, brought up in connection with foods projects and canning projects

MAMMAL STUDY

²³ FEEDING IN OPEN AIR, VOLUME 14, NUMBER 1		²¹ FEEDING AMONG TREES AND SHRUBS VOLUME 13 NUMBER 3	
Red bat, 14-1; hoary bat, 14-1; other bats	Little brown bat, 14-1; silver-haired bat, 14-1; big brown bat, 14-1	Gray squirrel, 13-3; red squirrel, 13-3	Flying squirrel, 14-1, raccoon, 13-3; porcupine, 14-1
Active mostly at twilight and daybreak; common about woods and country; wonderful fliers; sleep head downward; really good instead of bad		Most active in daytime; noisy; learn tracks and how made; Problem page 1, Volume 13, Number 3; use of hind limbs in running, of front limbs in eating	
	Active mostly at twilight and daybreak; common in towns about lights; wonderful fliers		Most active at night; if possible, learn tracks of raccoon at least as seen in snow or mud
Why found near lights, insects there at same time; food entirely insects caught on wing; use of tail, teeth		Read tracks and calls expressing caution, fear, and other feelings; use of tail as a balancer; home life; teeth	
	When first seen and last seen in year; which migrate and which do not; compare length and use of bats fingers and toes and ours; teeth		Compare tracks with squirrel tracks; if possible, note large eyes of flying squirrel and compare with owl and with own eyes in dark; calls; teeth
A kind of bat for each type of landscape and for different degrees of darkness; enemies and protection; migration map		Preparation for winter and relation to other animals; why migrations are unnecessary; study additional examples, distribution map	
	Migration map; enemies; home life; relation to insects; swallows do by day what bats do by night		See or read about food habits of a pet raccoon or squirrel; enemies and means of protection; distribution map
Emphasize that public opinion is not always just in its judgments; do not jump at conclusions; work on projects		Game laws dealing with these forms; fur values discussed; why protected during breeding season	
	Relation of insects to disease and of bats to insects; which more desirable		Game laws, reasons for protecting porcupine in particular, fur value.

MAMMAL STUDY (continued)

FEEDING ON THE GROUND, VOLUME 13, NUMBER 3	25	FEEDING ALONG THE WATERWAYS, VOLUME 13, NUMBER 3	26
Cottontail rabbit, 13-3; varying hare, 13-3; meadow mouse, 13-3; woodchuck, 14-1; deer-mouse, 13-3; chipmunk, 14-1	Skunk, 13-3; common shrew, 13-3; mole shrew, 13-3; common mole, 14-1; star-nosed mol., 14-1	Muskrat, 13-3; beaver	Mink, 13-3; otter
Activity; learn to know tracks and how made; which feet make larger tracks and why; read "Raggyug" in "Wild Animals I Have Known"		Active night or day, mostly at night, seen commonly in or about water; tracks as seen in the mud and runways under water	
	Found on ground; under leaves, or underground; all eating same type of food and have much same type of teeth; read "Cock Robin"; food; tracks		Active night and day, mostly night; use furs as introduction if animal cannot be studied; sly habits; powerful; swimmer, fish story 13-4; tracks.
Read tracks in fields and on problem pages; food habits; use or neglect of use of tail and reasons; home life; teeth		Use of tail and hind legs in swimming; method of eating, of warning; nature of fur; interpret problem page Volume 14, Number 3 and real tracks; teeth	
	Compare variation of form of bodies of forms seeking insects above ground and beneath; types of feet and reasons for types; teeth; track reading		Track interpretations (14-3) and outdoor food habits; roaming disposition; teeth; fur
Winter activities; enemies and means of protection; storage instinct developed or undeveloped and influence of this on habits		Home life and home building; additional track interpretations; enemies and means of protection; calls; distribution map	
	Yearly activity; why surface feeders must be different in winter preparation from underground feeders; abundance of food; use of skunks and shrews		Yearly activity; relation to muskrat and to other forms including game fish; method of capturing prey and reason for no migration; distribution map
Economic value of mice, rabbits, and woodchucks; means of controlling them; laws; rabbit project may be carried on		Game laws and necessity of them; fur values; means of trapping humanely; reason for laws against shooting; effect on skin	
	Value of skunks to farmers in destroying potato bugs, turtles eggs and insects; value of shrews for same reason; fur value; laws		Game laws; fur values; destruction of vermin or poultry; which of greater value to farmer

MAMMAL STUDY (continued)

<p style="text-align: center;">27</p> <p>FEEDING ON WASTE SCACENGERS, VOLUME 13 NUMBER 3</p>			<p style="text-align: center;">28</p> <p>PREYING ANIMALS, VOLUME 13, NUMBER 3</p>
<p>Common mouse, 14-1; use white mice for study if you wish</p>	<p>Common rat, 14-1; use white rats for study if you wish.</p>	<p>Red fox, 13-3; dog</p>	<p>Cat, 14-4; common weasel, 13-3; least weasel, 13-3</p>
<p>Active night and day; common about houses and barns; timid; dust-colored and not easily seen; long whiskers, long tail; food</p>		<p>Most active at night; covers wide range of territory; type of tracks and how made; use furs as approach if necessary; read "Uncle Remus"</p>	
	<p>Active night and day; too common about dwellings and storehouses; vicious disposition; food; cleverness, braveness</p>		<p>Naturally most active at night; types of tracks and how made; play; stealthiness; ears and tail and what they can tell you; food</p>
<p>Use of tail when climbing about a trap or over high places; method of eating; enemies; calls; tracks in snow or dust, especially tail track</p>		<p>Track interpretations; toe marks; nature of food and teeth; manner of eating; wisdom; call; use of tail, when running, when lying</p>	
	<p>Use of tail in climbing and of fore feet in eating; tracks and their interpretation; length of fore and hind feet and hobbling gait; calls; enemies</p>		<p>Track interpretations; method of catching food; absence of toe marks and reason; means of keeping claws sharp</p>
<p>Home life, especially nesting material and nature and number of young; show that absence or protection of food is a preventative</p>		<p>Home life: relation to rabbits, mice, and game; additional track interpretations; enemies and cleverness in protecting self</p>	
	<p>Home life, especially number of young and of broods; relation of rats to destruction of garbage; compare damage done by rats, skunks, and other forms</p>		<p>Care of young; nature of young; enemies and means of protection; relation to birds, game, and mice</p>
<p>Means of controlling increasing abundance of mice; relation to health and wealth of a household; superiority of traps and poisons over cats</p>		<p>Game laws; fur values; value of does and foxes to man</p>	
	<p>Means of eradication; amount of damage to supplies; skunks do mostly good, rats almost none; which get the worse treatment</p>		<p>Real and accepted values; to man; the differences; game laws</p>

MAMMAL STUDY (concluded)

29 DOMESTIC ANIMALS, VOLUME 13, NUMBER 1		30 FEEDING ON TREES AND SHRUBS, VOLUME 16, NUMBER 2	
Cattle, 13-1; pigs, 13-1; sheep, 13-1; goats	Horses, 13-1	Tent caterpillar, 13-1; tussock moth, 16-2; birch borer, 16-2; ce-cropia, 13-1; elm leaf beetle, 13-1	Plant lice, 13-1; 16-2; cicada, 16-2; scale in-sects, 16-2
At home on the ground; manner of getting up and lying down; tracks and why similar in these forms		Found in all four stages; emphasize caterpillar and adult stages here; nature of injury to plant; method of loco-motion	
	At home on the ground; manner of getting up and lying down; tracks and why different from cattle, disposition; food		Not in four stages, em-phasize adult here; method of locomotion; nature of injury to plants and kinds of plants on which found
Track interpretations; means of protection; method of eating and type of teeth; types and breeds of cattle and sheep; voice		Notes on eggs and pupae; show necessity of resting stage for change from larva to adult; manner of getting food and of wintering; en-emies	
	Track interpretations; method of eating; use of lips and teeth; method of uncovering food in winter; types and breeds of horses; voice; protection from elements		Sucking mouth parts to get the food; if possible find immature stage and watch them shed skins; rear plant lice; enemies and protection
Care of young; products and product maps; proper foods to bring about desired results		Complete life history; method of protecting self during all times; use as food to enemies; decide in which stage insects are most at our mercy; means of control	
	Ability of types to do appointed tasks and reasons why each is fitted for task; proper and humane methods of harnessing and housing; feeding		Complete life history of some one form; weak stages in life history; influence of weather conditions upon development; means of control
Calf, pig, or sheep, project; see project manual; use of wool as a textile in clothing project and of fish as meat in foods project and in canning project		Estimates of damage done in local region by forms; organize cam; paigns to assist in controlling spread if injurious forms; use in garden and crop projects	
	Real use to man; summarize farm practices dependent more or less upon horses; put time on project work		Estimates of damage done and control campaigns against spread of injurious forms; use in garden and crop project

INSECTS AND THEIR KIN

31 FEEDING ON LOW PLANTS, VOLUME 16, NUMBER 2	32 FEEDING ON OR BENEATH THE GROUND, VOL- UME 16. NUMBER 2
May beetle, 13-1, 16-2; potato beetle, 13-1, 16-2; click beetle, 16-2; monarch butterfly, 13-1, 16-2; army worm, cabbage butterfly, 13-1; grasshopper, 13-1, 16-2; katydid, cricket, 13-1, 16-2	Squashbug, 13-1, 16-2; stinkbug, 16-2; leaf-hopper 16-2; spittle insects, 16-2
Emphasize adult stage and a conspicuous immature stage; kinds of plants on which found; locomotion	Cutworms, 16-2; root aphids; white grubs, 16-2
	Earthworms; slugs; land-snails; pill bugs
	Lay no great emphasis on this group in these grades; cutworms and white grubs may be recognized; note habit of living underground
	Lay no great emphasis on this group in early grades; if found, merely notice any peculiar actions they may make
Emphasize adult stages; kind of plants on which found and nature of injury if any; means of locomotion	
	Decide what cutworms or white grubs or other underground insects develop into; choice of food; method of eating; nature of injury; method of locomotion
Decide whether form is like tent caterpillar or plant louse in life history; calls if any and how made; manner of eating food and of wintering; enemies; rear one form	
	Note method of locomotion; injuries caused to plants if any; note mounds thrown up by earthworms and point out advantage to plant
As many stages as possible, include additional examples; enemies; means of breathing and method of eating	
	Complete the life cycle and study relation to other insects as relation between ants and aphids; determine most helpless time in life history
Method of protecting self; food at different stages; is food and the method of getting it always the same? Decide upon weakest stage in life history; control	
	Compare method of locomotion in earthworm, snail, and pill bug; life history of one; relation between weather and abundance; enemies and protection
Weak stages in life history; decide value of each form, if it has any; poison or film for control	
	Practice means of controlling these insects which may be injuring gardens and crops carried on as projects
Estimate damage done in local region; find out means of control and if necessary practice it in connection with garden or crop projects	
	Practice control methods with gardens and crops if necessary
Estimate local damage and prevent multiplication of forms on crops and gardens under school's influence; garden and food projects	

INSECTS AND THEIR KIN (continued)

33 FEEDING ON WASTE (scavenger), VOLUME 16, NUMBER 2	34 FEEDING ON INSECTS OR ANIMALS, VOLUME 16, NUMBER 2
House flies, 13-1, 16-2; millipede, 16-2	House spider, 13-1, 16-2; wasps, 13-1, 16-2; other spiders and wasps and hornets
Ants, 13-1, 16-2; cockroaches, 13-1, 16-2	Lady beetle, 13-1, 16-2; damsel bug, 16-2; stink bug, 16-2; ground beetle, 13-1, 16-2; centipedes, 16-2; bed-bug, 16-2; lace wing, 16-2; ichneumon flies
Emphasize adult stage; ability to care for self; variety of places found; large eyes; care of body	Emphasize adult stages; home and where found; persistence; disposition to fight if necessary but peaceful if let alone
Emphasize adult stage; ability to care for self; care of parts of body; home, if any	Emphasize adult stages; if conspicuous, study immature stages; activity; means of detecting danger and of finding food; activity
Means of locomotion; foods, and how obtained; sanitation, if any; relation to human sanitation, breeding places; rear flies in a caged box	Method of making home, and parts of body used in each act; food and how obtained; eggs and young if available; wintering habit
Ant nest desirable; care of immature stages; food and means of eating; comparative strength; enemies and means of detecting danger; types of individuals	Food and how obtained; enemies and how avoided; inconspicuous stages; wintering habit
Ideal conditions for multiplication; desirable and undesirable qualities; decide upon means of preventing multiplication; enemies	Relation to the lives of other insects; different kinds of spiders or wasps and types of homes and food of each
Relation of forms to other insects; to plants and animals; ideal and poor conditions for multiplication; desirable and undesirable qualities	Relation to other insects and animals and plants, desirable or not and why; conditions favoring multiplication
Recognize any values which may exist; list breeding places and suggest or put into practice controls; relation of flies to foods in food projects	Collect some evidence that these forms have helped or injured garden and crop projects
Conduct campaigns making these forms comply with man's needs; put to practice in making garden projects more effective	Collect evidence proving that these forms help or injure man in his everyday life and adopt means of encouragement or discouragement

INSECTS AND THEIR KIN (concluded)

35 OF DIRECT ECONOMIC INTEREST, VOLUME 16, NUMBER 2	36 FEEDING IN OPEN AIR, VOLUME 14, NUMBER 4
Bees, 13-1, 14-1	Silkworm, 16-2; mosquito, 13-1, 14-2
Emphasize adult stage; seen commonly about fragrant flowers; industrious; peaceful unless annoyed; home	Barn swallow, 14-4; chimney swift, 14-4; nighthawk, any similar form
	Cedar waxwing, 14-4; kingbird, 14-4; phoebe peewee or similar forms
	Inhabit open air high up; graceful flight; capture insects on wing; sociable
	Care for open air near ground; capture insects on wing but return to perch; less sociable
Parts of body used for different acts; types of individuals and their duties; have observation hive if possible; expressions of content and anger; enemies	Study adult mosquitoes and wigglers; learn connection between them; study actions and noises produced; if possible, watch silkworm work
	Notes of the year; when first seen, last seen; nesting; why good flier; food; calls; compare wings and legs with those of other types
	Poorer flier than swallows; how wings differ from theirs; food; calls
Relation of bees to seed production; conditions necessary for prosperity of a hive; influence of weather and food on production of honey	Rear some mosquitoes in a screened aquarium in school; distinguish between types and sexes; recognize all stages; if desirable, rear silkworm caterpillars
	Make migration map for the year; continue finding additional information
	Make migration map if possible; discuss method of getting food; variety of food; why some stay in winter when others must go
Carry on bee project or make, stock, and carry on an observation beehive	Study relation of mosquitoes to health and pleasure of man; decide upon weak place in life history; make product chart for silkworm
	Make martin houses or put in time learning how to attract these or other birds
	Collect notes from Audubon Society, Teachers' value of these birds, and of other insect caterpillars and other
	Carry on campaign against mosquito breeding grounds or rear silkworm according to directions; use of silk as a textile in clothing project

BIRD STUDY

37 FEEDING AMONG TREES AND SHRUBS, VOLUME 14, NUMBER 4	38 FEEDING ON THE GROUND, VOLUME 14, NUMBER 4
Humming bird, 14-4; yellow warbler, 14-4; catbird, 14-4; chickadee, 13-3; wren	Brown creeper, 14-4; downy woodpecker 14-4; red-headed woodpecker, 14-4; flicker, 14-4; nut-hatch, 13-3
Found in and among delicate parts of vegetation; active; light in weight; "Sir Downy and Miss Chickadee," Volume 13, Number 3	Found most commonly on the ground; pick up food as it may happen to lie; poor fliers
Found on more sturdy parts of trees; notice typical positions; "Three Friends," Volume XIV, Number 3	Found on ground most commonly; get food from beneath ground surface if necessary; learn to know tracks in snow or mud, 13-3
Notes of the year; discuss value of light weight to these birds; calls; food and how secured	Nature of food; relation of shape of bill to nature of food; more or less clumsy; calls; track interpretations
Use of tail and legs in getting about free; method of getting food; peculiarities of body helpful in getting food; calls	Method of getting food from beneath ground; perching birds have hind toe different from scratching birds as shown in track, why; calls; food
Make migration map if possible; discuss why most of these birds are not with us in the winter and why so many are in spring	Food changes during the year; color changes during the year; why some of these forms stay while others leave; migration map
Make migration map if possible; discuss what these birds can do that other cannot do; effect of their absence	Compare food in winter and in summer; interpret tracks made by feet, wings, and tails to understand their different uses
Establish feeding station at school window; plan to make grounds attractive for birds	Relation of sparrow to agriculture; good and bad points about them; which forms more and which less desirable
Use of woodpeckers and like birds in caring for trees; which forms useful and which not, and why	Make a study of value of these birds, particularly the quail; plan how they may be protected in your county

BIRD STUDY (continued)

FEEDING ALONG WATERWAYS, VOLUME 14, NUMBER 4 ³⁹		FEEDING ON WASTE (SCAVENGERS), VOLUME 14, NUMBER 4 ⁴⁰	
Green heron, 14-4; spotted sandpiper, 14-4; killdeer plover; snipe; bittern	Canvasback duck, 14-4; kingfishers, 14-4; mallard; teal; wood duck; loon; hell-diver	Crow, 14-4; blue jay, 14-4; cowbird; English sparrow, 14-4	Bronzed grackle, 14-4; herring gull, 14-4; turkey vulture, 14-4
Found mostly along shores, "haunt of coot and hern;" poor fliers; peculiarities of flight; how legs and neck are held in flight		Found in a variety of places; intelligent; strong, reliable flight; noise; cooperation of members of a flock; tracks	
Explain why legs and beak are without feathers; longer the legs, the longer the neck; why; calls and how made	Found feeding in deeper water; can remain more or less stationary over food, how; position of legs; movement on land in air and on water; flocks		Found in a variety of places; sociable or not; quiet or noisy; food; recognition of migrating flocks
Method of getting food from beneath water by diving from air or water surface; calls; food; nature of feet and of bills	Variety of food and method of getting; enormous appetite; means of expressing joy, fear, anger, and caution by calls and tracks (13-3, 14-3)		
What can these birds do that others cannot do and why they can do it; compare muddy and gravelly shore forms and movements	Why good fliers; where nesting; habits about nest and elsewhere; calls and method of making them; daily and seasonal migrations		
Nature of young; nests and care of young; reason for migration; home life, in spring particularly; unity of family	Food through the year; great migration unnecessary because of food variety; home life; relation to other bird forms		
Value of sandpipers and plover to farmers; a shore without a sandpiper is as unreal as a marsh without a heron	Make migration map, if possible; care of young; necessity of the existence of these types; enemies and how evaded		
Game laws; reason for closed season in spring to save broods of the year; report violations to game warden	Use to farmer; desirable and undesirable qualities; means of encouraging or discouraging visits		
			Means of control, if desirable, value to farmer if value exists, recognition of useful and useless forms

BIRD STUDY (concluded)

41 BIRDS OF PREY, VOLUME 14, NUMBER 4	42 DOMESTIC BIRDS		
Screech owl, 14-4; great horned owl, snowy owl; barn owl	Red-tailed hawk, 14-4; Cooper's hawk, 14-4; migrant shrike, 14-4; eagle; fish hawk	Chicken, 13-1; guinea; turkey; pigeons; peacocks, pheasants	Ducks, 13-1; geese, 13-1
Active mostly at night; in daytime seen in hole in tree or in thick tree top; then nearly helpless; large eyes for night seeing		Most at home on ground; walk or hop; flight; nature of young; behavior of young	
	Active in daytime; some fly high in air others remain more or less hidden; soaring ability and relative size of wings		Most at home in or near water; waddle instead of walk; scoop-like bill; plumage firm and solidly packed; nature of young; feet webbed; tracks
Compare eyes with pupils of our eyes on dark and bright days; use of beak and claws; quietness of flight; protection of home; calls		Calls expressing joy, fear, invitation, and others; method of getting food; protection of young; scratching feet; breeds	
	Compare types of hawks with types of air planes; nature of claws, beak, and feathers; calls; food habits		Legs placed far back makes waddling necessary and swimming easier; calls of all sort; food and how procured; protection; breeds
Study of food pellets found in evergreens; show large percentage of mice in food; home life; migration		Best food to secure desirable results; ideal results; hatching period and care of setting hen; moulting; shelter; enemies	
	Seasonal migrations; learn to recognize valuable and injurious forms; relation of hawks to other birds		Proper food; ideal nests and housing conditions; hatching period; moulting; enemies
Emphasize necessity of judging value of anything on more than one bit of evidence; owls among our most useful and yet most abused birds		Carry on poultry project; see project manual; use of flesh as food in foods project and in canning project	
	Means of controlling multiplication, if desirable; collect information as to value to farmer; see Audubon Society reports		Carry on poultry project; see poultry project manual; use of flesh as food in foods projects and canning projects



TYPE OF GARDEN ROSE
Photo by DR. SHUFELDT

Wild and Garden Roses

Dr. R. W. SHUFELDT
Washington, D. C.

Of all the flowers in our country probably none are better known than the roses; and surely one would have to hunt a long time to find either a boy or a girl who did not know a wild rose or any of the kind we have in our gardens the instant the flower was seen. But to know a rose is one thing, and to know about roses is quite another thing; and you must not be surprised when you hear it said that many a person has devoted a lifetime to the study of these familiar flowers, and then mastered but very little of all there is to be known about them.

In the first place you must know that wild roses grow in a great many places over a large part of the Northern Hemisphere, and that there are fewer wild ones in our country here than we

meet with, for example, in Europe or the Old World. Those who describe and write about roses tell us that upwards of an hundred kinds of wild ones have already been named, and this, mind you, does not include the numerous kinds of garden roses. So, taken together, there may be as many as a thousand different kinds of roses that have been described for us in the books that treat about them.

As you know, some of the garden roses are perfect wonders, when we come to consider their size, form, and delicate colors. Still, beautiful as they all are, you must bear well in mind that any one of these elegant varieties have been, through cultivation, derived from a wild rose of some kind. Ages upon ages ago the florists undertook this delightful work — so long ago indeed, that no one now living really knows when it was first started. Little does it matter how handsome any one of these garden roses may be — if planted in the woods or fields again, and neglected, it will, should it live along from year to year, soon come to be a common, wild rose again, of one kind or another.

Roses are the favorite flowers of every nation where they are known, so much so that in England it is the national emblem. Then, too, when great wars are over, and victorious soldiers march in parade down the principal avenue of the capital of their country,—be it London, Paris, Rome, or our own Washington, the people, often including hundreds of little boys and girls, cast scores of roses before them in the line of their march. In fact, all through history roses seem to be mingled with every great event in our lives, including baptisms, weddings, and funerals; and to wear a rose has a great many meanings among the different peoples of the countries where this flower of history is found.

So great is the number of kinds of garden roses that have been derived from the various sorts or species of wild ones, that to name and describe them here would be quite out of the question. As you already know, they vary wonderfully in form, size, and color—some being small plants, some big, bushy ones, and still others are known as ramblers, because, if allowed to grow to the limit, a rosebush will, in time, climb all over a good-sized cottage, or even an ordinary city house.

Cultivated roses are of various colors in addition to being pure white. We meet with pink ones of all shades; red ones;

those of deep carmine shades, and it would seem that some one has even bred a *blue rose*. Still others are of a delicate tea color, and there are no end of the shades of yellow and chromes. It is wonderful how all this has been brought about, especially when you come to know that few, if any, wild roses depart from either white or pale shades of pink. Our best known wild roses are the Pasture Rose, of which we have a colored figure here; the Swamp Rose, the Sweetbrier, the Dog Rose, the Meadow, and the Climbing Roses. But this is by no means the whole list, as any boys' and girls' flower-book will tell you. These are only a few of the principal and best known ones; and when you come to know them well, a study of the others is easy. To gather them in the woods and fields, bring them home, and go to your books to find out their names, soon comes to interest you so much as to be one of the pleasantest of your pastimes.

Note in the Pasture Rose of the fields, and in the garden one, how different their forms are; still, nearly all this difference is due to the fact that in the wild rose we find but a single circle of pink *petals*, while in the garden species these are considerably multiplied. This is brought about by careful cultivation, and we never meet with any kind of a true rose in nature that possesses any such number of *petals*. This is a good point to know about wild and garden roses. Then you should collect and study the different kinds of rose *leaves*, the various forms of the *thorns*, and the manner of growth of the plant itself. *Rosebuds* also differ greatly, and are very interesting, as are the red seed pods, called *hips* or *heps*, that we find in the autumn when roses, with all other flowers, have "gone to seed."

Sometimes the Pasture Rose, just mentioned, will put forth a flower or two late in the fall, just as though it hated that the summer had passed; which is also the case with most little boys and girls. For, from vacation days, with their green fields and wild roses, it is back to books and benches again—with snow and sleds for a change. Well, so much the better; for we will welcome and appreciate the wild roses all the more when the summer comes round again, which it surely will.



Nature Study Excursion to dairy with fourth, fifth and sixth grade children. Los Angeles, Calif.

Stalking the Cow.

ELIZABETH FRAYER BURNELL, A. M.

Assistant Supervisor of Nature Study, Los Angeles City Schools.

Stalking wild game is royal sport. The unfamiliarity of the cow has made her equally exciting quarry for many a child of the apartment house district. It is not exceptional to find city children who know less of a cow than of an elephant. That will no longer be applicable to Los Angeles children, however. The cows have been star actors, and movies at that, in the educational system of the city for the month of January. Serene bossys on their way home from pasture have been formally saluted by inquisitive youngsters who have discovered a new interest in heel joints and elbows. Fathers have taken clamouring children to neighboring lots to see how a cow walks. "Does she move her right hand and left foot together or her right hand and right foot?"

The Nature Study Department in the Los Angeles City schools, under the directorship of Dr. Charles Lincoln Edwards, cooperate with various departments of the city such as the parks,

the zoos and the museums. Nature Study bulletins have been scheduled to synchronize with city wide interests such as the stock shows and the pigeon shows and the children have been given a place among the exhibitors at the city Dog Show. For the study of the cow during January the Milk Inspection Department of the city has given helpful and enthusiastic support in preparing a list of the dairies of the city with reference to school excursions.

Dairy owners have been helpful and cordial in explaining the use of equipment and in showing school groups around the dairies. A regular tour of inspection has included the milking, the straining and cooling of the milk, and the bottling. The children have had vivid demonstrations of the care and expense necessary to fulfil the requirements for certified and guaranteed milk.

Eighty-five children gathered around a corral to watch the cows. Mischievous boys found greater excitement in seeing who could first win over the confidence of timid calves than in putting them to flight with noisy teasing. Here was a new incentive for being quiet in order to encourage the cattle who were slow to accept the advance of their visitors. For this was a Nature Study Excursion and not a picnic. Tradition had established the requirements which they would be expected to meet. With notebooks and pencils the young reporters prepared to explain their observations to their school-mates and their families at home.

Jersey, Holstein, Guernsey, Durham, and Ayrshire cattle have been added to the list of friends of the children of the city. Even fastidious little girls have put their fingers inside the mouths of the calves in their interest to feel the lower incisors and the bare gums above. Two tame cows near a school peaceably submitted to inspection and to having their mouths opened by boys of the school group.

Ask a Los Angeles child why teeth are interesting and you will start him on a long story which will include the flesheaters of which he will assure you the dog is one, and the grasseaters of which he has studied the horse and the cow. Several thousand children know more about teeth of horses and cows than is known by many of their elders.

Picture exhibits have been used to help visualize the animal relationships. These have proved a splendid asset, especially

when the material has been collected by the children and when they have helped to mount and arrange the pictures. Groups of pictures large enough to be seen at a distance have shown the Cud-Chewers: cows, sheep, goats, deer and camels. Posters have been made to illustrate graphically the fact that the hippopotamus walks on four fingers of each hand, that the pig has two on which he walks and two smaller ones, and that members of the cattle group have the third and fourth fingers developed for use while the second and fifth are mere vestiges. These exhibits have been arranged in the Nature Room where the school had one. In even the most crowded schools where space is at a premium it has been possible to find a central hall or a well-lighted passageway where the pictures have been exhibited. They have helped to make a lasting impression not only of zoological classification but also of our kinship with the animal world. The fourth-grade boy who was excited over the discovery that the arms of a cow were "just like my own" is on the road to new intellectual achievements.

A big truck took 35 children to one of the most famous dairies of the state, making a twelve mile round trip from the school. The children were much impressed to watch 392 cows each taking her place in her own stanchion. They were interested to find that each milker knew his cows by name. The white caps and suits of the milkers, the care in washing the cows, the precaution against dirt in the care of the pails—all contributed to building up in the child a new conception of the relation of cleanliness to health.

Some seventh grade girls started out as unenthusiastic members of one school excursion to see a neighborhood cow. They "knew all about cows". When the excursion was over they were the most reluctant to leave.

A wide awake Nature Study teacher took 80 of her Russian and Mexican children to visit the Hauser Packing plant. Compare this excursion with the results obtained by the teachers who taught lessons on burning and fuel without attempting a single experiment in the classroom. Children were told to light a candle at home and place it under an inverted tumbler to see what would happen. The chief hope of the supervisor is to stimulate the teacher to bring live material into the classroom and to increase the frequency of field trips for every child.

An Italian fifth grade youngster became the leading figure of the school when he conducted classes to his back lot to see his billy-goat and nanny-goat. No, he had never seen them chew their cuds. So we asked for his mother and she assured the children that they chewed their cuds "just like chewing gum". The foreign neighbors gathered around in curiosity to see why teachers were coming to see the goats so we conducted an Extension Course in Nature Study—mentioned the fact that the goat is a near relative of the cow about which we were studying, and asked the children to explain the difference between its arms and legs. They demonstrated with their own joints saying that goats were like ourselves "the heel bends backwards and the knee bends forwards." It gave an excellent opportunity not only for observing but for that best of educational processes of at once sharing with others who are interested listeners a new bit of information.

Visits have been made to goat dairies and the children encouraged to find out everything that they could about the relative merits of cow's milk and goat's milk, of the relative cost of feed and of the care of the animals. "How do they compare in intelligence with the cows," we asked, and the children who owned goats were quick to speak up for their own pets.

Some 165 principals have been stimulated to find out not only the present environment of their children but also their background. How many of them are the product of an apartment house and how many have ever been in the country? Ask a room full of children how many of them have ever seen a cow chew its cud. One hundred thousand children have had their experience widened by a month's nature study of the cow. Three thousand teachers have to a greater or less degree taken advantage of the opportunities to enlarge the horizon of their children beyond the school room walls.

Vital questions of the community life have been discussed—where is the feed for the cattle raised and how much of the year can the dairymen depend upon pasturage for their cows; what is done with the surplus milk; where is the butter of the city made? The children have returned from excursions with samples of cotton-seed, of silage and of beet pulp tied up in their handkerchiefs. They have discussed the use of fertilizers and the service of cattle in connection with rotation of crops.

Discussion of different breeds of cattle has brought a review of the lessons earlier in the year on the breeds of dogs and of pigeons. Reversion to type and ancestral patterns are problems that can be made of great interest to the grammar school child.

There has been much stimulus not only to visit dairies but to revisit the zoos and to see the relatives of the cow. Some rooms are keeping Nature Study Honor-rolls with records of children who have watched animals chewing their cuds, scoring points for the camel and the giraffe in proportion to the unfamiliarity of the animal. The children have found new things to look for. They have discovered that Nature Study in the words of Liberty Hyde Bailey is "Seeing what one looks at and drawing correct conclusions from what one sees."

Field excursions give laboratory experience of the highest type. Hoofs and horns and teeth take on new meaning after seeing horses and cows and camels and studying them first hand. Big principles of evolution, of animal breeding, of zoological classification, of the interrelations of the plant and animal world have been brought within the horizon of every child. It is such neighborhood and more distant field excursions which link Nature Study with the true scientific spirit of the high school and the university.

The County and City School Libraries for Visual Education have cooperated in supplying slides. These have illustrated butter and cheese making, breeds of cattle and tanning leather. The teachers as well as the children have expressed the greatest enthusiasm over these illustrated talks.

The child is not asked to memorize. He is taught that it is his ability to observe and to draw correct conclusions which counts. The child who has stroked a beautiful Jersey cow and felt her soft coat will never answer merely by rote that "the cow is a fur-bearing animal like ourselves." The best education is that which comes from intimate contact with real things as they appeal not only to the eye but also to the hand and the ear.

The individual who has stalked a timid cow in a corral and made friends with her has a source of intellectual pleasure and interest not to be found in books alone.



THE WINNERS

From left to right standing: Charles Hagner (school winner), Dorothy Logan, Florence Banks, Loleta Chalmers, Elsie Carlberg (2nd place where winner was withdrawn), Emma Shaw, Leona Holton, Hilda Hall, Mary Hitch.

Seated: David Blair, George Merritt, Ralph Zeese, James Bowman, Arnold Fegclgrin, Emerson Wilson, Edward LeCarpentier.

Bagworm Collections in a Wilmington Del. School

EDITH W. WARNER

Nature Study Teacher

From December 17 to 24 the Pupils of Grammar School No. 24 of the Public Schools of Wilmington, Delaware engaged in a contest for collecting and destroying of bagworm cocoons. The bagworms had been causing great damage, by eating the leaves of many beautiful trees, and after studying of these caterpillars, the children were given one week for collecting the cocoons; at the end of the given time, each pupil gave an account of his cocoons and the class then went out to a spot back of the school where a bonfire was made of cocoons and paper to make the cocoons burn well. The children enjoyed the bonfire very much. Owing to bad weather, at that time only 313 children took part in the contest, but this number destroyed the total number of 67,530 cocoons.

The Winners of the different classes were as follows:

Class	Winner	Number of Cocoons brought by winner	Number of Cocoons brought by class
8A ¹	Emily Foster	300	1314
8A ²	Lucy Bittner	600	2477
8A ³	George Smith	658	1944
8B ¹	Emma Shaw	1015	5264
8B ²	Loleta Chalmers	600	5045
8B ³	Ralph Reese	1700	5728
8B ⁴	Charles Hagner	4369	12916
7A ¹	Margaret Brown	550	1855
7A ²	Mary Hitch	804	4199
7A ³	Edward Le Carpentier	200	2706
7A ⁴	Emerson Wilson	200	969
7B ¹	Dorothy Logan	950	2270
7B ²	Hilda Hall	350	3958
7B ³	Florence Banks	1650	4015
7B ⁴	George Merritt	202	523
7B ⁵	Arnold Fogelgrin	115	319
7B ⁶	Samuel Jones	745	3160
6A ¹	Leona Holton	415	1392
6A ²	James Bowman	2100	3575
6B ¹	Joseph Fisher	1017	3801

As is shown by the above chart 8B⁴ class was the winning class, and its winner, Charles Hagner was the winner for the entire school. Three other boys of the same class did splendid work but owing to the high number collected by their winner they did not receive any honors; these boys were: David Blair with 2135
Lester Truman with 2000
Howard Sparks with 1000

Every child who took part in the contest, worked hard to win honor for himself and his class; and it was surprising how much the girls accomplished where it was often necessary to climb trees, but no accidents resulted from the work. During the gathering of the cocoons the children were careful not to break even small twigs from the trees; as it was explained to them that this injures the tree as much or more than the bagworms. After destroying this large number of cocoons; some of which were opened by the children, and the eggs counted, were found to contain as high as 250 eggs; we hope to have many more beautiful trees in our city unmolested by the greedy caterpillars.

An Interesting Boulder

C. J. KIMMERLE

Ann Arbor, Mich.

In a cool, dark ravine, cutting thru the mountain, is a rock which, like a full and beautiful life, attracts the attention and admiration of all who see it. And the rock has lived a real life, for it has lived in various places and seen much, and now it is helping to beautify the ravine.

Many, many centuries ago, this limestone boulder was a part of a limestone ridge far away in the north; then in the course of time perhaps by a fracture in the rock or from some other cause, it was broken off, and on its sides could be seen little fossils of queer little shells which told of the formation of the rock. After staying in this resting place for many, many years, suddenly, one day, it was picked up by a huge, slowly moving body of snow and ice, and, along with many other boulders, it was carried southward. For years and even centuries it was borne along, until it must have become weary of being scraped over the earth and ground against the rocks. On and on, southward it went, but gradually the burden pressing on it became lighter. A strange thing was happening. The snow and ice were gradually melting and loosening their hold on the boulders, and one day, after long weary years of travelling, our boulder was finally deposited in a permanent resting place.

Its resting place was a lovely ravine with hemlock covered slopes. Other boulders, too, were there, and among them played and raced a strong, little mountain stream. This stream was a playful, friendly stream and it delighted in making the acquaintance of each rock. And so it tumbled over a hindering rock and flowed around and past our boulder, and, as it dashed by, it playfully threw up a handful of spray. Each time it went by it repeated this action and the rock was thankful for the cool moisture.

But in the midst of all this beauty the rock felt sad and ashamed, for, looking down in the water, it saw how bare and sternly gray were its own sides while everything else about it was bright and beautiful. The slopes of the ravine were covered with the dark beauty of hemlock trees; the stream sparkled

like a gem in the sunlight and in the shade reflected the green of the trees; and all the other boulders had a soft tho thin covering of bright green moss. The large, gray boulder alone looked stern and forbidding.

Many years passed and now the old gray boulder is the proudest and happiest dweller in the ravine. Let us look back and see what has happened. Every day as the little stream played about and raced down the ravine, it continued to throw handfuls of spray on the old rock which it had grown to love, and, as time went on, little particles of waste, such as dead leaves and bits of bark, fell on the rock and were held there by the moisture. To this was added bits of decaying rock and soon tiny bits of soil filled the fissures. Into these fissures the wind carried the spores of mosses growing in the ravine, and one day, when the old rock looked down at the sparkling water, it caught sight of its own reflection. But the boulder was so surprised at what it saw that it could scarcely recognize itself. Its sides were no longer bare and unsightly, but enveloped in a thick covering of dark green moss, a much thicker and lovelier garment than that worn by any other rock. Some of the mosses had starlike tips, others were colored with bright red, another kind was long and feathery, and still another looked like tiny rosettes. How proud and happy the old boulder was!

But it was to be made still more lovely and wonderful. One day a new little plant called the walking fern appeared on the rock. The leaves of the new plant grew from queer, little round leaves to long tapering fronds, and when they were full grown they buried their tips down into the soft, moist moss, and in a few weeks new little plants had been formed, until today one whole side and parts of the others are covered with these busy interesting plants. And besides this, another fern has chosen the old boulder for its home. This fern is called polypody, and all year round its green fronds grace the top of the rock.

And so, if you were to visit Wild Cat Ravine, you would at once notice and admire the old rock. Sometimes in the evening a veery stops here and sings his weird, beautiful song. All year round the rock is green, matted with moss and the fronds of the walking-leaf, and crowned with polypody. The old boulder is happy indeed!

A Story of Jim the Normal School Squirrel

ETHEL GALLAHER

Western Normal, Kalamazoo, Mich.

One fine day when our nature study class met we were surprised to find in the cage in which Jacob the guinea pig lived, a tiny baby squirrel. He looked far from happy. He couldn't open one eye and he was so weak that he kept tumbling over each time he tried to sit up. He gave us a good example of perseverance as he sat trying with all his might to eat a wilted cabbage leaf.

We found that the little fellow had fallen from his nest, had been saved from an inquisitive dog and brought to the place where all creatures, happy or otherwise, are always welcome.

The rabbits refused to share their home with him. They jumped on the poor terrified little fellow and thumped their hind legs on the bottom of the cage showing their anger and contempt for the intruder. So there was no place for Jim, the new baby, except in the office.

A few days in his new home and a plentiful supply of warm milk and bread made Jim a happy squirrel. He liked carrots, lettuce, dandelions, and all the nuts we would crack for him. When offered bread and butter he would dig into the bread and smack his lips while eating the butter.

It was still quite cool weather and Jim discovered that the most comfortable place to sleep was on a box near the radiator. There he would curl with his tail wrapped around him and sleep most of the day. He soon began to play. Altho he was an amiable little fellow he would let one know that he had four sharp little teeth when he became excited.

Just about this time vacation came and to me fell the pleasure of Jim's company during the summer. He travelled to his new home in a bird cage. It must be confessed that neither Jim nor I had any pleasure in the trip. He was so terribly frightened and I so sorrowful that our beloved little Jim should go thru such a trial. A sack of nuts had been placed in the cage and into that bag crawled the poor baby. He seemed to feel that this was the safest place he could reach, for he stayed there perfectly motionless during the thirty mile drive and for some hours afterward.

I prepared my room for him by taking up the rug, spreading an old comforter over the bed and removing everything that I thought could possibly attract his attention. Before the summer was over there were only two things he had not tried to taste—the iron bed and a much treasured old chest.

When Jim first came out of his cage he was nearly as frightened as when he was in it. When he got outside of those terrible bars his fears soon vanished. He was still too young to do much jumping so he crept about sticking his inquisitive nose into every corner. He discovered a piece of old carpet in the door-way and his terrible journey, the cage, the strange place and all his troubles were all forgotten. He grabbed that carpet in his teeth, gave it a few pulls and tosses and rolled over and over with it exactly as a kitten plays with a string. When the game had ended Jim felt quite at home.

Soon darkness began to fall and then Jim looked around for a bed. A corner by a trunk was chosen and there he slept for several nights.

One day I put him up on the window-sill. This pleased him. He soon learned to crawl up by himself. Up a pile of books, across the desk, then down the window-sill he would go, a rather round-a-bout way but one that required but very small jumps. Now the weather was warm and Jim very wisely decided that the window-sill was a more comfortable bed room than was the corner by the trunk. So there he curled himself at bed time and went to sleep. In the night I heard a great scratching and scrambling. I hurried to the window and was just in time to save Jim from a fall. In some way he had slipped and was hanging by his fore paws from the sill.

Not many days afterward he found that by a short leap from the window-sill to a chair and up the chair back, he could reach the bureau. Here he slept comfortably for some weeks. At first he curled up between two boxes. If those boxes were not in place at bed time he would hunt around and seem very unhappy. Later he was given a shoe box and a piece of woolen cloth that he pulled over him just as any one pulls up the bed clothes. From the scrap box he chose a piece of blue voile and from the bureau drawer he took a stocking.

One day Jim made a sad mistake. He chewed up part of his bed and tipped what was left to the floor. That was all right while it was bright and sunny but bitterly did he repent when it grew dark and cold. When I came home that night some thing was stirring over by the trunk. I guessed that Jim was in trouble and soon had him in my arms. A very tired and sleepy baby he was, perfectly willing to snuggle up close while I found what was left of his bed. I put the bed clothes in the box and put Jim in. He stretched out, rolled over on his back and was almost instantly asleep.

Some time after, in the course of his investigations, he discovered that the back of the bureau drawer was a good place to chew. He chewed for some time and then found that he could climb into the drawer. After that no other bed suited him. He did not object if I opened the drawer and petted him as he lay curled up in a fluffy ball. On hot nights he didn't mind if I opened the drawer half way. When once he had gotten into his bed he liked to have his ears rubbed. He would roll over on his back, stretch out his tail and his four paws and close his eyes in bliss. Sometimes he would take my finger in his little forepaws and half nip and half suck it.

Oh, Jim was a most lovable little creature at bed time! There were a number of cool nights during the summer and on those nights he curled into a ball with his tail close about him. Often we would spread a blanket over him and there he would lie, cosy and warm, sometimes the entire night.

Jim was very particular about his personal appearance and seemed specially proud of his lovely bushy tail. It was a never ending source of enjoyment to watch him make his toilet. As soon as he got out of bed he would climb to the window-sill, sit there and wash his face over and over with his fore paws. Then he would seize that beloved tail, fluff it out and nip it with his teeth. Next he would stretch—and such stretches! He even spread out his tiny fingers, at the same time yawning and sticking out his wee red tongue. Then he was ready for breakfast. In fact I never saw the time when Jim was not ready to eat. His corn was kept in a tin coffee box. He learned to tip it over and push off the cover with his teeth. So I put it in a drawer where he couldn't get it. Jim soon learned where it was kept and when I started for the bureau he would hurried-

ly climb to the top, lean over as far as possible and watch that drawer until the can was brought out. Then he would dive in and seize as many kernels as his mouth would hold and then begin to chew as hard as he could. He was always a great believer in, "gettin' while the gettin's good". I have seen him with one hazel nut in his mouth, get angry because he couldn't get another in at the same time.

At first his nuts had to be cracked. By August he did not hesitate to tackle a walnut. He was fond of bread and milk, raw potatoes, lettuce, dandelions, apples and tomatoes. Green peas he shelled, cast the shells aside, and caused the peas to disappear most rapidly. For some unknown reason he refused to eat carrots which he had loved when a little baby. The dessert he liked the best was watermelon. How he did like nice juicy watermelon! He would hold a piece in his paws and gobble while the juice ran down upon the floor at his feet. When he had finished the melon he drank the juice and began eagerly looking for more.

Jim was also very fond of cookies and chocolate candy. He discovered a box upon the bureau one day and it was interesting to watch him. He went at that box as if he were digging for gold and had almost reached it. It really seemed cruel to take it away from him, he was so eager. But it would have been more cruel to have let him have his heart's desire, for a very small piece of candy is enough for a wee squirrel.

Before Jimmie had been with us many weeks he had learned to climb and leap. He could even climb the post of the iron bed. Much time was spent in running and leaping from one piece of furniture to another and it was perfect joy to get into the hall and run up and down the stairs. Sometimes he overestimated his ability and fell to the floor, usually striking his nose. Then how he would shake his head and sneeze and rub his nose with his paws.

As a special treat Jim was permitted to go into other bureau drawers than his own. How he did enjoy burrowing amongst the neckties and handkerchiefs! If he could find a nail brush, or toothbrush he would quickly seize it, carry it out of the drawer, and begin chewing with so much gusto that he could be heard in the other rooms.

One day he discovered a piece of chamois skin and from that

moment it was his and his alone. When I wanted it it was sure to be in Jim's bed. When I tried to use it, he would run up my arm, grab the corner and pull with his might. When he finally got his treasure he would sit holding it in his paws and licking it. One day he began to lick a piece of velvet in the same way. So I decided it was the softness that he liked. Still when he was given another piece of chamois skin he cared nothing for it. So it is difficult to say what did attract the little creature.

I never allowed Jim in my desk drawer. For that reason I suppose, it was very attractive to him. If he was in another part of the room and I started to open the drawer, he would make a dash for it. Into it he would go, seize a roll of passpartout paper or a paint brush. Those two articles seemed most desirable to him.

One could never imagine a pet more playful than little Jim. He dearly loved to run up and down over one, playing a regular game of tag if one pretended to catch him. Just once I tried writing letters when Jim was around. When he grabbed my pen a few times and my arm a few more times I decided that such an occupation did not meet with his approval. He played with a piece of cloth or carpet in regular kitten fashion but really seemed to enjoy playing with people more. Such fine times as we did have on the bed! I held a handkerchief by the corners. Jim seized it and then I gave him a toss into the air. Down he would come, turn over two or three summersaults on the bed and then rush back for another toss. When he tired of romping he would stretch himself out at full length, all of his paws and his tail extended, and rest a short time. Then back he would come ready to continue the game. Often he would come over to the bed before I was awake in the morning. It was also a favorite trick of his to pull out my hair pins and comb.

Little Jim never seemed to dislike being petted except when at his meals. Toward the end of the summer he demanded petting. He was especially fond of having his ears and face rubbed. It seemed a pleasure to him to lick one's hand and often he would run his mouth over one's face, taking little nips with his lips. These two acts seemed to be his expression of affection.

He was a very friendly little chap, so long as his visitors were of the female sex he showed no fear. But if a man entered the

room he ran for his bed. There he either burrowed under his bed clothes or sat up with his paws on the edge of his box and peeped over. He would condescend to take food from the hands of a man if he were coaxed a bit.

Frequently he was seized with the idea of thrift. He would work hard carrying nuts about the room and storing them away. He was not particular as to whether they were out of sight or not. He would even hide them in my lap or on the floor in plain sight. He always gave them a few pushes with his mouth and a few pats with his paws. Then the operation was complete. The bed was quite a favorite hiding place, and there was always a shower of nuts every time the bed was made. It was too bad to disturb his store but he never seemed to mind hiding the same nuts over and over again.

All summer our little visitor was as happy as any little squirrel could be, eating playing and growing. But at last vacation was over and back to the Normal travelled Jim. He was very much insulted at being put into his travelling cage again and tore at it with all his might. Unfortunately he had forgotten about his former home and every thing was strange. Worse than all there were terrifying men everywhere. Jim was perfectly miserable. Then an open door and an open window showed him the road to happiness. Like the wise little squirrel he was Jim took it. We have seen him out on the campus playing in the trees. He peers thru the branches at us but refuses to come down.

Notice

Reprints of the Outline of Nature-Study (including the general directions and cutout pictures) by Dr. E. L. Palmer will be on sale about Oct. 1st, 1921. Every teacher should have a copy. Write for quantity price.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN
ELEMENTARY SCHOOLS

Published monthly except June, July and August. Subscription price, including membership in the American Nature Study Society \$1.50 per year (nine issues). Canadian postage 10 cents extra, foreign postage, 20 cents extra.

Editorial

JOHN BURROUGHS.

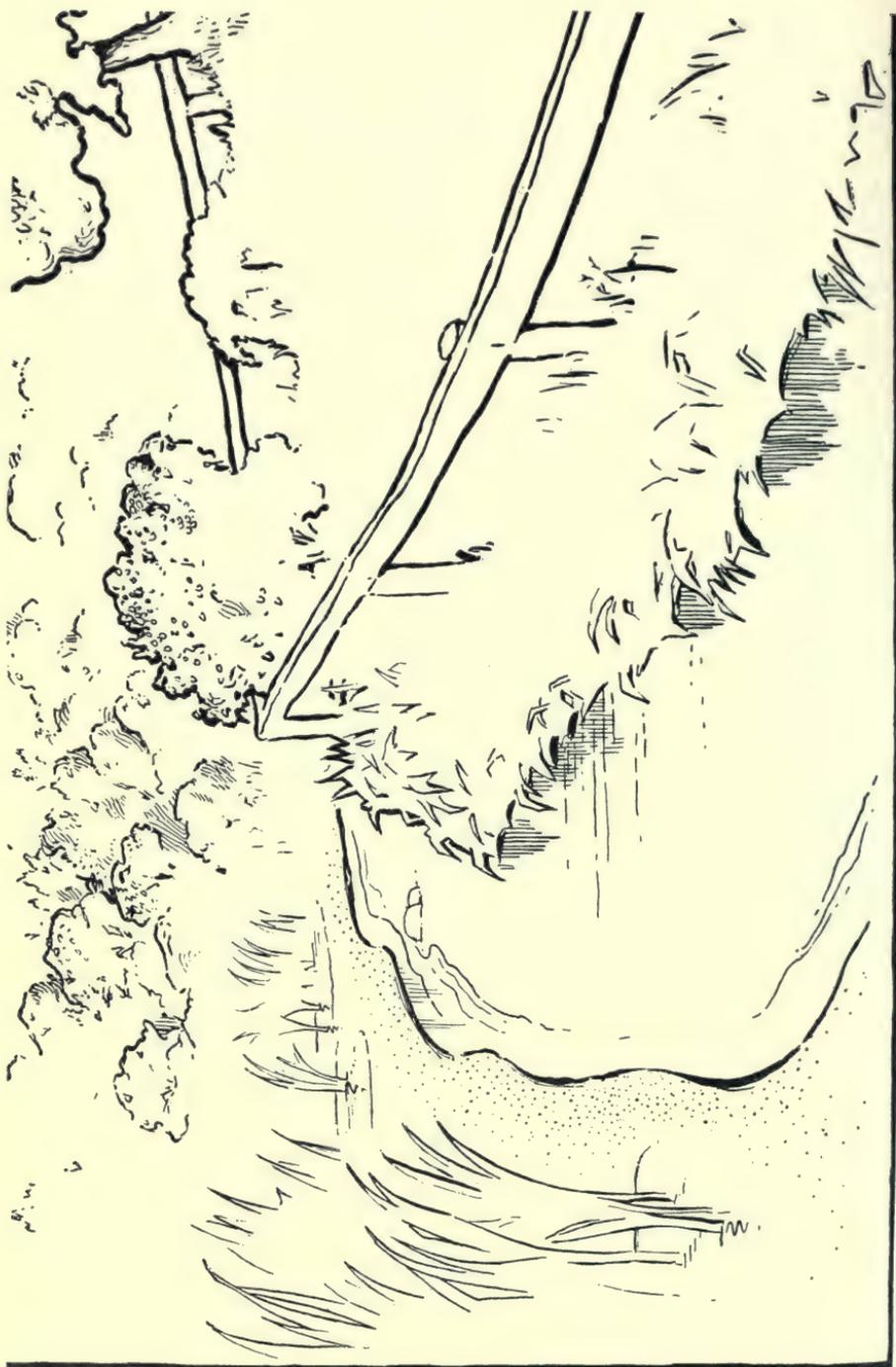
In the nation-wide expression of sorrow occasioned by the passing of our great interpreter of the teeming life of woods and fields, little has been said concerning the fact that his life was well-rounded and well finished. We could so illy spare him even tho he had attained the age of 84, surely a good old age, that we could not bring ourselves to think of him as other than young and vigorous. He had lived happily doing the work that he loved; he was still keen in interest and young in spirit; and he gave us the secret of his perpetual youth when he wrote: rust, rot and mildew come to unused things". "Oh, the blessedness of work, of life-giving and sustaining work! The busy man is the happy man; the idle man is the unhappy." "Oh, the blessedness of motion, of a spur to action, of a current in one's days, of something to stimulate the will, to help reach a decision, to carry down stream the waste and debris of one's life."

Perhaps no one has summed up the lesson of his life better than he himself when he wrote: "In every man's life we may read some lesson. What may be read in mine? If I myself see correctly it is this: that one may have a happy and not altogether useless life on cheap and easy terms; that the essential things are always near at hand; that one's own door opens upon the wealth of heaven and earth; and that all things are ready to serve and cheer one. Life is a struggle, but not a warfare, it is a day's labor, but labor on God's earth, under the sun and stars with other laborers, where we may think and sing and rejoice as we work."

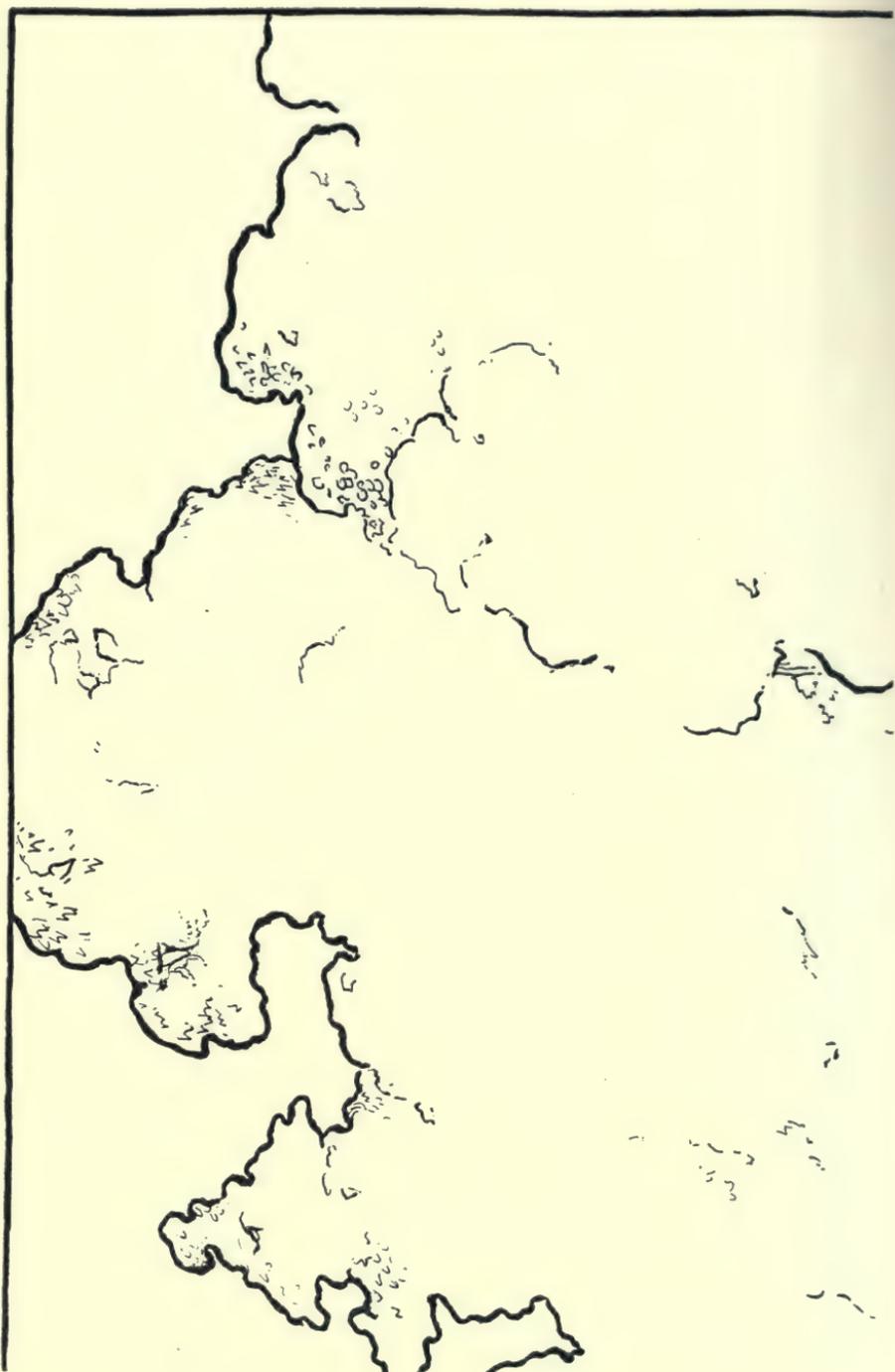
CORNELL UNIVERSITY AND NATURE-STUDY

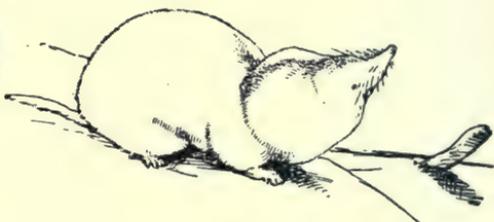
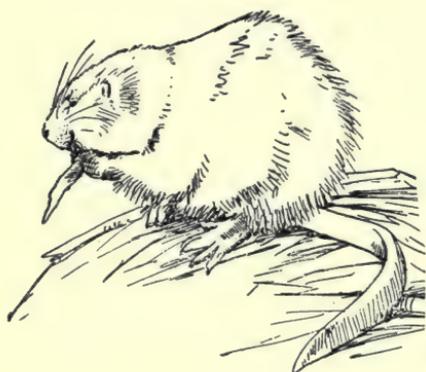
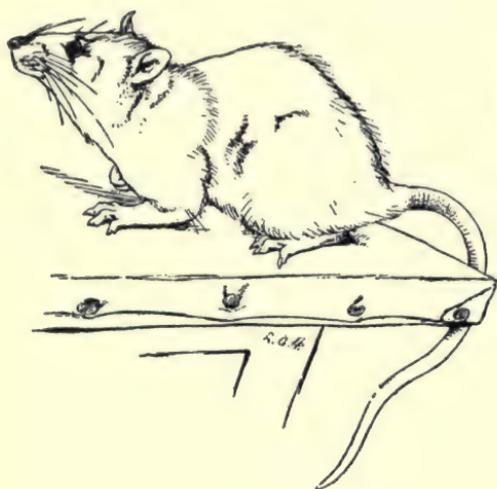
Nature-study was undertaken at Cornell through a mandate of the New York Legislature in an attempt to better agricultural conditions in this great state. The farmers were experiencing hard times during the years preceding and following 1893. Measures of relief were considered, and mainly through the advice of Mr. George T. Powell, then Director of Farmers Institutes, the introduction of Nature-study into the Rural Schools was regarded favorably as a means of interesting farm children in farming and retaining their services in improving agriculture. Cornell did not ask it, but when the State gave an appropriation to the University to be used to establish Nature-study in the rural schools, the obligation was accepted in all seriousness and in 1896 began a propoganda which has extended beyond New York and has reached beyond even National boundaries.

With Professor L. H. Bailey as leader and with John W. Spencer, Alice McClosky, Edward Tuttle, Ada Georgia and the Editor as a staff of regular workers and with the help of many others temporarily, and with the co-operation of the N. Y. State Department of Education the work has been established on a permanent and practical basis. Death and other duties have taken away the original staff of workers at Cornell and the work in the future will be carried on by Dr. E. Laurence Palmer who brings to his task enthusiasm and understanding that ensrues success. Because his Leaflets are so vital and inspirational we have given the September Number of the REVIEW the pleasant task of placing his methods of work before teachers who are not fortunate enough to be on the New York State mailing list.









Rat
Muskrat
Squirrel

Deer mouse
House mouse
Short-tailed shrew
Meadow mouse

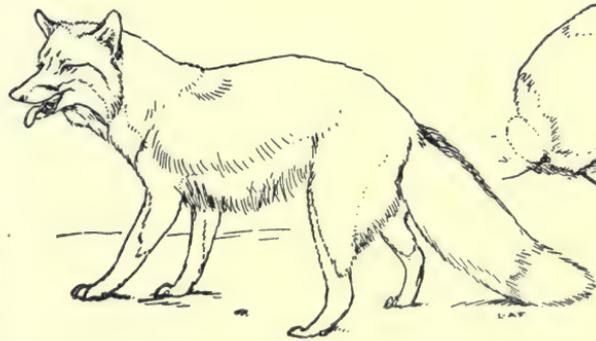
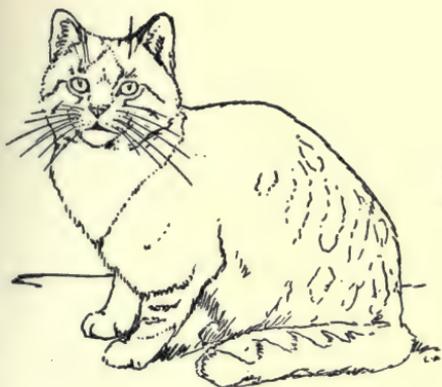


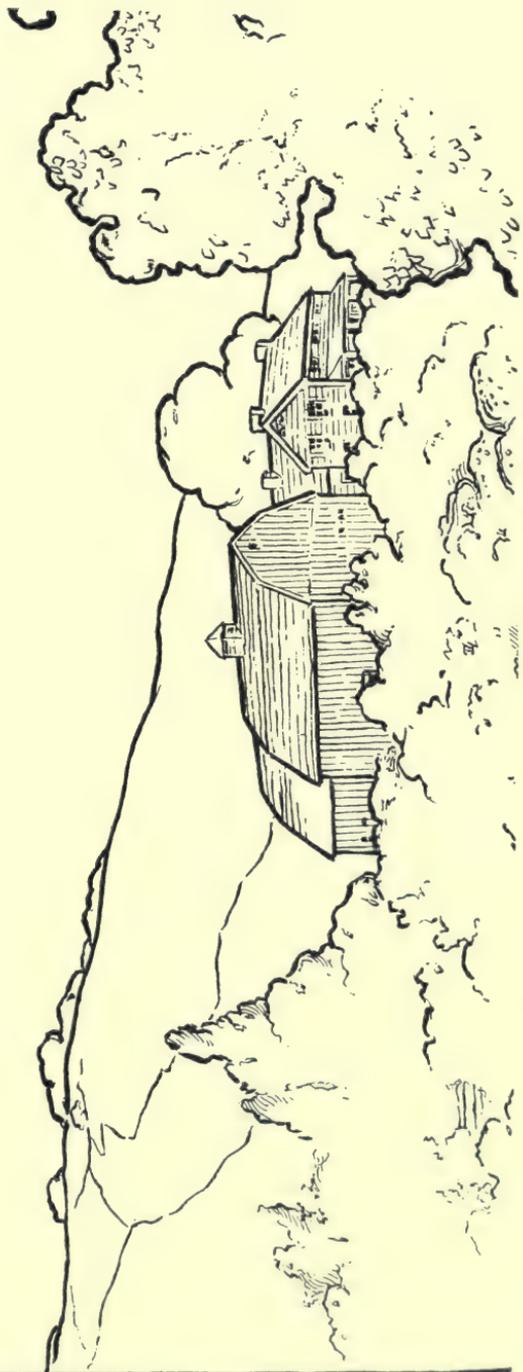
PLATE OF ANIMALS

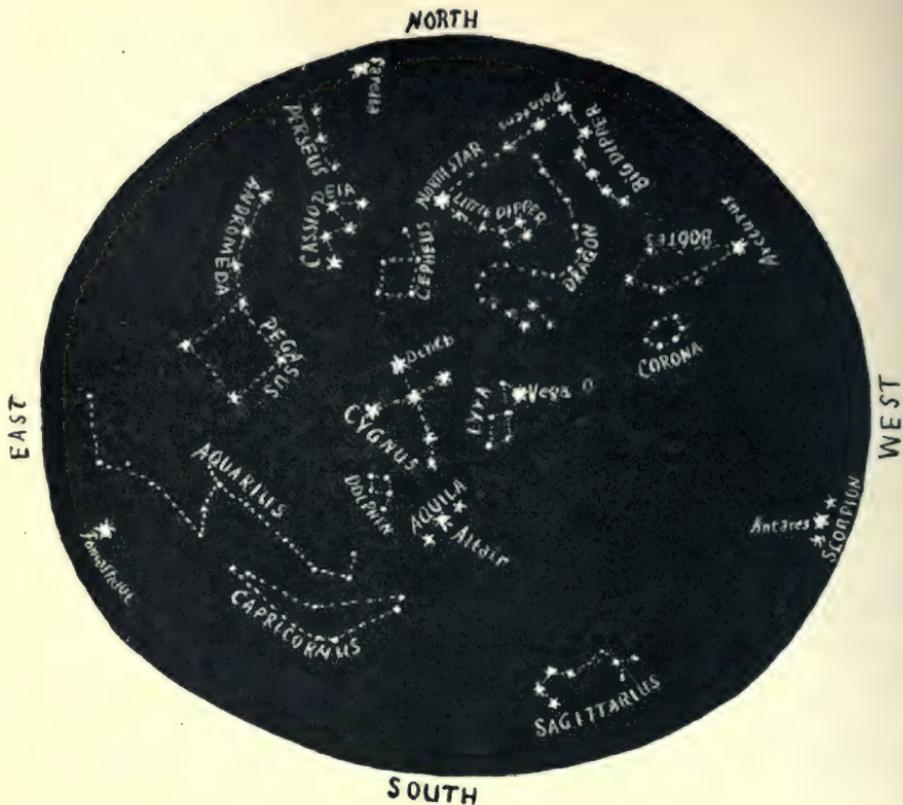
(To be used on landscape)

Cut out animals carefully; if desired, mount on a card and cut out again, leaving a slender vertical slip at base. Cut slits in the landscape in proper places, and through these insert the slips. The plates of animals are furnished and copyrighted by the Comstock Publishing Company, which publishes them in larger form on water-color paper

Cat
Skunk
Fox

Raccoon
Mink
Rabbit





THE STAR MAP FOR SEPTEMBER

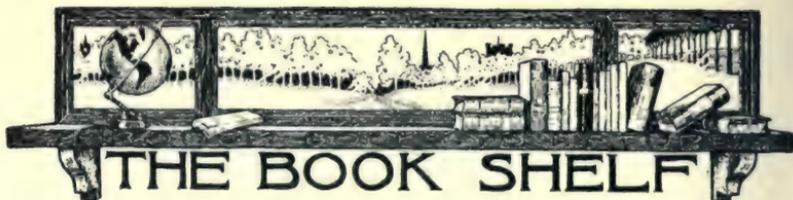
The most notable of the constellations to be studied in September are as follows: The Big Dipper is in the north-western sky with the handle up, curving toward the west; continue the curve about twice the length of the handle and it ends in the splendid star Arcturus; this brilliant star is at the sharp angle of the kite that marks the constellation Boötes which is very near the western horizon; above Boötes is the circlet of stars which make the Crown. Cassiopeia, or the Queen's Chair, is east of the North Star; east and below the Queen's Chair are the four bright stars in a line that mark Andromeda; the southern star of the four marks an angle of the great square of Pegasus. Almost directly overhead is Cygnus, the Swan, also called the Northern Cross; the great star Deneb is at the head of the cross. West of this and almost overhead is beautiful blue Vega in the Lyre. South and lower down may be seen the little diamond-shaped constellation called Delphinus, the Dolphin, also known as Job's Coffin. West of this are three stars in a row, the big star in the middle being Altair, these mark Aquila, the Eagle.

The Planet sisters of our Earth which we call morning and evening stars are not so placed as to give us a bright evening star this month. However, Venus shines brilliantly in the sky of the early morning and red Mars may also be seen in the Lion in the morning.

SUMMER
(A Definition)

By HOPE H. GIRARD

1. Hungry robins,
Clear blue skies;
Flying swifts
Darting flies.
 2. Open barn doors,
Cooing ring-doves;
Tell-tale echoes,
Downy foxgloves.
 3. Modest harebells,
Brier roses;
Honey suckle,
Morning-glories.
 4. Busy wasps,
Loaded trees;
Fields of clover,
Working bees.
 5. Waving cornfields,
Pale full moon;
Silver wheat fields,
Early dawn.
 6. Dancing shadows,
Tumbling rills,
Fleecy clouds,
Verdant hills.
 7. Sparkling eddies,
Rollicking falls;
Nestling ferns,
Woodland calls.
 8. Dewy grassplots,
Gushing showers,
Leafy arbors,
Loafing hours.
 9. Treasures hidden,
Colors brightened;
Quiet growth,
Fancy ripened.
 10. Beauty's splendor,
Harvest alluring;
Growing in fullness,
Life-right assuring!
11. Full of glories
Without number,
Is the season,
Our summer!



Nuova, The New Bee, VERNON L. KELLOGG, 150 pgs., 15 full page illustrations and drawings by Milo Winter, Houghton Mifflin Co.

Before Dr. Vernon Kellogg helped Mr. Hoover feed hundreds of thousands of French and Belgian sufferers in the war-zone and before he was Secretary to the National Research Council he was a Professor of entomology and wrote learned volumes that will remain for all time as bulwarks in that vast section of science. But he found time even then to write a volume of *Insect Stories* for children which for charm of style and interest has few rivals. Now again he has given us "A Story for Children of Five to Fifty" equally well written and equally fascinating; and his talented, versatile wife has embellished it with happy little songs. It is a story of a rebellious worker bee who found the established order of things in the hive not at all to her liking. The author is very careful to give accurately in every detail the habits and wonderful activities of the bee-folk and only allows his fancy to deal with the psychology and acts of the attractive little rebel and with the successful outcome of her romance. The illustrations by Milo Winter are fitting and charming. The story of *Nuova* should be on the shelf of honor in every child's library.

Everyday Adventures, SAMUEL SCOVILLE JR., 241 pages, 24 full-page illustrations from photographs, The Atlantic Monthly Press.

Mr. Scoville is a lawyer and a city dweller but he lives his real life in the fields and woods, and he has the power of revealing to us just the joy he experiences in his various excursions. His descriptions are so vivid and he has such a keen dramatic sense that he takes us with him willy-nilly. His various excursions are described under the following chapters: Zero Birds, Snow Stories, A Runaway Day, The Raven's Nest, Hidden Treasure, Bird's Nesting, Treasure Hunt, Orchid Hunting, Marsh Dwellers, Seven Sleepers, Dragon's Blood.

Occasionally he takes his children along and this makes the volume very good reading for Boy Scouts and Campfire Girls and by no means detracts from its charm for adult readers. The following from the account of his hunt for the Raven's Nest is a good example of the vivacious style of this interesting book:

"For fifteen freezing miles we clambered over and around three of the seven mountains. By the middle of the afternoon we reached a cliff hidden behind thickets of rhododendron. In the meantime the snow had changed to a lashing rain, probably the coldest that has ever fallen on the North American continent. Ploughing thru slush, the black rhododendron stems twisted around us like wet rubber, and the hollow green leaves funneled ice-water down our backs and into our ears. Breaking thru the last of the thickets, we at length reached a little brook which ran along the foot of the cliff. A hundred feet above, out from the middle of the cliff stretched a long tongue of rock. Over this the cliff arched like a roof, with a space between which widened toward the tip of the tongue. In a niche above this cleft a dark mass showed dimly thru the rain. 'The nest!' muttered the Collector hoarsely, pouring a pint or so of rain-water down my neck from his hat-brim as he bent toward me. I stared with all my eyes, at last one of the chosen few to see the nest of a Pennsylvania raven."

Everyday Adventures is a delightful addition to our present day Nature literature.

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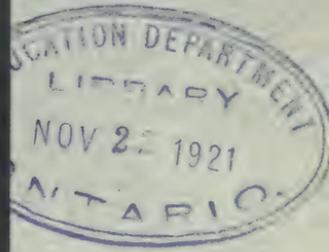


Photo by R. Matheson

BOB'S COCOON YIELDS ITS TREASURE

The Nature Study Outline Number

OCTOBER, 1921

VOL. 17 No. 7

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Nature-Study and the Reading Lesson

M. R. VAN CLEVE

Supervisor Nature-Study and Elementary Science, Toledo, Ohio

One of the best opportunities for teaching nature-study in schools is in relation to the reading lessons; and for the very obvious reason that much of the material in the readers is about nature. It is so in the primary readers where natural objects are used to base the bulk of the reading matter upon, and it is so in the upper-grade readers which contain nature literature.

Consider the primers and first and second grade readers with their numerous pictures, words, sentences and paragraphs portraying familiar animals and plants. It is evidently assumed by the makers of readers that the children know these things about which they talk and read. But a little careful testing by any teacher will certainly show that many of the children, particularly those of cities, have no clear percepts of some of these things: bluebird, sheep, cow, frog, toad, snail, oak, spruce, pine, cedar, brook, owl, eagle, spider-web, chicken, bee, wheatfield, daisy (examples taken from a few primary readers). The chief purpose of primary reading is doubtless to teach children to *recognize* and *comprehend* words is it not? Too often the child gets no further than the recognition. Many of the words he learns are names of things. They are but symbols however, not the things themselves. A bluebird is not a combination of eight letters. Neither is it just a flying feathered creature signified by the concept "bird." It is a throbbing exquisite bit of *life* with colors and songs of its own which thrill the emotional nature of anyone who has seen and heard it whether it be on the occasion of the annual renewal of greeting or in the mere recall of the image in the memory where like Wordsworth's daffodils

"They flash upon that inward eye
Which is the bliss of solitude."

Here then is where the nature-study lesson can and should function: to see that the children have perceptual experience with these things about which they are reading. This requires, so far as possible, contact with the actual objects, most of which can be brought into the schoolroom or seen on a short walk out-of-doors near the school except perhaps in the large cities. And let it be noted here that any observation of creature or other natural object indoors should lead to a search by the child for the thing in its natural habitat. Let the true success of intra-mural nature lessons (excepting a few types) be gauged just so, i. e., by the extent of the follow-up — the *out-door observation* by the children.

The question arises, "May not the perceptual experience be gained from the illustrations which are so abundant in the primary readers?" To some extent, yes—at least with those illustrations which are approximately true to nature. But no one will question for a moment the superior value of experience with the real thing. No one would claim that one's perceptions of Niagara Falls, the Yosemite, the Ocean, Japan, gained from pictures (even moving pictures), is comparable to those secured in travel. Suppose your only experience with violets had been seeing pictures of them; that you never had smelled or felt their freshness or plucked them in the quiet woods? Well, that is all many children and perhaps you yourself know of some of the animals and plants mentioned in the readers. As regards much geographical knowledge, we must be content with the word and picture substitutes for the things; but with nature everywhere about us, *why be content with mere symbols of common objects in books?* Lowell wrote in that splendid nature poem (too little known), *Sunthin' In the Pastoral Line*

"Why, I'd give more for one live boblink

Than a square mile o' larks in printer's ink."

Here he was referring to the custom of American poets before the time of Bryant of mentioning only skylarks and other English birds (which perhaps none of them had even seen) when they might be writing of their own emotional experiences with American birds and flowers. Entirely too much of our knowledge of nature (and American nature at that) is in printer's ink—"words, words, words" as Hamlet said; yes, even too much of it in the expensive ink of colored pictures;—and not enough of it learned where Whittier learned, —

"In nature's unhoused lyceum."

Furthermore, many of the illustrations in readers are unsatisfactory from a nature study point of view. For instance, in order to carry out a uniform color scheme in a book, various different species of birds are depicted in the same colors, and frequently in colors entirely foreign to them; and the crescent moon viewed in the evening sky by a child just going to bed may be placed in any position to suit the desire of the artist without regard to scientific fact. We do not wish to quarrel with the illustrators. From their point of view it perhaps matters not whether colors and forms are true to nature, and they doubtless are bored by what seems to them the literalness of the scientists. We must, I suppose, for the sake of goodwill and deference to pictorial art, allow them to place in our readers bluebirds with blue underparts and white backs, pink horses, and blue cows — such is the privilege of art! Very well. But we owe it to the child to show him at least a correctly colored plate of the bluebird and lead him as soon as possible to know this fine fellow as well as other birds, insects, flowers and trees, just as God made them in their inimitable beauty.

As Prof. Vinal* has so well pointed out, neither child nor teacher can gain much correct information regarding nature from the reading material in the primary readers. Some is truth, much is fancy. The writer is willing to leave the final judgment as to what is the best type of subject matter and illustration for primary readers to the thoughtful primary teachers of the country, for what they demand will be placed in the readers of the future (if it has not already been done). But even if fancy in word and picture is to predominate, is there any reason why, at the same time, the children should not be taught the truth about these creatures of which they read? * Even six-year old children enjoy both fact and fancy and if skillfully taught neither need spoil the other.

How then should the primary teacher teach the nature-study suggested by the reading material? Space limits will allow only a few brief illustrations.

1. The children are to read about the squirrel and nuts and acorns. Many children have fed squirrels and can tell about their experiences. Have any seen squirrels nests?

* N. S. Rev. Dec. 1918

Where? Any near the school? What colors and size were the squirrels (determine species). Copy squirrel tracks seen in snow or mud. Watch a squirrel bury a nut, then see if you can find it. See who can find oak trees and nut trees near the school or near his home.

2. Here is a picture of a bird's nest with young in it. In April and May each child should find such a little family and watch it and report on it, bringing the nest to school after the family have left. Where was the nest? How fastened in the tree or elsewhere? What is it made of? Where did the mother bird get the material?

3. Notice this tree in the picture. Is its shape like any here about the school? I wonder what kind it is?

4. Have you seen the moon look like that? When it is that shape next in our evening sky, we will notice whether its points are turned just as in this picture. Is there always a big bright star close to the moon? Watch outdoors and see. Then tell me.

5. See those beautiful clouds in the picture. I wonder if we ever have clouds like those in our sky. We shall watch out of our window for them every day, and perhaps we shall see other beautiful kinds.

Now what of the use to be made out of the nature literature selections of the advanced readers? Some of the prose sections are direct excerpts from the writings of naturalists and should always be used to stimulate teacher and children to explore in their yards, parks, fields and woods. And what of nature poetry?

Many of the poets are nature-seers, in two meanings of the word: they have been good observers and they have distilled wisdom from their observations. While there is much fancy in nature poetry and sometimes error, there is enough truth and more than enough inspiration to lead anyone who wills into a better knowledge of nature. There are some writers on nature-study who ridicule this correlation of nature-study and literature, stating that it spoils both the poetry and the science. But the writer of this article believes that this correlations an effective stimulus to observation and indispensable to the full appreciation of nature literature. To condemn this correlation is no more justified than to condemn the writing of nature poetry itself.

Emerson:

"Far distant sounds the hidden chickadee
Close by my side." (referring her doubtless to its
"phoebe" song which is ventriloquistic in its effect).

Let us take a few illustrations for interpretation from the nature poems customarily used in the readers. The poem beginning "There's a little brown thrush sitting up in a tree" probably refers to the brown thrasher, one of our finest singers. The children should be shown his picture (and if possible the singing bird—an easy matter for country schools and not very difficult in cities), and should be taught many things about him. This should be done with other bird poems also. How in the world can a person really enjoy Bryant's Robert of Lincoln who has not seen and heard this hilarious minstrel with his Quaker wife? The bobolink is not rare. Find out from some local botanist in October where fringed gentians can be found (if Bryant's poem is there for you to teach). Secure only a very few to bring to the schoolroom to see; or by far better, take them out to see them in full bloom (but not to pluck). When Stevenson speaks of stars to the child mind in his Garden of Verses,

"The Dog and the Plough and the Hunter and all,
And the star of the sailor and Mars."

let us remember that these are all in our winter evening sky (excepting Mars occasionally) and therefore can be made more than mere words. Gilder's poem beginning "What does he plant who plants a tree?" or any other tree poem, should be the starting point for a desire to learn to know as many trees as one can. The reading of Tennyson's Brook or Lanier's Song of the Chattahoochee ought to drive teacher and pupils almost to truancy in springtime or autumn.

Here then in the readers, nature is calling to children and teacher. *Shall we refuse to hear or let them hear?* Comenius summed the whole thing up three centuries ago:

"Do we not dwell in the garden of Eden, as well as our predecessors? Why should we not, instead of these dead books, open to the children the living book of nature? Why not open their understanding to the things themselves, so that from them, as from living springs, many streamlets may flow?"

Of course books are not so dead now as they were in the days of Comenius. Yet they are indeed very dead if the reading of them does not lead us to understand and enjoy our fellow men and nature. Any effort the teacher will make to better interpret nature-reading and nature-literature by means of nature-study, and to stimulate nature-study by means of the inspiration of nature-literature, will open for the child (and he can hardly do it for himself) two of the gates to Henry Turner Bailey's Holy City of the Spirit; namely, the gate of nature and the gate of literature.

Nature Bids You Come

DONALD THISTLE

High is the sun in the Heavens,
The meadows are purple and gold;
Dotted with misty whiteness
For yarrow grows there as of old.
Proud spikes of the wild verbena
Of royal hue indeed,
Rivalling the indigo bunting
Are tossed by the winds and are freed.

Then come where the milkweeds' pink clusters
An old fashioned perfume doth give,
Where the mullein on high stalks is blooming,
And joy is complete, but to live.

Liquid the notes from the pasture
A meadowlark greeting the day;
Bobolinks mount with their warble,
While oft sounds the screech of the jay.
You enter the woods by a by-path,
As quiet indeed as a thief,
But policeman jay's sure to find you,
And study of birds comes to grief.

But come where the bluebird doth carol,
Where the bell notes of wood thrush are heard,
Where the tanager flashes his crimson,
And the brightest of jewels a bird.

The Wise Wood Rats

CARROLL DE WILTON SCOTT
San Diego, Calif.

(This is a story specially for boys and girls—and others whose hearts are still young. It is about the western wood rats, the builders of the wonderful stick houses you often see among the chaparral. These rats have nothing in common with city rats save their relationship. They are clean,clever,bright-eyed, soft of foot and live a woodsy, romantic life).

Mr. and Mrs. Wood Rat lived in a brushy canyon near the Fremont school near the outskirts of the city. Their house was made of sticks and built among the limbs of a laurel sumac bush. How old their house was nobody knew—perhaps ten years, perhaps fifty. Of course the same sticks had not been there that long. If you had dug into the bottom of the house you would have found a mass of decayed leaves and wood going back



to the soil. But every night or two the gray builders would add a few twigs of sage or a spray of lemonade berry or a piece of tin or paper or bottle picked up in the canyon. So for years the house had grown at the top and wasted away at the bottom. But year in and out, at every season the center of the house was soft, dry and cozy.

The city had grown up around the wood rats but as their fathers and mothers had lived there for a long time they did not like to move. It was true the house cats often gave them a scare. But many of their wild enemies such as bobcat and coyote were frightened away by the houses of men along the top of the canyon. So they remained where they were until—

It was July. Mr. and Mrs. Wood Rat's children were grown and had gone to shift for themselves and the old folks were sitting in their nest room munching dried elderberries. Mrs Wood Rat had been nervous all day. Suddenly she said, "We will have to move. Those bad boys who came today and poked sticks into our house will come again. We shall have no peace here any more".

"They can't push our house over. It is built through the sumac's limbs", said Mr. Wood Rat confidently.

"They might set fire to it or get their dog to bite into it. I heard their dog barking yesterday. Besides a sharp stick may go through one of us some day. It's no use—we had better move."

"Allright", agreed Mr. Wood Rat, "where shall we go?"

"On the other side of the canyon is a big clump of cactus. You know we have often gone there for a drink in dry years. We will build among the cactus".

"But Mr. Skunk lives there", objected Mr. Wood Rat.

"I think he has gone," answered Mrs. Wood Rat. "I haven't smelled him about for some time."

"Well, when shall we move?", asked Mr. Wood Rat.

"Tonight", said Mrs. Wood Rat decisively.

So saying, Mrs. Wood Rat started off along one of the trails that they had made through the years with their dainty pink feet on many a nightly errand. Mr. Wood Rat followed. They had gone but a few feet when "crash"—through the sage bush jumped a huge black cat. With a quick side jump Mrs. Wood Rat barely escaped. She scurried on and soon reached the cactus. She waited quivering from tail to sensitive whiskers. Soon Mr. Wood Rat slipped to her side.

"He nearly got me that time", gasped Mrs. Wood Rat. "I couldn't see him till he sprang".

"We are safe here", answered Mr. Rat looking anxiously around. "We will never starve here anyway", eyeing the rosy cactus apples above. "Where shall we build?"

"Here—build up around the trunk of this prickly pear cactus", indicated Mrs. Wood Rat.

All night they worked, swiftly as moon beams, silently as shadows. They carried sticks from the bushes close by. Sometimes they cut off stems of green sumac or the sharp ends of Spanish bayonet leaves. They left three open spaces for doors but all around these doors they laid pieces of cactus stems prickly with thorns. A clumsy skunk would get his paws full of prickles if he tried to enter. A snake would not like to crawl over them. But the Wood Rats hopped nimbly over them like the fairies that in picture books play leap frog over toad stools and were never once stuck. In among two hollows Mrs. Wood Rat stowed dry grasses and made cozy, warm nests, one for each of them. Another hollow as a store room and dining room.

They did not build their house in one night of course. In the daytime they stayed in their new home. But at night they piled load after load of sticks and leaves on their house nest making it the shape of a giant pine cone to shed the winter rains. Each night they visited the old home bringing food that they had stored—cured grasses and elderberry leaves and seeds of chilicothe and simmondsia.

One night when the pair were about to enter the old home they heard a strange sound. A muffled murmur filled the whole house.

"What is it", whispered Mrs. Wood Rat.

"Bees—let's go—come quickly", answered Mr. Wood Rat. So away they scampered.

True enough, a swarm of bees from a hive in the neighborhood had chosen the empty nest for a snug home. I am told that next day there were several swelled faces in several homes near the Fremont school. One dog, Bowser by name, will never again dig into a wood rat's nest as long as he lives. But all this is another story. The wood rats knew nothing about all this for they were safe in their new home munching dried elderberries.

California Nature Study Class and What It Did

E. E. BALCOMB.

Professor of Nature Study Arcata Normal School

California has many advantages for Nature Study. Trips may be taken and outdoor work undertaken at all seasons of the year. There are no "shut-in" months. The State Normal School at beautiful Arcata is no exception. The new State Normal School building is situated on a hill which Nature seems to have fashioned especially for the purpose. Standing in the entrance to the new building one gets a magnificent view that is seldom equaled anywhere in the world. The eye rests upon the surf, the whitecaps, and then wanders out, out and out on the almost limitless rolling waters of the Pacific Ocean. Sometimes a great vessel with all its white sails bellied by the breeze and painted against the azure blue sky may be sighted. At another time, it is an ocean steamer, proudly plowing Pacific's placid waters. Glancing to the South one surveys the Bay, while to the East are the foothills of the mountains covered with the world-famous Redwoods. In fact, not many years ago the very site of the Normal School itself was the home of giants of world renown.

The class was composed of girls graduated from high schools, and now preparing to teach—all Juniors except one. They took a great interest in the work from the first day. Their joy was the keenest however, when they were on a field trip.

One day, they took their butterfly nets, trowels, knives and other instruments for gathering specimens, together with an ample lunch, and started on a long anticipated trip. They went thru the forest and rested a little while in the Redwood Park of the local city. One bird was discovered in the Park, but birds are rare in the Redwoods, and their stretches strangely silent of winged singers' songs.

Leaving the Park, entering the public road, and climbing a famous hill, gave them a magnificent panoramic view of the Bay, the City and the famous dairy flats, extending to the Pacific Ocean.

They ate their lunch in an open field. The picture shows a small part of the Class doing justice to this very necessary and pleasant part of a long Nature Study Trip. While eating, they added half a dozen more birds to their list. After following the

road up the hill for half an hour or more, they turned to the left through an open field of stumps where several flowers were secured. The girls with their nets had many a merry chase following the fleeting fluttering butterfly.

Here, the class enjoyed observing the latest discovered species of bird—the “man bird” or flying machine. He played hide and seek through the low shifting clouds and finally passed directly over the eager watchers. He went beyond them for a few miles, circled over the village of Blue Lake and then returned, giving them a second magnificent view. The girls endeavored to “get him” with the kodak, but like many another girl, they “failed to find him”.

Following an old logging road into the woods, they found so many specimens that a “council of war” was called. It was decided as an “emergency measure” to eat the cake so as to “release” the basket for carrying specimens. There were no “slackers” when volunteers were called for. About two miles farther on they discovered the shacks, barns and other buildings of an old deserted saw-mill site. Again the necessity for specimen containers grew apace, and another halt was made to eat the remainder of their lunch. Some one may wonder why the specimens required so much room. They were taken “roots and all” for they were wanted not dead but alive.

The teacher conceived the plan of having a wild flower exhibit, and building a terrarium, and a miniature model of the Normal School buildings, and grounds, together with the foothills, ravines and forests in the background. The class co-operated enthusiastically in carrying out this suggestion, as indeed, they did all of his suggestions. They made a terrarium about 7 ft. by 4 ft. The class took saw, hammer and nails, and actually built boxes 8 inches deep to cover the bottom of this space. These boxes were filled with soil. In the soil were planted a great variety of plants especially violets, ferns and along the edge some low-growing daisies. One girl planted a dear little pine tree, which grew splendidly, and bore on its graceful branches several “last year’s” birds nests. These boxes were set upon some laboratory tables. 1" x 2" pieces were nailed to the boxes, and extended to the ceiling. Mosquito netting was tacked to these in such a way as to inclose all the space above the boxes, and on the side toward the

two full height sash windows. This made a large, light and airy space for butterflies and other winged insects. The class also had a small glass aquarium. You will now see why on their trips they were always endeavoring to secure live specimens.

But to return from this digression to the deserted mill and the lunch.

After loading everyone with all the specimens they could carry, all followed down a rippling stream past the reservoir of the City Water Supply and many cool and shady nooks. The merry party reached the Normal School Building in time to "plant their plants" and make comfortable their "animals." The only regret was that there were so many perfectly good specimens that were passed by on the way, because of their inability to carry any more.

When the display was finished at the right of the terrarium and butterfly cage you saw for about 12 feet along the wall in miniature the foothills, canyons and Redwood forests, while in the foreground were the Normal School Buildings, athletic field and other local features; and banked among them were great gorgeous bouquets, whole arm loads of rhododendrons, azaleas, daisies, buttercups, huckleberries, salad berry blossoms and many others.

On some other tables were arranged fruit jars with only a few specimen flowers in each: these were labeled for the benefit of those who wished to know the names. One object of the exhibit was to help the students become more familiar with the wild flowers of this region.

Many people visited the room during Commencement, and all were enthusiastic about the exhibit. Not only the students in the Nature Study Class, but all the others as well, secured many ideas and suggestions that will help them in their own schools. This, after all is the chief function of a normal school.

The only fly in our ointment of happiness was that the next day after Commencement when the class came to take some pictures, and show the exhibit to friends, they found that it had been removed. This had been done through a misunderstanding, and it seemed a real tragedy to the Class, for they all wished pictures of their handiwork that had cost so much hard work and yet so many hours of pleasure.

The Black Snake

HARVEY C. WENT.

Camp Director's Association of America

The article in the December issue entitled "Common Snakes" interested me very much. I have never seen a black snake encircle a tree in the way E. B. Whiting mentions. I felt moved to write this through the remark that the black snake was "said not to be poisonous". There are but two poisonous snakes in the northern states, except in the far west, and these are the rattler and the copperhead. Farmers will generally assure you that the flat-headed adder is poisonous, but this is not so.

I made the acquaintance of the black snake in 1912, while running the boy scout camp on the Housatonic River. We always had a number of these creatures in captivity. In the fall I secured a 39 inch black water snake, and he became a member of my household. For a while I kept him in a box, but soon gave him his liberty to roam about the house as he wished. I must confess that many of my wife's friends stopped calling. As time passed, he felt the desire to enter upon his winter's sleep, and would disappear into all sorts of strange places. Once he was found coiled around the springs of an old upholstered chair, and it was certainly some undertaking to get him to let go and allow me to draw him out. Another time he was discovered in the back of the piano, coiled around the wires.

I was worried because he would not eat, and once a week I fed him strips of beef, by forcible means. I split a lead pencil, rounded the end so as not to injure Pete's throat, and poked the meat into his mouth and down his throat, while my left hand held his jaws open. Sometimes the meat was returned. He almost always fought against the process, though once in five or six times he would eat a piece with apparent relish. In the spring of 1913, while visiting the Bronx Zoo, I inquired what to feed the snake. I was advised to try fish. I had never thought of that. From then on, there was no more forcible feeding. I would put Pete in the bath tub in about three inches of water, and throw in some smelt or a small eel. He would regard the offering for a moment, and then seize it. When a snake eats, he holds his food with the jaws of one side of his mouth, while he advances the opposite jaws and

secures a new hold. This method of eating is not pleasing to the beholder at first.

I was nearly always bitten during this process of forcible feeding, but such bites are little more than scratches. Pete did not strike at anyone after the first few days of our acquaintance. Discovering that people did not harm him, he lost his fear. My wife would pick him up, when it became necessary. Upon the request of the Y.W.C.A. I went around to the factories for a while telling stories at noon time, and generally carried Pete. Very often these requests closed with: "please bring the snake."

In the summer of 1913 I went on a long hike to the Catskill Mountains with a group of boys, and we carried Pete on our wagon. When about 20 miles west of Kingston, we lost him. I trust that he is living happily in New York's reservoir.

The snake people are peaceable folk. I write this because I want boys and girls to know the truth about them.

The Oriole's Lullaby.

ANN E. LUCAS.

Oh hush ye, my nestlings; o'er hilltop and meadow
The gray dusk is coming so surely and slow,
And far overhead in the tree tops' soft shadow
The night wind is crooning his lullabies low.

And blown by light breezes your cradle till morning
Quietly, peacefully, drowsily swings.
From his tower in the pine tree the owl sounds his warning,
Then hush ye, my wee ones, 'neath mother's soft wings.

With clear — burning torches aglow till the dawning
The stars o'er the earth will their peaceful watch keep.
The weary world rests till the first gleam of morning,
So ye, too, my birdlings, shall hush ye and sleep.

A Bee's-Eye View

HELEN LEE SHERWOOD.

Cornwell, N. Y.

From the upper porch of my home I often look down over the little flower garden whose stone path leads to my log-cabin honey-house and my bee hives, with a view of soft mountains not far beyond. There could scarcely be found a sweeter scene of flowers and sunny green slopes and fields, of quiet mountains and smiling skies; and then there are bees whirring past me, sometimes in a steady stream. I see them gleam in the sun as they pass and hear their swift wings. Of all their secrets, the one I long most to know is how this scene looks to their curious eyes. What do they see from above the garden and hives? Sometimes I think one of them stupid and blind when she flies right against my face on her way, or when I wave a finger a very few inches from the head of a resting bee and she never moves. The Polistes, those long-legged brown wasps who build their paper combs under the eaves of my cabin, are very quick to greet me when I wave to them from quite a distance. The whole family rise to their full height and face me, standing at attention.

But when the young bees come rushing out for their "play flights" and soar above their hives to learn their directions they must be using some, at least, of their eyes taking in all the landmarks by which they can find their homes again. I have but to move a hive a foot or so, or turn it to in face a different direction, and the home coming bees will fly round and round the exact spot where their doorway used to be. This becomes largely matter of habit, no doubt, for if I move a hive at night when all the bees are in they fail to notice the change in the morning as they go off, and keep coming back to the spot which, in some strange way, they have learned by heart. Surely the flower's effort to entice them with colors are not wasted, for the bees are quick to distinguish colors and some colors are much more pleasing to them than others. Could an artist's eye rejoice more keenly than a bee does in the most enchanting of all flower colors—a pure, clear blue when the sun shines through the petals?

The mystery which is, most likely, forever to be concealed from us is *how* the world looks to the bee. Does she see thousands of flowers standing on their heads with her compound eyes and a few

standing as we see them with her ocelli, or do her compound eyes show her a gay mosaic, or is it quite different from anything of which our minds or imaginations can conceive? Will they never tell me how this scene that I love so to watch appears to them? Could their wings make such happy sounds if its beauty were nothing to them, I wonder?

One morning late in September I looked out and saw nothing of my garden, my hives or my mountains. A white fog blotted out everything but a few wheel-webs of spiders, strung with pearls, and a dripping branch of a pear tree very near by. An hour or so later I was working in the vegetable garden in front of the hives when I heard a strange, high-pitched sighing in the air. There was nothing visible through the fog but the sound continued, slowly circling about. It was an indescribable sound such as one might encounter in a dream; a sound so full of despair, so devoid of hope that no one still living could utter it, I thought. It seemed to be all around me in the air, a continuous, slow mourning in one high tone. I had never heard the meaning of the word "lost" so vividly expressed before. As I watched I discerned a bee, and then others wandering through the endless fog in slow, despairing circles. Some of the hives were dimly visible scarcely ten feet away, but the bees were lost in the white air; and there is nothing that lives quite as hopeless as a "social" insect that finds herself alone. To die for her colony is, apparently, a joy, but to be lost from the colony is despair beyond human experience (if an insect feels the despair she seems to express). However strongly bound by love or other ties we may be to other human beings, it is not impossible in the nature of things, for one of us to live alone on a desert island. But who can conceive of a honey bee that is not a citizen, that has no country to serve? Only the sound of these slow wings wandering in circles through the blinding fog can suggest to us what that seems to mean.

Nature Study In A College Woman's Club

MARTHA MONG.

Erie, Pa.

Last year the College Women's Club of Erie, Pa., found the program of topics prepared for discussion at the monthly meetings especially enjoyable. These topics are embraced under the general caption, "Studies in Nature." During the four years just preceding, the Club had adopted for its program successively, studies in art, opera music, modern drama and Greek drama, and each program proved stimulating and interesting, though the subject of Greek drama seemed to make a less general appeal than the others. For this reason it seemed essential for the prosperity of the Club to choose for 1916-1917 that topic which would appeal to the largest possible number of the membership. So each member was asked to send in to a committee the topic of her choice. A list of all these topics, numbering about twenty-five, was placed in the hands of each member, and at the June meeting, the time appointed for choosing the subject for the work of the ensuing year, each member was asked to select from this list of twenty-five, the ten topics that seemed to her most desirable and to arrange them on a ballot in the order of her choice. As was to be expected the vote did not approximate unanimity, but "Nature Study" had a clear lead.

The program committee then had on hand a problem of no mean proportions, nature study being as wide as the world and the meetings of the club limited to eight. It was decided that a general survey of the field would be best and the following program was produced.

In the presentation of topics, effort is centered on making the work as concrete as possible. For example, a fine study of the history of Lake Erie—prepared by one member for the December meeting was made graphic by means of many maps drawn to show the changes caused by the alternating advance and retreat of the ice, which took place in the lake bed during the glacial period. In this paper the fact was brought out that the gravel pits of Erie being worked now were deposited by these ancient lakes, and that their old beaches have determined the courses of some of our best roads.

So also when toads shall be the topic of the evening it is expected that real toads will be present; and when the life in a brook is under consideration, some squirming, wriggling specimens will be at hand for inspection.

The attendance at the meetings thus far has been fine, the members coming out not alone for the social enjoyment, but also because they are really interested in the topics to be discussed. So to any clubs considering nature study as a possible program of work we should advise a trial, and we feel confident that the effect will prove vivifying even as it has proven with us.

A Years' Program Of The College Woman's Club Of Erie, Pa.

STUDIES IN NATURE

Whether we look or whether we listen
We hear life murmur or see it glisten. *Lowell*

- OCTOBER: TREES
Some Common trees of the Great Lake Region
The Life of a Tree
Famous Tree Lovers and Their Writings
- NOVEMBER: STARS.
Other Suns than Ours
The Stars of the Winter Sky
Maria Mitchell
- DECEMBER: THE GLACIAL PERIOD
The History of Lake Erie
California Big Trees and the Glacial Period
John Muir
- JANUARY: FISHES
The Story of Fishes in the Earth's History
Fishes in the Erie Hatchery
Isaak Walton—The Complete Angler
- FEBRUARY: TOADS AND THEIR RELATIVES
Life and Habits of a Toad
Frogs, Tree Frogs and Salamanders
Schuyler Matthews, — Lover of Toads
- MARCH: WILD FLOWERS
Stories of Common Wild Flowers
Insects and Flowers
Asa Gray
- APRIL: THE BROOK
The Making of a Brook
The Life in a Brook
James Whitcomb Riley
- MAY: FERNS
The Life of a Fern
Ferns Found in the Vicinity of Erie
John Burroughs

The Arbutus

B. O. BUTLER.

Easton, Md.

No native plant has endeared itself more with the people of New York and New England than the Arbutus. This, sweetest of all spring flowers has a place in many hearts. Formerly it grew in many places in New York State, even up close to large cities, but now the patches of this trailing plant, with glossy green leaves and pink faced blossoms, are fewer. The patches are becoming smaller and smaller each year and in many instances have vanished. The trailing spring flower, tinted like a shell, grows only in the less occupied spaces of a region among the lonely pines or amid dry leaves and mosses. *Epigiea repens*, the arbutus, is a member of the heath family, which is restricted to a number of shrubby plants having attractive flowers, blossoming early in the spring. The woody stem of the trailing arbutus, technically classifies it among the shrubs. As a habitat it favors pine woods when there is little competition for space. It has a branching leafy stalk, trailing close to the ground under dry leaves and grasses as the term *repens* signifies.

In color the leaves are green and rusty and in shape oval. The taut, strong midrib gives the margin of these glossy surfaced leaves an undulating character. The leaves occur at regular intervals alternately upon the trailing stem.

People show their love for the flower by tearing up the roots along with the blossoms. Such selfish ignorance is fast reducing the lovely plant to a mere tradition in many populous districts. The lowly plant puts out its blossoms from under fallen leaves just after the snow has melted or while lingering snow drifts are still around. All winter long the buds lie hidden beneath drifts of snow waiting for the first warm breaths of spring to unclothe them and as soon as the melting snow leaves bare the ground on southern slopes the buds begin to open and the arbutus is the charming queen of Spring. In regions where it is fairly abundant it is the one early blossom sought by all, "its delicate beauty charming the eye as its delightful fragrance appeals to the sense of smell". The blossoms are crowded together in bunches of from three to eight at the end of prostrate hairy stems. The

flower is constructed on the numerical plan of five. The tubular corolla varies in color from a pale white to a deeply tinted rose and the five parted pale green calyx is set around with five bracts. A cluster of these blossoms exhales a sweet and spicy fragrance.

The structure of the flower is of decided interest. An examination of various flowers reveals a great variation in the relative conditions and positions of the stamens and pistils. In some we find anthers which abort the pollen, in others only partially so while in others the pollen is well developed. We can find some flowers with stigmas, which are broad and with upper surfaces at right angles to the style, while in others the stigmas are generally to be found in flowers with abortive anthers and vice versa.

The plants are in a transformation stage and are in reality dioecious. Many interesting variations are shown in this species. Altho the plants are related by descent, the variations are inherited just as much as the likenesses. "Like produces like, but not just like".

Cross-pollination is being achieved by variations and reproduction is accomplished with fewer waste parts. This may be accounted for in two ways. First; by the elimination of one sex from each flower, and secondly; by becoming dimorphous by developing perfect organs at different heights in the same flower. That there is a tendency toward this condition is shown by varying lengths of the styles and filaments. In some instances the plants blossom profusely but may set no fruit, depending upon vegetative growth for reproduction. Whenever both sets of reproductive organs are found perfect it may be considered as a reversion to an early type of plant.

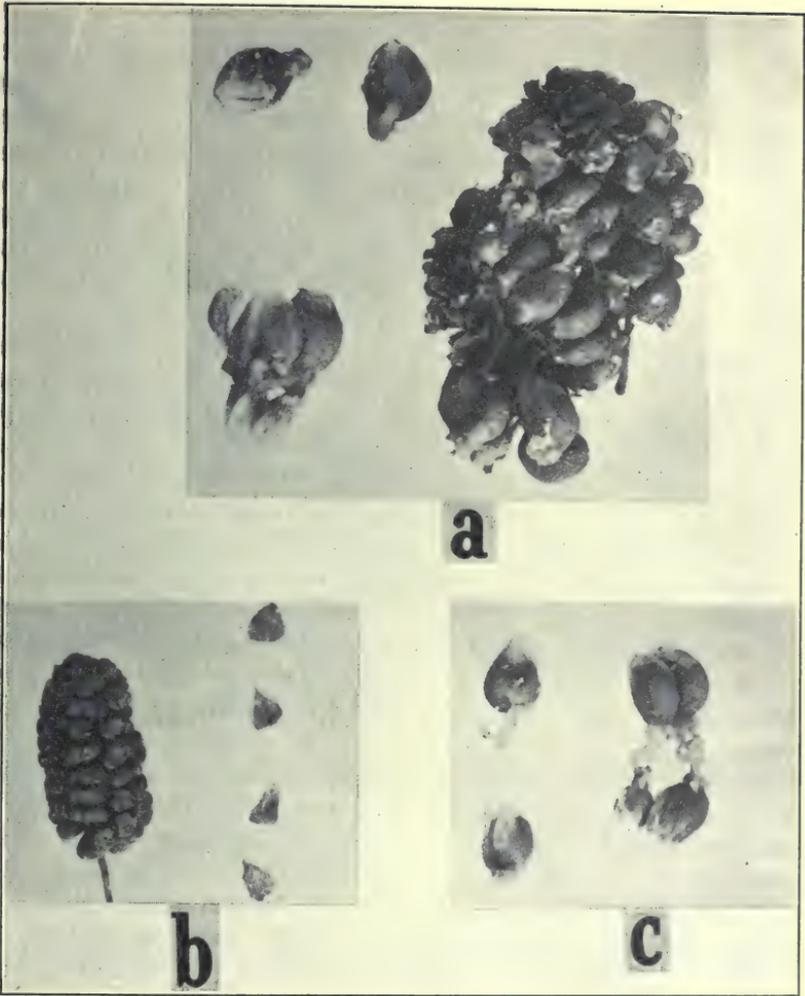
Insects and winds are the agencies by which pollen is carried from anther to stigma. The flower blooms early in the spring when there is little insect life afield, but the nectar of the fragrant blossoms attracts the few there are at the time. The beautiful orange banded bumble bee is the most frequent visitor, since the fertile females live over winter in some sheltered nook, they do not perish like the other occupants of the bee nest, so are on hand to seek the little flowers in early spring. Instead of flitting from flower to flower the bee crawls. Honey-flies, with long tongues, visit the flowers as likewise do little *Sesia* moths. These moths mimic the bumble bee as do others a humming bird. Unlike most moths this one flies during the warmest parts of sunny days to visit the arbutus.

On a Peculiar Disease of Mulberry Fruit

By J. J. TAUBENHAUS.

U. S. Bureau of Plant Industry

Not long ago, a colored preacher nearly caused a riot among his congregation by proclaiming that the world was coming to an end. When questioned by his deacons as to his reason, he stated that the world had become so wicked that even mulberry trees no longer lived a true life, and instead of producing its kind went wrong and produced popcorn. "Popcawn", said the deacons, "dat is impossible". "Come and see", said the preacher. Down they rushed through the lane to a group of mulberry trees which were growing there for nearly twenty years, producing mulberries regularly every year until now. With anxious looks and mouths wide open, the deacons reached for the trees and shouted to the preacher for real proof. "Here dey is", said the preacher, extending his hand and plucking some limbs with the mulberry fruit actually covered with what looked like popcorn seed. "Impossible", said the deacons, "dis looks lak witchcraft". "Ridiculous", said others, "dis is some trick played by dis preacher to scare his flock". Discussions and heated arguments followed and they finally decided to gather a quantity of these "popcorn seed" from the mulberry and bring it to the white folks who lived near by. Sure enough, Mr. Jones, a white neighbor, was greatly surprised to see popcorn-like seed growing on mulberry fruit. At first, he could hardly believe his own eyes, and with his fingers, tried to pick out the seed to make sure that no joke was played on him by the negroes. However, and with a sense of humor, he exclaimed: "Preacher is right, de world am coming to an end, even mulberry trees are going wrong". When the seance was broken up, Mr. Jones told his next door neighbor of the peculiar mulberries which the colored preacher had just brought to his attention. "Why", said the neighbor, "I have a clump of mulberry trees on my own farm which behave exactly like that, and I am puzzled indeed to know what it is." A heated argument began in which Tom Smith, the next-door neighbor, tried to convince Mr. Jones that these "popcorn seed" (Fig. A) on the mulberry were a new creation of nature, a sort of cross between corn, milo, feterita and mulberries. Mr. Jones, however, was not well satisfied with these arguments and induced



A NEW MULBERRY DISEASE

Figure A.

To the right, showing mulberry fruit twice natural size, the grains of which are infected. On top and to the left, two individual infected grains due to the swelling of the causal organism growing within. When these fall to the ground, the outer coat peels off exposing the inner sclerotia. To the left at the bottom, two sclerotia held together by a gelatinous substance.

Figure B.

To the right, four normal individual mulberry grains. To the left, normal mulberry fruit for comparison.

Figure C.

To the right four sclerotia picked out from infected fruit showing the tendril-like threads which hold the roundish spores in a gelatinous mass. To the left, two individual sclerotia showing the same.

his neighbor to send a quantity of the material to the Agricultural Experiment Station at College Station. The specimens were referred to the Station Pathologist who gave them a most careful examination. It was found that similar specimens were received at the office during the last three years with statements that whenever such "popcorn" grains were found on the mulberry trees, there was no normal mulberry fruit, in many instances greatly disappointing the kids. In one instance it was added that the chickens greatly relished this new "manna".

Careful study by the Division of Plant Pathology of the Texas Agricultural Experiment Station has conclusively shown that this peculiar growth resembling popcorn seed on mulberry fruit is nothing else than a disease of the fruit which results in the swelling of the individual grains, (Figs. A. and B) the swellings variously reaching the size and shape of popcorn seed or feterita and sometimes milo grains. While these studies were carried on by the Plant Pathologist of the Texas Agricultural Experiment Station, Dr. Lewis, Botanist of the University of Texas, independently came across this same trouble on mulberry trees growing in the vicinity of Austin, Dr. Lewis and the writer came to the same conclusion that this is a disease caused by a fungus.

While the whole history of this new disease has not been entirely worked out, that much is certain. The swelling of the mulberry grains is caused by a fungus which seems to gain an entrance in the fruit, perhaps during pollination or as the mulberry fruit is still young. The invading fungus keeps pace with the growth of the mulberry fruit. If one looks very closely, he will find that early in the season, around April and May, these swellings may actually become quite perceptible. As the fruit reaches maturity, the swellings of the individual grains seem to have reached their maximum size. In examining with a hand lens, some of these swelled-up grains, one will find that at the tip end of each grain there protrudes a stout, gelatinous, whitish gray thread. (Fig. C) When this is dropped in water, the gelatinous thread dissolves and the water becomes decidedly milky in appearance. In examining this under the microscope, it will be found that the milky appearance of the water was due to the presence of large quantities of colorless, roundish spores, which

are held glued together in a gelatinous substance probably secreted by the causal fungus itself.

Immediately upon the maturity of the fruit, the so-called "popcorn seed" from the mulberry fruit drop to the ground. After a few days, or possibly weeks, the outer coat of these seed falls off, leaving a black pebble-like structure the size of a popcorn seed or smaller. These black bodies, known as sclerotia, consist of a mass of fungus threads. These sclerotia when dropping to the ground, lie there until the following season.

The thing which has not as yet been worked out about this disease is the significance of the minute spores previously described and the purpose of the sclerotia. In other words, how do new infections take place? Is it through the wintered-over sclerotia or through the minute spores formed on the deformed mulberry seed? When these two questions are answered, it is reasonable to suppose that the identity of the fungus and the history of the disease will be worked out, and methods of control determined.

If one examines trees which are affected with the "popcorn" disease, he will notice in many cases a die-back of the twigs. Whether this die-back is in any way related to the mulberry fruit disease is still unknown.

Autumn.

ISRAEL KNOX.

Age. 14

The radiant and golden stars depart,
 The velvet sky and silver moon retreat
 Before the heavy, threat'ning clouds that greet
 The gloom, and banish ecstasy of heart.

The rose, sweet, fragrant not long since in bloom,
 And arbutus whose scent's been created
 To match the clear, pale-hued pearl, have faded,
 And give no more their heavenly perfume.

A Note on the Purple Cone Flower, (*Brauneria Purpurea* (D. C.) Britton).

J. ANDREW DRUSHEL,

Harris Teachers College, St. Louis, Missouri.

The purple cone flower is found from Pennsylvania southward to Georgia and Alabama; westward and southwestward to Michigan, Iowa, Missouri, Arkansas, and Louisiana. In the region of St. Louis, it usually occurs on limestone slopes, in open oak woods, either as single plants or in small colonies of scattered individuals. The blooming period extends from middle July to early October. See cut for a fine example of a volunteer seedling.

The writer of this note, in the late autumn of 1910, removed two strong plants of the above species from the woods near Al-lenton, Missouri, with the view of getting a showy perennial ornamental plant which would endure the unfavorable summer conditions usually found in St. Louis. The plants were placed in a rich shaded corner of the college building. After thriving here for several years without producing fertile seed and with only a small increase of new plants from the roots of the parents, they were removed to the southeast corner of the college building, a dry, hot, and sunny spot. In the course of a few years these few plants became a closely crowded olump as shown in the picture. This clump was one of the show places for the students of the 1916 summer school.

The first fertile seed was formed in 1917. From this seed many young plants were grown both outdoors under natural conditions, and indoors under greenhouse conditions. These seedlings were planted in mass, also as individuals, in exposed sunny spots with highly pleasing results. The writer in the spring of 1920 set two dozen young plants in a corner on the south side of his residence situated on the north side of the street. These plants during the dry hot weather of July and early August produced a mass of blossoms, the admiration of the daily passers-by.

In view of the hardiness of the purple cone flower, its showy blossoms, its long period of blooming, and its relative freedom from enemies, it is suggested that those readers of this note who

live within the natural range of the plant become acquainted with it to the extent of bringing it from the woods to their home ground. By doing this, they will add another all-around satisfactory ornamental plant to their collection and may prolong indefinitely the life of one of our most beautiful vanishing species. It is also urged that other promising perennial native plants be given an opportunity to show their right to a permanent place somewhere about the home.



THE PURPLE CONE FLOWER

Hanging the Pictures on Memory's Wall

REV. MANLEY TOWNSEND

The simplest things can often furnish us with the richest pleasures. To find the uncommon in the common affords extraordinary satisfaction. Such is the power of nature study. It enriches life. It provides a perpetual fount of unalloyed delight. No one who has entered into the treasures of the natural world can ever be dull or filled with *ennui*. Even a "desert" isle has no terrors for him. Wherever he turns he finds objects of interest, old and new friends to greet him. Here it is a fern, there a flower, and again a bird. No person can be called really educated who is ignorant of the wonderful world in which he lives. No matter how many Greek or Latin roots he may know, or how profoundly versed in mathematics or literature he may be, if he knows not something of the stars in the heavens above his head and the forms of animal and vegetable life on the earth beneath his feet, he is ignorant. His education has been seriously neglected. He has missed a very important realm of knowledge, a realm no human being can afford to miss. Of course, education is entirely relative. One may be highly educated in one thing and densely ignorant in another, like the man who owned the first volume of the encyclopedia and knew a great deal about astronomy, alchemy, architecture and Australia; but who knew nothing of physics, chemistry, mechanics, zebras or New Zealand.

The day is surely coming when every child will be taught in the schools to know and love the wonder world in which he has been placed. The teachers will be trained for this purpose in our normal schools. A few minutes, rightly used each day, can open the child's eyes to a new world and introduce him to an inexhaustible treasure house of perpetual delight. Thereafter, life will take on new and added meaning. We are continually meeting people to whom life grows gray, dull, insipid in middle life. It is because they have so few resources. To one who has entered into a sympathetic understanding of nature, life never becomes gray or insipid or dull. Everywhere he turns he sees friends that he admires and loves, friends he has been acquiring through the years. He is rich in the best of all treasure, the priceless wealth of the mind and soul. We do indeed "live in deeds, not years; in thoughts, not breaths; in feelings, not in figures on a dial."

The little colored boy was perfectly right when he replied to the kind lady who asked his age. "If you goes by what mudder says, I'se six; but if you goes by de fun I'se had, I'se most a hun'-red".

This whole marvellous realm of nature, so prolific of enduring joy, is a closed book to the average person, who goes through the world with eyes closed and ears stopped to its appeal. The appreciation of nature should be begun in childhood. Then is the golden time, when the young, unfolding mind is most sensitive to its environment. Then, if wisely guided, enduring pictures will be hung upon memory's wall,—pictures that will never fade.

What the Nature Study Society is doing in Webster Groves, Mo.

ANNE A. JONES SEC'Y.

The Nature Study Society of Webster Groves was organized in April of 1920 and has at present one hundred and twenty active and one hundred and fourteen junior members. Since its organization it has been holding regular meetings on the first Friday evening each month (with the exception of the summer months) and has had at most of these meetings, speakers on various topics pertaining to some branch of nature study, and all of them authorities on the subjects in hand. Some of the talks were illustrated with slides, others with moving pictures, and others again, such as rock formations, wild flowers, etc. with specimens.

Many field trips have been taken, sometimes having the speaker of the Friday evening meeting lead a field trip on the following Saturday afternoon in order to carry along or illustrate his talk of the previous evening. This sometimes brings the message home more forcibly than any other way.

The junior members prepared a programme for one of the evening meetings; they were drilled by several of the active members, the children appearing in costume and acting out their parts with much credit to themselves and their leaders.

The active membership is divided into four groups for the study of birds, astronomy, trees, and wild flowers.

The bird group had, during the season, seven monthly meetings at the homes of different members. Audubon charts were used to get acquainted with the birds, their markings and comparative sizes.

The chairman assigned different members to prepare a paper or a talk on some particular bird or class of birds, gradually getting around to all the members and most of the birds to be seen in Webster Groves.

Early morning bird walks were frequently called, to see, hear and identify birds on the wing, and also to find the location of the best bird haunts. Other walks were in the afternoon, one extending into the night, to hear the whippoorwill and one, a very pleasant out-door "experience meeting" with picnic lunch, was held on the beautiful lawn of one of our members.

Sixty-six varieties of birds were identified during the season. At the present time four members of the bird group are operating government bird traps, and banding (through permission of the Bureau of Biological Survey of the Department of Agriculture) all such birds as come into the traps, recording and forwarding the results to the Biological Survey. In the few weeks that they have been operating, about thirty birds have been banded and released and a large number of English Sparrows placed where they can do no more harm.

The astronomy group has been meeting once a month; during the summer they were very informal and held in the pleasant back yard of one of our members, and through a three-inch Telescope we followed the movements of the planets, the moon, star clusters and nebulae, and more than one, especially of the younger members, who had never seen the wonderful workings of nature through a telescope, experienced the "thrill that comes once in a life time" upon seeing Jupiter and his moons, illustrate in miniature, the movements of the solar system.

At most of the meetings of the tree group during the winter, bare branches from trees were brought in, and the tree key for winter used in tracing them down and identifying them.

The flower group did most of its work in field trips. We also have junior groups for the study of birds, trees, wild flowers, insects and reptiles. They study out of doors, taking walks, under the guidance of competent active members, who give one day a week during the school year to this work.

Plans for this fall and winter are under way for providing and caring for feeding stations for the birds, the work to be carried on largely by the junior members. The society, in the face of many difficulties is at last the owner of a Moving Picture Machine to be used by the society, by the schools, or by any other organization for the displaying of educational films.

And now just a few words about a very active body of workers known as the "City Beautiful Committee" who do not confine themselves entirely to beautifying the city but very largely consider the health of the community. They are making a strong plea for the beautifying of unsightly places, such as all cities both large and small are burdened with, and to see that all trees are properly pruned and cared for and replaced when necessary.

They are actively engaged in civic work, organized the "clean up campaign" and worked hard for the proper care of stagnant pools and disposal of "tin cans" because both are not only unsightly, but a menace to health, being the breeding places of the malaria carrying mosquito. This is slow work and sometimes very discouraging but they believe that by preaching it wherever there is an ear to hear, it will eventually accomplish much good.

Mrs. Gray Grasshopper Goes House Hunting

A. J. STACKPOLE.

Berkeley, California

A Story for Primary Grades

The hillside, this morning, is flooded with bird and insect life. Among the busiest of the insect ladies, is Mrs. Gray Grasshopper with the red hind-legs, who is starting upon a househunting expedition.

From a tuft of grass—nearly the color of her wing shields—she jumps upon a rise in the hillside, and, with those big, compound eyes in her forehead, as well as little eyes in the middle of her face, looks about her for a suitable store room for her eggs.

Just now Mrs. Gray Grasshopper flies and jumps more clumsily than her maiden sisters and her slender brothers; for she is weighted with the responsibility of carrying and storing a half-thousand tiny, yellow, larvae-eggs.

The odd little ears at the base of Mrs. Grasshopper's wings are deafened this morning to the shrill voices which rent the very air about her. Her hundreds of young brothers are scraping their drums with the queer files fastened to their hind legs. Somewhere in this throng of musicians is Mrs. Gray Grasshopper's husband; but his drum sounds very faint, for his heart is sad. He is trying to forget his wife who, so soon after their wedding feast, spread out her wings and left him.

Thinking not of her lonely husband, but only of finding a firm, dried reed sufficiently long and thick to cradle her young, Mrs. Gray Grasshopper hurries on. Not for the briefest second will she stop even to listen to the booming of the Bee-soldiers' guns, as they fly from blossom to blossom. Nor, will she listen to the rasping scale coming from Billy Quail's violin; neither will she heed the doleful air Father Meadowlark scrapes from his cello.

What cares Mrs. Gray Grasshopper for this lively music? What cares she for anything but a place to store her little ones during the long months of Fall and Winter. But she should stop now, for only a moment, as the Cricket Brothers in the bushes close by, are ringing their tiny, silver bells. And Mrs. Gray Grasshopper knows they are playing some one's funeral anthem.

"I wonder who it is?" this gray-brown lady asks of a very old man grasshopper whom she meets near a tuft of yellow grass.

"Jerry Bluejay is dead," the old man grasshopper replies, "a Human Boy with a gun shot him this morning. You see I am invalid—I have but five legs and my wings are gone."

"I have no time to talk with you," Mrs. Gray Grasshopper snaps, striking the old fellow with her long antennae, or whiskers, "and, besides, I think you are joking about your not having any wings. I see something light resting upon your shoulder."

"Oh, my dear, watch me. I cannot fly even one foot. Bob White snipped off my real wings two days ago, and what you see upon my shoulder is only my wing shields, of course I cannot fly with them. May I come along with you?"

"Nonsense!" "I cannot bother with you."

On and on she jumps until she reaches a small hazel bush standing upon a barren knoll.

"Oh, this is splendid," says she. "I'll stop here for a moment's rest and a bite to eat. Also, I must keep my big eyes open

for that Bob White who snipped off my husband's leg and wings."

With her six padded feet Mrs. Gray Grasshopper climbs upon the first branch and proceeds to chew the edge of a tender leaf. Then she decides that a sip of tea would be just the thing for her nerves; so she sets to work with her strong mandibles, digging and scraping the bark until the tiniest drop of sap appears. As the sap flows, she washes her face with her long whiskers and dries it with her front feet. And now she is ready to sip her tea. But just as she is about to take a long draught, something dreadful happens. A sudden, creepy, chilly sensation causes her to draw up those red hind legs, spread out her wings and fly as far from the hazel bush as she possibly can. What has happened? Is she afraid to investigate the cause of her sudden fright?

Mrs. Gray Grasshopper does not know that a score of thirsty black ants from their nest at the foot of the hazel bush smelled the sap the very instant it began to flow, and hustled themselves up, up the limb, ready to drive her away by tickling her hind legs with their wiry antennae, and reap for themselves the harvest of her toil.

Will Mrs. Gray Grasshopper never learn that the ant family are ever upon her track, waiting to steal water from her fountain, and, the moment her heart stops beating, make a luncheon of her juicy hind legs? Also, how is she going to learn about her worst enemy, Mrs. Gnat?

Like most parasitical people, Mrs. Gnat is a great talker; it is she who buzzes about the ears of Humans when they sleep out of doors, keeping them awake and causing them to say and think wicked things about her. It is Mrs. Gnat who wears a dainty, transparent gown and is quite invisible in the sunshine. But the noise she makes! It is a great wonder the little black ants who are deaf cannot hear her buzzing!

Now, instead of building a nest of her own as any respectable insect should, Mrs. Gnat follows Mrs. Gray Grasshopper about from the time she leaves her husband, waiting to lay a ruinous egg in each compartment which Mrs. Grasshopper fashions for her own little ones.

Such ladies as noisy Mrs. Gnat may be essential to this world, for, were she not to destroy so many of Mrs. Gray Grasshopper's eggs, there would be so many little Grasshoppers to feed, that

there might not be enough fruit and vegetables for Human Babies to live upon.

But what cares Mrs. Grasshopper for Human Babies? Her only concern is to find a store room where her own little ones shall be safe from the snows and blasts of winter.

At last she finds what pleases her. For several moments she investigates a dead reed about one inch thick and a little more than a foot tall. With her strong mandibles she pricks the bark to learn whether it is sufficiently strong and thick to keep out other prying insects, and the pith inside the bark warm and soft enough to shelter her babies until springtime.

Having climbed up the reed an inch from the ground, Mrs. Gray Grasshopper proceeds to dig with her horny tail a small, funnel-shaped hole in which she deposits twelve or fourteen little eggs. Then covering the hole with a kind of gluey substance, she measures another space with her mandibles and moves on. But into the first little nest whose gluey door the sun has not yet hardened, comes gay Mrs. Gant ready to lay her own eggs.

Unconscious of what is taking place behind her, Mrs. Gray Grasshopper patiently climbs on, fashioning and filling dozens of little cradles which are placed one above the other, in a kind of spiral line.

Mr. Faber, the great French Naturalist, tells us that, during her egg-laying process, Mrs. Gray Grasshopper always keeps her back to the sun, therefore she moves with the earth as we move *from* the sun! Thus, the mystery of the spiral line running from base to top of the Grasshopper's lodging house, is solved!

Now that dusky shadows are covering the yellow hillside, we wonder what is to become of Mrs. Gray Grasshopper. Where is she to spend the night? She answers the question by climbing to the very tip top of the apartment house and drawing her wings and legs very close to her weary body. And, with the tiny eyes in the center of her head and also with the other pair of great, compound eyes in her forehead, she stares vacantly at the milky shadows a new moon casts upon the land. The odd little ears at the base of her wings are open to the notes of tired musicians.

Quite distinctly now, Mrs. Gray Grasshopper hears the tolling of tiny, far-off silver bells. Can it be that a Human Boy has slain another Jerry Bluejay?

No Mrs. Gray Grasshopper, the Cricket Brothers dressed in their shiny mourning-costumes, are playing some one else's funeral anthem.

Play a little softer, will you, boys? The ant family may feel the vibration of your music and reach the dead reed before a certain little heart stops beating. Already they are smacking their lips in anticipation of juicy red legs for their midnight banquet.

Trailing Arbutus

AGNES ATWATER

Thought of the summer in winter's heart lying,
Tenderly nestled when snowflakes are flying,
Flushed with the light of a cold northern sky,
Delicate, fragrant, lovely, and shy,
Wax-like and rose-white, wee stars of perfume,
Sweet heart of springtime breaking in bloom!

Low in the dead leaves and pine-needles hiding,
The rust of last year on its green leaves abiding,
Close to the earth its slender vine clinging,
In each fibre feeling the vague impulse springing,
Filled with earth's sweetness, thrilled with earth's power,
Spring heart of ecstasy burst into flower!

Thoreau's Observations on Fogs, Clouds and Rain

FLORENCE WHITE,

Yorktown, N. Y.

Thoreau, a lover of nature, and a keen observer in all that pertains to it, made most of his observations from the standpoint of a camper. He had that gift, so rare in many of us, that of finding pleasure and something interesting in ordinary things which most of us call misfortunes. It is for this reason I have chosen to gather his writings on fogs, clouds and rain and put them in to unified form.

In speaking of joys he tells of a camping trip and quotes Belknap the historian of Mass. as saying " 'In the neighborhood of fresh rivers and ponds a whitish fog in the morning lying over the water is a sure indication of fair weather for that day, and when no fog is seen, rain is expected before night'. That which seemed to us to invest the world was only a narrow and shallow wreath of vapor stretched over the channel of the Merrimack——The fog, as it required more skill in steering, enhanced the interest of our early voyage and made the river seem indefinitely broad. A slight mist through which objects are faintly visible, has the effect of expanding even ordinary streams by a singular mirage into arms of the sea or inland lakes. In the present instance it was even fragrant and invigorating and we enjoyed it as a sort of earlier sunshine, or dew and embryo light."

Again he quotes but does not give the source,

“Low-anchored cloud,
Newfoundland air,
Fountain head, and source of rivers,
Dew cloth, dream drapery,
And napkin spread by fogs;
Drifting meadow of the air,
Where bloom the daisied banks and violets,
And in whose fenny labyrinth
The bittern booms and heron wades;
Spirit of lakes, and seas and rivers,
Bear only perfumes and the scent
Of healing herbs to just man's fields!”

“In the mountainous parts of the country, the ascent of vapors, and their formation into clouds is a curious entertaining object.

The vapors are seen rising in small volumes like smoke from many chimneys. When risen to a certain height, they spread, meet, condense and are attracted to the mountains where they either distil in gentle dews and replenish the springs or descend in showers, accompanied with thunder." In still another place he speaks of the fog in much the same way.

"Fogs and clouds which conceal the overshadowing mountains lend the breadth of the plains to the mountain vales. Even a small featured country acquires some grandeur in stormy weather when clouds are seen drifting between the beholder and the neighboring hills. The most stupendous scenery ceases to be sublime when it becomes distinct, or in other words limited and the imagination is no longer encouraged to exaggerate it."

How many people find interest in plain ordinary clouds? Here is what Thoreau says. "At length I was entered within the skirts of the cloud which seemed forever drifting over the summit, and yet would never be gone, but was generated out of that pure air as fast as it flowed away; and when a quarter of a mile farther I reached the summit of the ridge--I was deep within the hostile ranks of clouds and all objects were obscured by them. Now the wind would blow me out a yard of clear sunlight where I stood, then a gray dawning light was all it could accomplish, the cloud line ever rising and falling with the wind's intensity.—It was like sitting in a chimney and waiting for the smoke to blow away. It was in fact a cloud factory—these were the cloud works and the wind turned them off done from the cool bare rocks."

Few people love the rain except just after a drought but read Thoreau and you will get a different idea of it. He says, "Some of my pleasantest hours were during the long rain storms in spring or fall, which confined me to the house for the afternoon as well as the morning, soothed by their ceaseless roar and pelting; when an early twilight ushered in a long evening in which many thoughts had time to take root and unfold themselves."

Again on a camping trip he says, "The best nights were those when it rained for then we were not troubled with mosquitoes. Some who have leaky roofs in towns may have been kept awake but we were soon lulled to sleep by a steady soaking rain."

Then he tells of a walk in the rain, "The rain is good for thought. It is especially agreeable to me as I enter the woods and hear the soothing dripping on the leaves. It domiciliates me in nature. The woods are more like a house for the rain; the few slight noises sound more hollow in them, the birds hop nearer; the very trees seem still and pensive. The clouds are but a higher roof. The

clouds and rain confine me to near objects, the surface of the earth and trees."

Speaking of an April rain, he says,

"Then the rain comes thicker and faster than before, thawing the remaining frost in the ground and you turn your back to it full of serene contented thought—more at home for being abroad, more comfortable for being wet, sinking at each step deep into the thawing earth, and gladly breaking thru the gray rotting ice." —"One would say that frost in the ground—bred rain, if, indeed, its evaporations do not create it. Expect rain after rain till the frost is completely out. The melted frost rising in the form of vapor, returns perhaps, in rain to liberate its kind still imprisoned in the earth.

In speaking of rain on a river, I think he gives a splendid description. "Rain again and we take shelter under a bridge and again under a pine tree and again under our boat. It is worth while to sit or lie thru a shower thus under a bridge or boat, because the rain is a much more interesting and remarkable phenomenon under these circumstances. The surface of the stream betrays every drop from the first to the last, and all the variations of the storm, so much more expressive is the water than the comparatively brutish face of earth. We no doubt often walk between drops of rain falling thinly, without knowing it, tho if on water we should have been advertised of it. At last the whole surface is nicked with rebounding drops as if the surface rose in little cones to accompany or meet the drops, till it looks like the back of some spiny fruit or animal, and yet the different colored currents, light and dark are seen thru it all; and then, when it clears up, how gradually the surface of the water becomes more placid and bright, the dimples growing fewer and finer till the prolonged reflection of trees are seen in it, and the water is lit up with a joy which is in sympathy with our own, while earth is comparatively dead,"—

Another quotation I like is this.

"It rains so easy—has a genius for it and infinite capacity for it. Many showers will not exhaust the moisture of April."

This of course is not all that Thoreau says on these subjects but I have selected those I thought would best illustrate my point, that Thoreau could find beauty and much interest in the duller things of nature. There is much the he has to say about clouds and their colors but I chose to confine myself to the duller forms and I hope this mere gathering together of a great nature lover's thoughts on such subjects may help someone find something of interest in life's duller side.



STAR STUDY FOR LATE OCTOBER AND EARLY NOVEMBER

October and November are ideal months for star study. The nights are not too cold and darkness falls early enough so that children are able to make their observations before bedtime.

The Big Dipper is below the Pole Star, with its handle toward the West, very near the Northern Horizon; the Little Dipper also hangs down from the Pole Star in the Northwest, and the tail of the Dragon may be seen between the two Dippers but his head with the two bright eyes may be seen just north of Vega; the Crown has almost dropped out of sight in the Northwest. The Northern Cross has its foot to the westward but brilliant Deneb at its head is nearly overhead. Vega with her train of five stars illumines the western sky and south of her Altair in the Eagle vies with her in brightness. Job's Coffin is higher up and east of the Eagle. Cassiopeia is climbing up the East and on November 16th is nearly overhead. The three stars curved below the Northern stars in Cassiopeia which mark Perseus may be easily seen: Andromeda and Pegasus are well up in the eastern sky. Carry a straight line through the Big Dipper to the Pole Star and continue it on to the southern part of the sky and it will come very near to a bright star shining alone,—this star is Fomalhaut. It is a sun that gives twenty times as much light as our sun and it takes light 21 years to reach us from it. In the East may be seen the misty little swarm of stars, the Pleiades and below them the V-shaped Hyades with red Aldebaran at the end of the lower arm of the V.

The planets are so placed that Venus, Mars, Jupiter and Saturn are all morning stars.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN
ELEMENTARY SCHOOLS

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Editorial

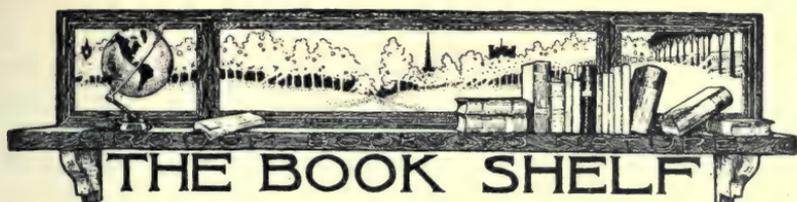
Nature Not a Member of a Union

To read about strikes in the newspapers and to be in one actively or passively are two quite different matters. We do not know how it seems to be in a strike actively for during a long career we have never struck for anything whatever. If the powers above us seemed to treat us unjustly we just plodded on and consoled ourselves with the thought that the hepaticas were sure to bloom in April and Iris in June. However, during the past month we have been suffering passively from the printers' strike and we wish to announce emphatically that the effect is demoralizing.

The complete manuscript for the May Number of the NATURE STUDY REVIEW was in the hands of the printer in April; what happened to it the unfortunate subscribers of the REVIEW know. The strike is still on and it is with sodden discouragement that we get a number of the NATURE STUDY REVIEW ready to print; meanwhile an earthquake could not increase our feeling of helplessness.

There is probably no factor more important as a moral force than regularity in business routine. If a man of great importance in the business world and of absolute integrity were suddenly placed where he could have no regular duties or regularity of eating and sleeping, he would surely become frivolous, crooked, or insane. Therefore, no one need be surprised to learn that the editor of this periodical has turned to aviation or become a football fan.

This result may only be avoided through the contemplation of Nature. October has brought the vivid scarlet to the sumachs. The old shag-bark is glowing yellow and the white ash has spread a purple veil over her golden foliage. The tall monkshood racemes stand intensely blue in the garden border. All these things are reassuring. Mayhap the time will come again when our little magazine which tries to represent Nature's ways faithfully may again appear with the months to which it purports to belong.



Early Annals of Ornithology. H. F. and G. Witherby, 326 High Holborn, London, 1921, sm. 8vo, 240 pp.; many illustrations.

When Mr. J. H. Gurney, of Norwich, England, writes any sort of book about birds, our ornithologists, of every class, know full well that they have a treat coming to them when the volume is in hand to read. We are all familiar with Gurney's recent and most beautiful work on "*The Gannet, a bird with a History*;" and now, following close upon its issue, we have his "*Early Annals of Ornithology*."

As our author points out in his Preface, "The idea with which this little volume originated was to collect all the ancient passages about birds, of any special interest, but more particularly those which concerned British Birds, and to string them together in order of date."

This task has been achieved in the most satisfactory and interesting way possible, the first chapter of the book being devoted to "Pre-historic Birds"; and then, from Chapters II. to XIV. inclusive, we have each, with very few exceptions, devoted to the literature of the century with which it has to do. As to the exceptions, we have Chapters VIII. — X. inclusive dealing with the sixteenth century, the matter being divided into three parts, while Chapter XI. treats of "The Crane, Bustard, Spoonbill, and Bittern." There are 36 illustrations, consisting of old cuts of birds; portraits of early writers and others interested in birds during those early times; maps; facsimiles of letters; birdrocks, and some few others.

The entire treatment of the subject is made most interesting and is of great value; and from Preface to include the excellent Index, every page of the volume bears the trademark of orderly presentation of matter; of a thorough knowledge of the subject, together with the employment of the choicest

and most refined language wherewith the facts recorded are communicated to those whose privilege it will be to read this elegant little work.

DR. R. W. SHUFELDT.

Lightfoot the Deer, THORNTON W. BURGESS. 205 pages, 8 full-page illustrations in color by Harrison Cady.

Thornton Burgess is today the literary Pied Piper, followed wherever he goes by thousands upon thousands of delighted children. It is one of the great experiences of life to be present at a lecture given by Mr. Burgess to a house filled and overflowing with his happy, wriggling, enthusiastic little admirers. We had this experience in Ithaca recently and the memory of it will be a joy for the rest of life. The story of Lightfoot the Deer is given with the underlying thought of the protection afforded by law to the deer which have become again the inhabitants of our "green forests". Sammy Jay and Bobby Coon and Reddy Fox and Paddy Beaver and other bed-time friends of the children also have their parts in this story of Lightfoot and it forms another attractive volume for the happy youngsters who have started a Burgess library.

How to Have Bird Neighbors. S. LOUISE PATTESON. 31 pages 102 illustrations from photographs, D. C. Heath Co.

This is a chatty and beguiling little volume that cannot help but have great influence for good on the boy or girl who reads it. Each chapter is a story of the author's own experience with birds and from these experiences much may be learned of methods for enticing birds and making them comfortable upon one's premises. The following account of how the martins took possession of their house and ousted the sparrows which were squatters in it affords a good example of the style of the writer:-
"By this time the English sparrows had begun nesting in some of the rooms.

The martins perched on the wires in front of the house and made a saucy chatter, calling the sparrows all sorts of names, I suppose. The sparrows jabbered back at them. In about an hour the martins left. Early the next morning another flock

of martins came. Some perched on the wires, some on the roof, and some on the porches of the martin house. Others flew around in big circles. All were twittering and calling in their happiest manner.

I had driven the sparrows away the night before, and this is how I did it: I put a few big nails into a tin can, then closed the can and tied it to a big stick. With this stick I banged the can against the martin house pole again and again. It frightened the sleeping sparrows. By the moonlight I could see six come out and fly away; but I think there were more.

Two pairs of sparrows came back in the morning. They had made their nests side by side in the third story. Long grasses were hanging out from the entrances. Perhaps the martins were sorry for them; anyway, it looked as if they were willing to play fair. They did not chase them off any more; and the sparrows being now so few, no longer molested the martins.

The martins now began to clean house. There were wads of chicken feathers and some broken eggs among the rubbish which they threw out. This was soon replaced by straws and sticks which they brought for their own nesting. I could only count twelve pairs of martins, so that there was plenty of room for them and the martins too. I suppose one reason why the sparrows were unwelcome is because they are such untidy house-keepers as to render close neighboring with them insanitary."

The following subjects are treated in the twelve chapters: My first bird neighbors, New adventures in birdland, Real troubles in birdland, The bluebird's bungalow, The wren's apartment house, The boy, The chimney swifts, Birds not of a feather, The martins' aircastle, More about the boy, The cardinals, My bird family.

The many pictures made from photographs by the author are very attractive and truly illustrative and add very much to the interest of the little volume.

Animal Ingenuity of Today;- C. A. EALAND, M. A. 312 pages, 26 full page illustrations, J. B. Lippincot Co.

It is small wonder that after four years of war men should find relief in reading and writing about the wonderful doings

of the lower animals; it is probably because of this that we have so many interesting books today which discuss the wisdom and the clever craftsmanship of our little brothers of the fields. This book on animal ingenuity is an excellent example. It begins with a discussion of the ways of the social bees and wasps and then of the solitary bees and wasps and of ants and white ants. Nests and eggs of birds, their plumage and courtship are illustrated and discussed. There are chapters on mimicry, queer friendships, migration, animal engineers, sappers and miners, seasonal changes, reptiles, frogs and toads, crabs and lobsters, spiders, shellbearers, corals, worms, and parasites and predators. The following account of the *Ornithorynchus* will give a fair idea of the author's clear method of presenting his facts: "Such a miner is the duckbill of Australia, most anomalous of animals from that land of animal anomalies. The duckbill is possessed of a bill like a duck, its name tells us as much, and feet strangely resembling that bird's; moreover it lays eggs; yet withal it is a mammal. As might be guessed from an inspection of its strongly webbed feet, the duckbill is an expert swimmer and as such makes its burrows in the banks of some favored stream. To every duckbill burrow there are two entrances, one above and one below the water level. The former is always situated beneath a clump of vegetation, so that detection is well nigh impossible. From below the water the tunnel ascends at a fairly sharp angle, but it winds hither and thither through the soil of the river bank and in all is many feet in length. It terminates in a broad oval chamber, which is well stocked with dried grasses. The young duckbills remain in their underground nursery till they are more than half grown, and it is lucky for them that their parents will tend them so long, for they are helpless little creatures."

The full page illustrations are from drawings and are graphic and in many instances dramatic. The author has brought together in this volume many interesting accounts of a large number of animals, and it will give enjoyment to many readers.

Creative Chemistry, EDWIN E. SLOSSON, M. S. PH. D. 311 pages, 37 pages full page illustrations, The Century Company.

One now and then finds a work of fiction so fascinating that he will not lay it down till he has read the last page. He will find the chapters of *Creative Chemistry* as enthralling as any novel, and to him who reads it the common things which he uses every day, food, clothing, colors, perfumes, metals, will have become things of magic. There is a chapter on "Fighting with Fumes" as well as one on "Feeding the Soil"; one on "Metals Old and New" and one on the "Rival Sugars." In all there are fourteen chapters, each chapter a revelation, and so simply and clearly written that previous knowledge of science is not necessary to understand it. Not the least interesting is the first chapter on the "Three Periods of Progress," but many a true scientist will not agree with the statement that "Nature is our treacherous and unsleeping foe, ever to be feared and watched and circumvented", though all who know her at first hand will admit that we should and must learn from Nature and, indeed, wrestle with her, for it is by discovering and using her laws that man has become the wielder of power, instead of its victim. The introduction reveals the serious purpose of the book and there is a list of Reading References for each chapter that adds greatly to its value. If each of the "Century Books of Useful Science" of which series this is the first, is written by as successful an interpreter as Mr. Slosson, those who read "*Creative Chemistry*" will not fail to read them all.

M. E.

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THE NATURE-STUDY REVIEW

VOL. 17

NOVEMBER

No. 8

Why Illinois Prairie Flowers Have Disappeared

DR. W. S. MOFFATT,
Wheaton, Ill.

Chief among the causes of disappearance of Illinois wild flowers are:

1. Breaking up of the prairies and tilling of the soil.
2. The destruction of timber.
3. The drainage of lowlands.

Among causes less potent may be mentioned the close grazing of woodlands, particularly by sheep; the mowing of country roads and railroad rights of way for the purpose of destroying weeds; the mowing of low prairie lands late in autumn and the establishment of forest preserves in the vicinity of cities.

Illinois is commonly called a prairie state. But it is not all prairie. A line drawn from Terre Haute, Indiana, across Illinois to a point opposite the city of St. Louis will mark pretty accurately the southern limit of the prairie. South of this line much of the land is hilly and broken and was originally heavily timbered. There are many rocky canyons and deep ravines, affording scenery that is a delight to the artist. Most of the soil is a whitish or yellowish clay, with a subsoil of hardpan. Many localities are well adapted to fruit growing, producing abundant crops of apples, pears and peaches, while the product of the Catawba vineyards has a nation-wide reputation. This part of the State is known as "Egypt." The southern portion is of particular interest to the botanist, as it marks the meeting of the Northern and southern floras. The wild flowers are in little danger, except from forest fires.

North of the line above indicated lies the great prairie region, extending across the state from east to west, and northwardly a distance of about 150 miles. Here in general, the surface is level or slightly undulating. There is a little timber, chiefly

along streams. The soil is a rich black loam, one to two feet in depth, underlaid with the clay of the drift. This part of the state is known as Central Illinois, or the "Corn Belt."

North of the prairie the country is more diversified. In the eastern portion is the Valparaiso moraine, characterized by rolling prairie with occasional clay or gravel hills, with rich bottom lands along the streams. In the extreme northwestern part of the state is an unglaciated area. In the greater part of northern Illinois dairying is an important industry.

As an inspector of farm lands for many years, I was able to watch the development of the prairie region. When I first knew it, it was in a transition state between grazing and general farming. During the grazing period an enterprising stockman would gather together ten or twelve hundred cattle and allow them to feed upon the prairie grasses. There were no fences. One man's range was separated from that of his neighbor, perhaps 20 miles away, by some stream. The soil was fertile and the ground not closely pastured, so that the wild flowers suffered but little. In the springtime one could see masses of the prairie phlox extending as far as the eye could reach; a little later large areas of the yellow sensitive pea, while in autumn the whole prairie above the tall grasses was covered with the reds of the blazing star and the yellows of *Silphiums*, Sunflowers and *Coreopsis*.

But gradually settlers began to creep in. A man would buy a 160-acre tract, paying \$1.50 to \$2.50 per acre. He would plow up twenty or forty acres of this, and plant a crop. Each succeeding year he would plow more land and plant more crops. Every acre so plowed caused the destruction of the wild flowers growing upon the tract. With such lands now selling at from \$350.00 to \$500.00 per acre it is not surprising that there are no wild flowers left on the prairies. Occasionally, along a railroad fence there is a strip of no-man's-land, a foot or two wide where one can yet see a few specimens of blazing star or sunflower that have escaped the scythe and the competition of ragweed and thistles.

The disastrous effect of cutting down trees and putting woodland areas under cultivation is so well known that it is not necessary to dwell upon it.

Equally serious, but not so immediate in its results, is the drainage of lowlands. After plowing up and putting into culti-

vation all the available prairie, the land owners turned their attention to draining the lakes, ponds and small streams. Innumerable ditches were cut and tile drains laid. The effect has been to lower the water-table several feet and to crowd out all the native moisture-loving plants.

Among the minor causes of the disappearance of the native flora is the state law providing that weeds shall not be allowed to seed along highways and railroads. Cutting the weeds of course takes the flowering plants also. Along the railroads, however, there are a few low-growing species that escape the scythe. Among these are the wild strawberry, bluets, *Polygalas* and the violets.

The establishment of forest preserves near large cities is somewhat recent, and has not yet received from flower-lovers the attention that it deserves. The forest preserve idea is an admirable one, insuring as it does the conservation of some of our finest tracts of woodland. But the effect of the tramping of many feet over these grounds has been overlooked. The 1920 report of the president of the Cook County (Illinois) preserves shows that 3,115,000 persons visited them during the year; that 714,000 of these visits were made during the month of August. If these preserves are kept open to the public, the choicest areas, in a few years will have become as barren of vegetation as a school playground or a baseball park.

Obviously, our wild-flower lovers are suffering from an over-production of people.

The Bulb to Alice

Yes, you may bury me, put me away,
Think I am dead, but I'll rise some day,
Rise from the darkness into the light,
Though I slumbered long through the Winter night,
Fragrant and lovely my flowers shall be
And my joy in life shall be joy to thee;
To cherish me now in my duller days,
Hope with my hope to win the praise
Of all who, living upon this earth
Are born again with the Spring's new birth.

T. D. A. COCKERELL

Wild Birds in City Parks

LYDIA STEARNS

Mankind could scarcely hope for greater joy on earth, than that experienced by the writer, during the past summer, when a quest for raspberries led us into the native haunts of the white-throated sparrows. The surrounding pine woods seemed filled with them, singing—not one, but hundreds of them—their plaintive, unselfish, peaceful,

“Oh, come dwell with us, dwell with us, dwell with us!”

One did, indeed, long to dwell with them, in their cool, wooded haunts; but those who may not have that privilege may at least become acquainted with the songster tribe. There is simply no excuse for not knowing the birds. Here are some we met in a two-hours' stroll, in Lincoln Park, Chicago, one April morning:

It was just the day for birds—and for people who love to hie them away from city noise and be “made new” in the ecstasy of a frolic with these most bewitching of God's creatures. The sun was warm, the air clear and, being morning, the people not too many.

Scarcely had we stepped over the threshold of the park, from Dearborn Avenue, before a soft, repeated note caught the ear.

“Sh! Not a sparrow,” and the glasses were pointed aloft. There he was, a sentinel of the gate—and a warbler, surely, with flashing of olive-yellow wings and yellow breast, but the tree was so very high and birdie so very lively we could not see his markings well enough to be sure, except that he was there and a warbler as we knew by his few notes and his color.

If we are to know the names of these beautiful wild song-birds, there are certain points we must notice, in order to identify them from the book descriptions and the museum specimens. We must notice the size and shape of bill and tail; we must try to see any peculiar markings over the top of the head and around or across the eye and the ear; we must notice the wings, looking for bars of color across them or patches of color upon them, and look for any difference in the color of the tail feathers; we must carefully observe the breast, its colors and marks; also, very carefully, the back.

Here comes one, though not a warbler. We cannot mistake him, however, as with flash of white and gleam of red, he pops down upon a branch and—peck, peck goes his saucy scarlet head, for he is the red-headed woodpecker with white belly and great white patches on his wings which are daintily edged with black, to match his shoulders. There were many of these handsome fellows throughout the park, darting here and there, hammering along trunk and branch, or lying flat to sun themselves.

But look—quick—your glasses! What is that large bird, winging his way from the lake? There is something trailing behind him—

“His long legs, of course,” comes the verdict, “that is a heron.”

Very good, but let us on to that nook where we saw the merry juncos, weeks before. Scarcely were we started when, coming up over the side of a knoll, we saw a flash of color. Had a bit of bluest sky dropped to the grass?

The glasses again—is it a blue-bird, like that we had seen down by the museum?

No, there is no red breast, but look at the beautiful bronze-brown wings, in striking contrast to the deep, almost indigo blue of the back, breast and head—all blue, except for bronze wings and tail, glistening in the sun. See how graceful that curve of his head and neck, so slender, as he holds them erect, looking for insects! There were a “flock of him,” for we soon saw many more. We wrote it all down, our hearts a-dance, and found him in the book, when we got home,—the indigo bunting. We saw a “lady bunting,” too, with olive-brown back and light olive or buffy-whitish, underneath.

Our heads were constantly upward turned, now, and soon a more modest bird was seen. Him we recognized at once as the black-throated gray warbler, his head, throat and chest black, with white streaks on the sides, pure white on the under part of him, white streaks on his sides, and the back gray, black-streaked. On the wings, also, are two white bars, a streaked fellow, surely, and easily recognized, when once you have made his acquaintance.

But what is that peculiar whistle—not a robin, not a black-bird? On we crept, very softly, locating his tree, following to the next, when he flew, until we could be sure of him—a thrush.

The park seemed literally full of thrushes. Always between the rarer birds, we saw Mr. Thrush, usually olive-backed, though once we saw the willow thrush, the wedge-shaped spots on his breast less distinct and of softer fawn-color on the pale, buffy chest.

Now comes a fly-catcher, the real crested one, with olive back, grey breast shading to olive yellow, below. Over all, in the sunlight and the blue, soared the swallows in graceful curves, swinging and circling almost wherever one looked, if the look went high enough.

But there is more to see—yet stay, what was that softly-moving bit of brown, among those low shrubs, by that rustic bridge? We draw very near, without giving alarm, and have a fine view of the exquisitely speckled, dainty wren.

Soon a flutter led us to another low bush where we had an excellent view of a modest, graceful bird, all in soft brownish-gray, with a wee, triangular spot upon his wing and a delicately penciled curve of white above and below his bright, dark eye. A little early for vireos, yet this fellow looked very like Hutton's.

A little farther, and we come to a gay fellow in black-and-white, more raggedly streaked than the black-throated gray warbler, his wings decidedly striped, a patch on the side of his head, belly gray, a black patch for a cap, and every other distinguishing feature a black-and-white warbler should have, for so he was.

A festive bird about the size of a warbler, but with longer tail, which seemed to form a peculiar little fan just at the end, when he flew, still remains a mystery. Then came more thrushes and then the royal scarlet tanagers—brilliant males in scarlet and Madam Tanager, in her harmonious olive robe.

Noted in passing was a fox sparrow, scratching for his dinner after the style of the barn-yard hen; and we also said good-morning to a phoebe-bird, eyeing the under side of a bridge for a good nesting corner. Near black-bird island, too, we lingered to watch the antics of the grackles.

Enough for one day? Never enough, but we were obliged to turn south again, to be in time for dinner, having been in the park just an hour-and-a-half, when we spied the "dearestest" of all. Draw near to this little pine tree and look well at these clearly "penciled," strong, curving lines of black, symmetrically drawn

down the sides of a glorious fellow. Look at the jetty necklace he wears over his brilliant yellow vest and note that patch of gray on the very top of his head, those flashes of white on his wings as he flutters, tip-tiltingly for you to see. There are white strips over his eye, and we must note all well, for unless you know him, this fellow is not so easily found out. No bird-book seems to do him justice, though when one knows him, the magnolia warbler always brings particular joy.

Scarcely had we torn ourselves away from admiring him, and wondering at the sleeping man beneath the tree, unconscious, like too many a wide-awake one, of the glorious things about him, when we encountered still another bird, much like the one just described, but with markings less distinct, and two white wing bars. This we found to be the mate of the magnolia warbler.

Satisfied, indeed, we turned homeward in earnest, though we could not shut our eyes when we spied Mr. Black-billed Cuckoo, nor could we resist a brief flirtation with such friends as the golden crowned kinglets, a brown creeper, the northern hairy woodpecker at his game of hide-and-seek around a tree, a yellow-bellied sap-sucker, and a Baltimore oriole that flashed across our vision.

Late in the afternoon we sought the museum, for the sure identification of some of the more unusual specimens we had seen, but we were late and as the "all out" was soon sounded, we again turned homeward, scarcely looking for birds now, so thronged was the park with people. But there was no need to look for the evening frolic of a gaily attired chap that now flaunted himself before us.

Was ever bird so well satisfied with his new spring coat? No wonder he was very proud of those great squares of clear orange, tipped with black; no wonder he turned this way, and now that, to give us a full view of those glorious epaulettes and breast plates of the radiant hues, the "brawest hielanman o' them a'"—rightly named redstart, displaying—why, of course, the sunset colors at the close of a glorious, happy day.

Even as I write a yellow warbler chatters saucily in the trees of our city street, and seems ever to call to nerve-racked and weary ones.

"Oh, come out among the birds and let your heart bubble!"



Photo by W. A. Rowley

LAKE MICHIGAN IN A TEMPERAMENTAL MOOD

Picturesque Duneland

STELLA M. ROWLEY

Chicago Normal School

It is a great pleasure to write for a group of nature lovers about so wonderful a place as the Dunes. Extending from Millers, Indiana, to Michigan City, is a region so fascinating, so full of nature's richest gifts that after the first visit one seems impelled, as if by some mystic force to return to it again and again. It has been said "A prophet is not without honor save in his own country." This is just as true of a great scenic wonder as it is of an individual. How many people there are who live within an hour's ride of the Dunes and know nothing of its wonders, who have never seen a "Blowout", have never climbed "Bald Knob" or "Mt. Tom," have never followed the trails which lead through the dells, the glades and along the quiet pools with their interesting plant life. Various outdoor clubs have done much toward bringing Duneland into its own, introducing its beauties to many people. Not the least of these is the Chicago Nature

Club, which has for years realized what a treasure house is at its very door, for if we consider nothing but the flora of this region that alone is sufficient to make nature trips of real value.

The Dunes are beautiful and picturesque at all seasons of the year. We may go out in the Spring after the Winter has gone and all nature seems quite secure in another year of growth. Then we find the lovely lupine in blossom. It grows so abundantly and luxuriantly, that at times, we seem to be looking not at the earth, but at a sea of blue. When we behold such glory, we feel like saying, "Spring is indeed the most beautiful season of the year at the Dunes."

In summer, to many it is simply a hot, dry place. We will admit it is not the season one would choose for long excursions but it *is* the time to enjoy the lake. Along that whole length of shore line is a beach that cannot be surpassed. It is also the time of year for glorious sunrises and sunsets, not only do we see the beauty in the heavens but that beauty is reflected in the wet sands along the shore. In looking at these sunsets we feel like saying with the poet of old, "The heavens declare the glory of God and the firmament showeth His handiwork."

From the point of view of the artist, perhaps no season of the year is so beautiful as the Autumn, when the leaves change their colors and the yellow of the witch-hazel and sassafras blend so beautifully with the reds and browns of the oaks and maples.

But what has the Dunes for us in the winter? An abundance of oxygen, sand hills not entirely covered with snow but a sufficient amount to make a background for the trees and twigs, making them appear like etchings. We make our own trails through the snow and we often stop to admire the long shadows of the trees, the brown leaves and grasses that refuse to remain hidden, making a striking contrast in color to the whiteness of the snow. The combination of water, sky and tawny sands of the dunes produces, at times, marvelous and even spectacular atmospheric effects. At sunset, especially, we may see the Alpine Glow of distant Switzerland reproduced on miniature Mount Blancs and Matterhorns of sand. Is it any wonder that each year our unique and beloved Dunes grow in favor? We who know them well return again and again as to a place enchanted, never tiring of their endless charms and of the opportunities they offer for a fuller appreciation of the wonders of nature.

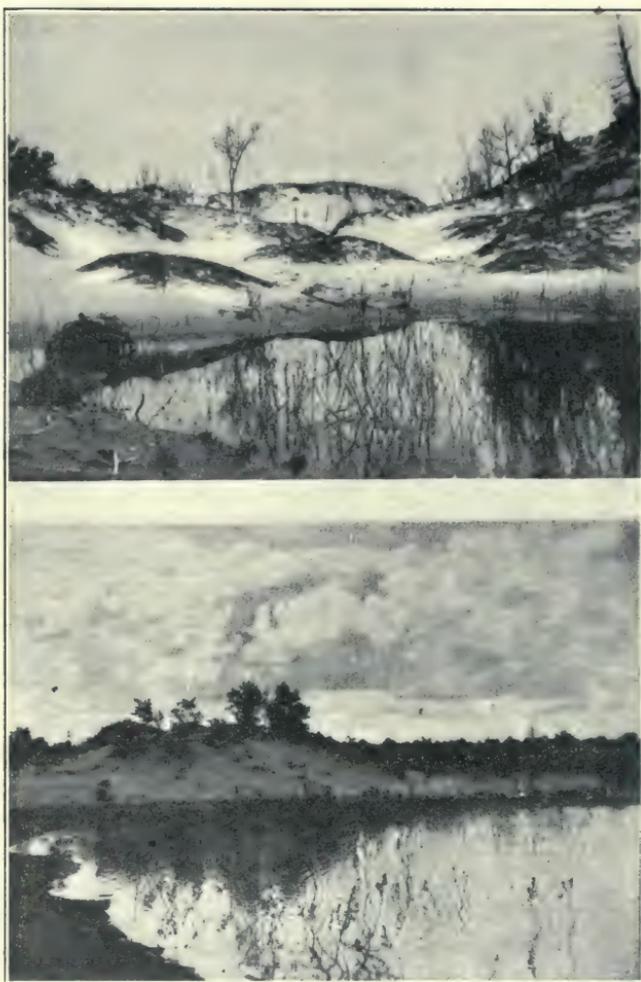


Photo by W. A. Rowley

Above—Typical Dunes

Below—Pools, seldom more than 9 feet in depth, add a picturesque touch to a Dune landscape.

Notes by Members of the Chicago Nature Study Club

DRAGON-FLIES AND MONARCH BUTTERFLIES.

"Twice the writer has had the privilege of seeing a migration of the large dragon-fly come from Michigan, across the lake, to the Illinois shore. Mingled with the myriad dragon-flies there has been each time, a fair sprinkling of the monarch butterfly. At first one wondered why the gentle butterfly should venture forth upon so long and dangerous a journey with so great a crowd of the fierce dragon-flies.

The question was answered in a forest of northern Minnesota. Walking down a road in the forest, the writer noted a violent movement upon a tree trunk. Closer observation revealed a giant dragon-fly literally devouring the heart out of a monarch butterfly whom it held firmly pinned, wings pitifully fluttering, against the tree trunk. No lion, devouring its still living prey, could have given a more ferocious impression.

But it was one of nature's tragedies. She creates no creature without providing food for it. May we not conclude that the migrating dragon-fly host is to some extent provided with food on its long flight by the attendant butterflies?

DR. HOLMES.

WISE, AND YET UNWISE.

In a second reader, used in our schools long years ago, there was a short story about a wren. One sentence in that lesson has never left my memory, "The wren is a tiny bird but it is a wise one." Long after I had left the second reader behind, I had the truth of the quotation proved most delightfully in my garden.

A small starch box with the correct opening for wrens, had been nailed up on the wall of the house. Two wrens happily built their nest in it filling the air the while with their cheerful songs. Shortly the box began to separate into its elements so I procured a better box and nailed it upon the wall some twenty feet away from the first box among sheltering vines. During the absence of the wrens I detached the first box and placed it upon the new one.

Presently one wren returned and flew to the home spot. Her apparent astonishment was very interesting. She fluttered a moment then dropped to the ground just under the spot and lay there looking up. She then flew to the roof above the spot, singing loudly while looking down over the edge. Again she flew to the spot, fluttered there a few moments and retired to an overhanging tree to sing and stare.

Presently she flew away.

I have never ceased to regret that I then left the garden for a half hour, for when I returned the old home had been discovered and the process of moving was well under way.

Now see if the childhood lore was not proven. They did not move the sticks from the old home into the new directly. No, the sticks were torn out and dropped to the ground, and from the ground the proper sticks for the foundation of the nest were once more selected and very rapidly the nest was rebuilt.

Then the old box was removed and my family looked forward to the joy of watching the rearing of a nestful of baby wrens. But we were sorely disappointed. The Fourth of July was celebrated with unusual enthusiasm that year. Doubtless the intense patriotism, with its terrifying noises and odors, disturbed the birds. They flew away never to return to the little house. In this they were not wise, for nowhere would they and their children have been more welcome or better protected.

DR. HOLMES

BACK YARD OBSERVATIONS

One June morning an excited overgrown eighth grade girl burst into my Nature-Science room exclaiming, "My mother found the queerest animal in our back yard yesterday! It looks something like a brown gray frog but it has prickles all over its back and two horns."

"Why, Antoinette, your description sounds like that of a horned toad. But how could a desert animal be roaming around Chicago?"

The next day Antoinette appeared with a quart bottle containing a horned toad fully as large as a woman's hand. The poor creature looked very uncomfortable in the slimy grass and

water from which I quickly rescued him and put him in an insect cage. He was very calm and puffed himself up double his normal size as forty eager children made his acquaintance. A half dozen boys lingered behind as the class was dismissed eager to buy this strange pet.

As the next class came into the room one small girl looked very much delighted. "Why, that is our horned toad," she exclaimed, "We brought it up from Arizona last fall. His name is Christopher Columbus. Bob and I took turns in taking it out for exercise and one day Chris slipped the string over his head and escaped."

Later Bob came in, picked up the formidable looking pet which snuggled in his hand and offered no resistance to the friendly strokes. Bob too was sure that it was the Christopher Columbus which had escaped from captivity the previous autumn.

Since the winter of 1920-21 was a mild one it seems probable that this horned toad had successfully hibernated in the Chicago area. At least not being able to determine anything further as to ownership Bob carried home his strange pet with a great deal of satisfaction.

Do you remember how Goldie Locks happened to visit the home of the three bears just in time to taste of their breakfast while they were waiting for the porridge to cool? Something very like that happened in a garden in River Forest one hot autumn day. A young Sapsucker on his journey to the South selected a crab apple tree that was brightly decorated with beautiful red apples. With carpenter like precision he drilled rows of holes a half inch apart on a branch about two inches thick.

Then Mr. Sapsucker went away expecting to come back to find each cavity overflowing with sap and richly flavored with any insects that might have been snared. Flies and bees came to the spot and hummed about as noisily as a whole swarm of bees.

Mourning Cloak Butterfly sniffed something good in that crab tree and drank and drank of the sweets Mr. Sapsucker had intended for himself. The smaller insects annoyed the beauty in black and white and he opened and closed his wings in angry jerks.

A bright Red Admiral appeared zig zagging among the branches of the tree. He drank deeply of the well filled cups but was not a little disturbed by flies and bees lighting on him. The four marks of red on the upper surface of his wings appeared and disappeared like an electric sign as he vainly attempted to dislodge them.

A sharp "Pit" announced the arrival of a Ruby-throated Hummingbird. He perched for a moment two feet from the banquet table then hovered over the buzzing center sipping eagerly from hole after hole. The insects were quite agitated at the appearance of this visitor and dared not perch on him. Every few moments Ruby throat rested on a near by branch and eagerly eyed the insects as they feasted on the sap. The whirl of his wings was the signal for small insects to fly away.

For two hours this program continued when suddenly on swift wings the Sapsucker appeared. This was the signal for uninvited guests to disappear and the hard drinker went from hole to hole, changing his position from time to time, then gazing off into space trying to imagine what had happened to his overflowing cups.

Five year old Elizabeth was quite excited upon seeing the large bird appear. Being told that the Sapsucker was really injurious to trees she said, "I'll not let him spoil my daddy's crab tree." So she walked boldly up to the tree with a club and pounded on the trunk. Mr. Sapsucker played peek-a-boo with her for two or three minutes then darted away with lively jerks from the garden.

He was back in a few minutes however busily engaged in deepening the holes and snaring an occasional insect which the sap attracted. Hummingbird and the insects kept a safe distance away when the head carpenter surveyed his work. Elizabeth's daddy prized his crab tree more than its occupant and soon Sapsucker was the victim to one who had given good service in the reserve militia. More luxuriant vegetation in one garden spot marks the place where the unwelcome guest of the crab tree was buried.

ESTHER A. CRAIGMILE

BLUEBIRDS

The Genie conveyed me to the foot of a great mountain that stretched before us terrace on terrace till it seemed to mingle with the clouds. Pointing upward, he bade me climb.

No scene could be more wonderful. The waters were falling down the mountain side and over the plateaus in showers that flashed in the sunlight and reflected every color of the rainbow. Great pools of the clearest blue gave back the azure of the clouds. Everywhere the eye discerned masses of white crystallization that took the form of pinnacles, domes and towers.

We had been mounting steadily upwards when we came to a level space covered with stunted pine and cedar trees.

Suddenly an arrow of blue flame passed in front of me, between the trees, then another and another. I grasped the arm of my companion!

"They are the mountain bluebirds," he whispered.

And then in that fairyland I saw these beautiful creatures, the symbol of happiness itself, flitting from tree to tree, tripping rapidly over the white ground, or sweeping in curves around us. They were of the softest, lightest blue, so beautiful in form, in motion and color, that they were in perfect harmony with the wonderful place in which I wandered.

These were the bluebirds of the Rocky mountains and I was on Jupiter Terrace in Yellowstone Park, learning with humble heart how Nature constructed her most marvelous creations, and full of the joy of life.

R. A. WIDDOWSON

THE PERIODICAL CICADA

During the last week in May or the first week in June of the coming year, Brood V, of the Periodical Cicadas will appear in Northern Illinois, Northeastern Iowa, a few counties in Southern Wisconsin, and the Dunes region of Northern Indiana. The life-history of these insects is fairly well known, but it has not yet been determined whether they are injurious to vegetation during their long larval existence underground. As they often live under fruit trees when there are no forests nearby, it will be interesting to note whether the trees from under which the pupae

emerge in large numbers are less vigorous than those where there are few or none of the insects.

In making these observations one should take into consideration local changes that may have occurred during the past seventeen years, such as surface drainage, erosion, cultivation and fertilization of the soil under the trees, in order that the comparisons may be free from error.

W. S. MOFFATT

Annual Meeting of the American Nature Study Society.

Toronto, Canada. Thursday, December 29, 1921.
Room 38, Medical School Building

PROGRAM

Morning Session—10 A. M.

Sky Phenomena—W. H. TUKE, *Principal High School and Mining Institute, Haileybury, Ont.*

The Appeal of Bird-life to Children—Miss LAURA B. DURAND, *Deputy Game Warden of Ontario.*

Nature Study of the Farm,—DR. JOHN D. DETWILER, *Instructor in Entomology at Cornell University.*

Election of Officers

Report of Secretary-Editor

Afternoon Session—2 P. M.

WHAT NEXT IN NATURE STUDY

Possibilities of the Moving Picture in Nature Study Instruction—F. R. MOULTON, *Chicago University.*

A system for caring for some of Children's Nature Study Interests, DR. E. LAURENCE PALMER, *Cornell University.*

The Use of Nature Materials in Intelligence tests—twenty minutes, E. R. DOWNING, *Chicago University.*

The Project Organization in the Primary Grades—twenty minutes, MARGARET E. NOONAN, *New York University.*

The Contribution of the Summer Camp—'20, WILLIAM G. VINAL, *Providence, R. I.*



TO THE WOODLAND FOLK.

JAMES CUTTING THOMSON.

Age 10 yrs.

O, thou merry brook that gurglest on
And makest all so happy on thy way,
Scorn not the songs I sing to thee;
And every time the wood peewee
And all thy songsters, full of glee,
Sing on thy merry happy banks all day,
 Answer, untiring,
 With thy murmuring.

O, thou sky-lark, high in cloud-decked
 sky,
Who carolest in joy for everyone,
Thou weariest not when nestlings cry
For parents dear. Until they fly
High in the sky to sing with thee
Thou takest care of each and every one,
 And art sore grieved
 When they have gone.

O, thou woodland folk, come nigh to me
For I am come to sing glad songs of
 thee;
But condescend to hear my song
That I be singing all day long.
I'd have good times with thee along,
And roam abroad with all the crea-
 tures free,
 Nor think nor care,
 But just be glad with thee.





"Visit the plant in its native heath, Consider its ways"

Plants in Their Environments

MARY M. BOYCE.

"Environed they are with many foes."

We hear much of the origin of species, natural selection, etc., but until lately little on the "at homes" and foreign travel of plants as they march steadily over the world. Warming has published, in Danish, a work on *Ecology*, being a study of vegetation in existing environments, and really the sociology of plants. He advocates data-collecting by studying the plants in the field instead of on the laboratory table, as has been done in the past. He shows how forms and functions are modified to serve purposes for food, water, heat, and protection for reproduction.

It is interesting to note the characteristics of plants in regions with marked physical conditions. Plants share the elements with animal life. Suspended in the air are found bacteria. We may trust microscopists when they tell of the communities abiding around us with never ending struggles for mastery and life. Lichens are nourished in the atmosphere; algae and yeast are

suspended in liquids; truffles are surrounded by soil; water-lilies are found enjoying a mixed media of earth and water; Hygrophytes, those plants which love to live exclusively in water, stand in bold contrast to the Xerophytes, which belong to the desert solely. The camel has imitators in the last mentioned group, as they absorb water rapidly and store it carefully. Believers in communities and co-operative kitchens find their followers in the plants dependent upon each other, as Symbiosis, a helpful living together has been found in all the great groups. The algae and fungi are perhaps the most noted examples. These last are important individuals, as the chief sources of soil and food supplies in certain regions. Not the least of their efforts is the habit of giving up previous duties to companion plants and assuming another work in the Symbiotic relation.

Dependent individuals may find their followers in the plants which belong to the Micorhiza group, which depend upon another plant for life, as in the filamentous fungus which interweaves among the rootlets of the Legumes, or the root tubercles of the Leguminosae. The ubiquitous clover, it has long been known, can always be an annual crop on any kind of soil. This is possible through the nitrifying bacteria which swarm in the tubercles.

The problem of protection against animal depredations is successfully solved by many plants; in the acrid juice of the Aconite; felty coverings of the Mullein; thorn of the Rose; in the objectionable odor of the Skunk-Cabbage; the tough skin containing silica of the Bear-berry; the water receptacles of other plants; the stinging hairs of the Nettle, and the metamorphosed leaf of the Barberry.

A curious defense, mentioned by many authors, is a friendly army of ants, to whom all other insects and caterpillars are intruders. When the environments are cold, the green tissue exposes itself as little as possible and generally with a coating of felt. Close setting of leaves protect from cold. Then, it is not possible to sufficiently admire the devices for shedding, collecting, absorbing and conducting rain. The Ombrophilous, or rain-lovers, are here contrasted with the Ombrophobic, or rain-haters.

Linnae discovered Mycetotropis Phenomena, and styled it the "Sleep of plants." He watched carefully for a certain flower to bloom, but the leaves so skillfully hid the blossom that the gar-

dener failed to find it. Darwin pinned the cotyledons down and the plumule died of chill. This shows the exquisite instinct of the delicate plant. Plants take some precaution against drought. No matter how lovely the weather may be the leaves remain furled until moisture appears.

Very feeble are vegetable growths without adaptations for environments. Some growths, such as grass which wrinkles and moss which rolls, show flexible peculiarities to protect life.

"The best laid plans of mice and men," as well as those of plants, "gang aft a'glee," and their cunning devices often fail.

Not the least among plant organs is the seed, and marvelous are the tales told of the distances travelled, cold and heat endured. Darwin surpasses all competitors in that direction. He tells of experiments with seeds which show wonderful resistance to adverse environments. He and others have soaked seeds in salt-water, with the result of the survival of the fittest—a large percent. We read of drift timber, carcasses of birds, crops and feet of birds, bodies of fishes, and surprising to relate, of icebergs, as carriers of seeds. When plants are identical, though separated by hundreds of miles on the summits of mountains, we turn to Agassiz' glacial theory for the answer.

Frail, indeed, are the individuals of the great plant families, but mighty are the efforts put forth for perpetuation.

Many are the problems awaiting the lovers of plants—problems which have never been solved, and the field for work is large. Visit the plant on its native heath, learn of it, consider its ways, and with the wisdom so acquired exclaim with the ancient writer, "How wonderful are Thy works!"

What's a flower? A bit of brightness
Sprung unconscious from the sod,
Yet it lifts us in its lightness
From our earthliness to God.

D. H. R. Goodale

A Practical Angle in the Aesthetic Side of Nature Study

C. W. G. EIFRIG River Forest, Ill.

Much has been said and written about the aesthetic value of Nature Study. By this we really mean the result of such study, a speaking acquaintance with nature. When one considers the endless variety of nature's forms, the whole gamut of forms and colors in the flowers and leaves of plants, the endless variation in the colors and songs of birds, the ever-changing beauty in the outline and tint of the clouds above and of the minerals below, the variegated patterns of color and outline in insects, shells, even snakes and batrachians, not to speak of the almost fairy-tale-like mysteries in the life-histories of many of these creatures, even the lowliest plant, then one realizes that only the A in the A B C of this great topic has been written.

In these lines I would dwell upon a practical angle or aspect of Nature Study in the sense of loving appreciation of the beauties and wonders of the great out-doors. I say practical, for, while aesthetic enough, it has practically helped me over otherwise uninteresting, dreary hours or days. And that I think is of practical value and importance in our life, which, despite all said to the contrary, seems to me to be depleted more and more of idealism, and is daily being lowered to a mere battle for existence, a battle with hostile forces over which often we have no control, and which tends to take the joy out of life.

Now for instances to show what I mean: While living in Canada, in its beautiful capitol, I frequently had occasion to go to places away from any railway, in fact one does not have to go far there to be away from our common carrier. I would go as far as I could on the railway—railroad is unknown there—and then I would be driven in some ancient vehicle 25 or 40 miles across country. This at all seasons of the year, and the return drive was often made from one to seven o'clock A. M., frequently in severe cold weather. These trips would have been highly unpleasant or at least monotonous, had not nature study or a speaking acquaintance with nature rendered them highly interesting. At night one would hear the rare call of the Saw-whet

owl, sounding for all the world like the filing of a saw, or the "blood-curdling" yells and hoots of the Great Horned and Barred Owls, or the dreamy sleep song of some smaller bird. Now and then I would take a mental census of the species of birds seen along the way when the trip was in day-time, and at the end ask my companion, the driver: "How many kinds of birds do you think we saw today?" He would say, "Oh, five or six." Whereupon I would report, "No, 30 species," which he considered impossible until I would enumerate them. All this besides watching the ever-changing aspect of the flora along the way, the coming and going of the flowers and leaves, some rare or especially early or late occurrences and the like. On the brink of one lake we would pass was the largest colony of the fly mushroom, *Amanita muscaria*, I had ever seen. Or some shy and perhaps rare habeneria or other orchid would make me halt the rig in order to get down and investigate more closely. Riding in the crisp, cool air of autumn, we would spy the first Snow-buntings, *Plectrophenax n. nivalis* of the season, together with a belated Bluebird; further on, several Pine Grosbeaks, *Pinicola enucleagor leucura*, would be eating of the sumac berries, or a Goshawk would be seen foraging. Thus hardly a minute passed without some interesting fact to note, to be afterwards duly recorded in the notebook and "ledger". In spring, one would hear from the moss-covered stumps in the woods on either side of the road the exquisite song of the Winter Wren, a well-modulated, sustained performance in an extremely high pitch, making the impression of a slender thread of silver being woven or spun over the dark green hemlock and spruce boughs. The Hermit Thrush and Veery would add their charming chorus while a Pilated or Arctic Three-toed Woodpecker would keep tune with his hammered tattoo. Nature lovers and nature students are often popularly looked upon as cranks, are termed "nuts" or whatever slang happens to be in vogue, especially if your nature person be an entomologist, sweeping about him with an insect-net, or your botanically inclined one, going out with a vasculum. Even a physician once opened a vasculum of a friend of mine who was returning from an outing, and, seeing the plants inside, asked, "Have these any commercial value?"—these people are really to be pitied. They are surrounded by beautiful, interesting things, but see and

hear them not. How much richer the life of one who knows a little about the common forms in nature, to whom every tree, flower, bird and insect conveys a story of the wonders of life hidden in them.

Take another case. How often travellers on railroads complain of ennui, of being bored and tired by the trip! Not so your nature lover! He will eagerly drink in with his eyes not only the large aspects of scenery, vale and mountain, but he will also eagerly search out the details. Here he notices a flower never seen before, but he can guess whereabouts it belongs; there a tree new to him is passed close by; and then he will recognize old and new friends among the birds flitting away from before the moving train. Recently I visited Mammoth Cave, Kentucky. From Glasgow Junction to the cave one has to ride on a train of one coach of the most primitive type, and apparently about to break to pieces. It must be a relic from "before the war," if not from before the flood. And as if not enough to expect one to be jolted and banged around in this disreputable conveyance, they extort \$2.16 for the trip of eight miles coming and going. Nor are the eight miles thru especially attractive scenery; only small wooded knolls, with the second growth often coming up to the track. How soothing then to one's ruffled feelings to look out and appreciate the new trees one sees. I saw for the first time on this ride the Sorrel-tree or Sour-wood, *Oxydendrum arboreum*, also the Hercules Club or Angelica Tree, *Aralia spinosa*, growing wild, as well as about all the different oaks to be found in Hough.

Or take that *bete noir* of the traveller on the railroad, the being compelled to wait for another train at some lonely junction, where there is only a miserable village or not even that. At such a junction in Minnesota I once heard my first Western Meadowlark, *Sturnella neglecta*, sing. In fact I always look forward to such stops with glad anticipation for the chance it gives one to hear or see something new in nature.

Also auto rides are enhanced in pleasure immensely in this way. Recently I was driven to Centralia from Vandalia, Illinois, through flat, monotonous country, over bad roads, not even fine farms being there. But when one family after another of Mockingbirds flew across the road, and now and then a flock of Prairie

Chickens sailed on outstretched wing further afield, all disagreeableness was more than overcome. Among the dust-covered weeds of the roadside even I noticed something new to me, the Bracted Plantain, *Plantago aristata*.

An otherwise monotonous lesson is the classroom often enlivened by the call of the Meadowlark or Killdeer, Bluebird or Goldfinch. In the trees, before my study-room windows in Ottawa I often watched the Red-eyed and Warbling Vireos, the Wood Pewee and Yellow Warbler, the Least Flycatcher and Robin singing or nest-building.

In this manner and otherwise, nature, after one has made her acquaintance, cheers one, makes life more pleasant and agreeable, inspires one anew continually and revives the sometimes drooping spirit. This I would call the practical side of the aesthetic value of Nature Study.

Sand Dunes and Forests

WORRALLO WHITNEY

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There are many phases of the struggle that is ceaselessly going on between plants and the sand dunes of the Lake Michigan shores. Among the most interesting and really tragical of these is the burial of forests by the moving sand.

The dunes have many approaches in their destructive work. In some cases the dune comes on as an avalanche of sand many feet in height—often towering above even the tallest trees of the forest. The forest has no chance against such an advance. It is utterly destroyed, the trees being engulfed as they stand, and we have literally a buried forest. The dune usually keeps moving on, piling the sand up in its front and removing the sand in its rear. Thus the buried forest may be uncovered long after its burial. Then we have what is known on the Michigan shores as a "forest graveyard." The dead trees stand stark and bare like so many skeletons to tell the story of the advance of the dune over a once luxuriant forest.

The approach of the sand, instead of forming a steep slope, is often very gradual, with gentle slopes. In this case the sand



A dense young forest of firs is being threatened with destruction by the sand which appears to be approaching rapidly.

The dune has stopped its forward march on the forest. Numerous signs of its destructive work are evident.

The sand has been blown away from these cottonwood trees revealing the secondary roots formed when the sand was piled several feet in depth around the trunks of the trees.

The steep slope of an approaching sand dune is shown, much higher than the trees. The partly covered trees on the slope are still alive.

A forest graveyard. The dune has moved on uncovering the buried forest in its rear.

Cottonwoods partly covered by the advancing sand. Their growth each year equals the rise of the sand.

may rise very slowly, a few inches each year. Some trees are capable of resisting such an approach. The cottonwood, one of the most common trees of the living dunes, is capable of producing secondary or adventitious roots along its stem. Most people know that if a cottonwood twig is put into damp soil, it will put forth roots and grow into a tree. When sand piles up slowly over trees possessing this power, new roots are produced on the stem above the level of what was once the earthline. As the primary roots of the tree are buried too deep for respiration these new roots take their place. This may go on indefinitely so long as the sand does not rise faster than the growth of the tree upward. Only the tops of the buried trees appear like clumps of vigorous young trees growing in the sand. But we know what is happening down below in the sand, for seedling trees could not get a start here in the drifting sand.

Some trees such as the birch and basswood are very tenacious of life under adverse circumstances and may live with their roots buried very deeply in the sand. One of the accompanying pictures (fig. 5) shows a birch which had been partially buried; then the sand was blown away revealing the story of its burial and successful struggle for life. Though not capable as the cottonwood of putting forth adventitious roots it had retained life with its roots buried at one time more than ten feet under the sand.

When the dune has passed or has ceased to move forward, as sometimes happens, the surface sand becomes more stable, moving only in a small way. Dune grass (*Ammophila*) gradually binds the sand with its creeping roots and the surface finally becomes sufficiently responsive to allow the germination of seeds of trees and shrubs. If seed trees of the forest are near enough for the transportation of their seeds to such spots a new forest is soon begun on the now dead sand dune. The sand dune has done its destructive work but nature is resilient and forests rise again to clothe the wounds with their verdure.

The Forester

CARROLL DE WILTON SCOTT

San Diego, California

ACT I. THE CAMPERS

Time, late summer; scene, a natural park in the California mountains, altitude about 6,000 feet; in a forest of oak, fir and incense cedar. A group of campers are just finishing their breakfast under a black oak. Their camp-fire is still smouldering; it is built against an old stump. The party is James Williams a rich, retired cattleman, his wife, his daughter, Mollie and a hunter friend, Fred Wymans. Their camp auto is near by.

WILLIAMS

Well, Fred, what's our program today?

WYMANS

I hate to go back without a buck. Do you think we would have any luck on Big Horn Mountain?

WILLIAMS

I think we might start a buck in there. I used to get one in there any time in the old days. You know Fred I used to control all these mountains—ran 20,000 head of cattle in here once. But the government with its meddling forest rangers has surveyed and cleared and fenced and postered the land until it's like a city park. We did what we liked in the old days—no fences, no laws, no supervisors. And deer—why they were tame as calves. And lions too—also tame. Let me see I think it was right on this slope that I had a tiff with a big cat. I had shot a deer and laid it on a fallen trunk. An hour later when I returned a huge mountain lion was quietly eating my deer. Do you think he sneaked off and left me the remainder? Not much! He bristled up and snarled at my intrusion like a pussy with a mouse, as much as to say, "all the deer in this forest belong to me." I was so taken aback by his bluff that I just stared at him while he walked away with the half-eaten buck.

WYMANS

The cats are as wild as the deer now and as scarce. The old days are gone forever.

MOLLIE

We should not regret that because so many more people can enjoy the forests now-a-days.

WILLIAMS

Here's one of those advance guards of civilization now. (the forester comes round a bend in the road, approaches and salutes the company.)

FORESTER

Good morning. Any luck with the deer? (there is an embarrassing pause.)

WYMANS

Not yet. We hope for better luck today.

FORESTER

You might try Big Horn Mountain. I jumped three bucks over there last week (he notices the camp-fire against the old tree trunk) I say, gentlemen, that's dangerous—will you be very sure to put out your fire? There's a dry northeaster blowing and the brush would burn like tinder.

WILLIAMS (rising to his feet)

Young man, I camped in these mountains when you were learning to read. I guess I can manage my own camp-fire.

FORESTER (coolly)

No offence meant gentlemen. We have certain rules for the protection of the forest from its greatest enemy, fire, and one of them is that camp-fires must not be built against tree-trunks. Please be sure to put out your camp-fire. (starts to go)

WILLIAMS (angrily)

Yes, you've plastered the trees with your petty rules till a man can't move without violating them. You rangers think you own the mountains. I tell you now you can't order me around. (He starts toward the forester. Mrs. Williams and Wymans have walked to one side.)

MOLLIE (catching hold of her father.)

Father—come—the Forester must carry out his orders. He is acting for the government.

FORESTER

Yes, for the government—the whole people. I represent them. (steps toward Williams) Mr. Williams, you and your kind had your

day. You logged over the mountains, wasted three-fourths of the timber, burned up the young trees, dried up the streams, overstocked the ranges and left the land a barren waste. But your day has passed. These national forests are for all the people—the home-seeker, the careful lumberman, the camper, the farmer in the lowlands dependent on the streams for irrigation—in short the present generation as well as future generations—and the sooner you learn this the better. Good morning. (the Forester turns and leaves.)

WILLIAMS

You contemptible upstart—I—

MOLLIE

Father—please come with me—the Forester must treat everybody alike.

WILLIAMS

Daughter, I would not have taken that from any man if you had not been here. (he strikes a match, lights his pipe and throws the match in the grass.) The Devil take his rules.

MOLLIE (looking for the match)

Oh father, you must not do that—you might set the woods on fire.

WILLIAMS

What's the difference. A little blaze would give these loafing rangers something to do. Come on daughter. Fred and I must get started. Can we have a lunch?

(Curtain)

ACT II. THE DREAM PAGEANT

Time, about mid-day of same day. Scene, a glade in the forest through which a stream flows. Late summer flowers are in bloom near the stream—tiger-lily, golden-rod, columbine, coreopsis. Elsewhere the grass is dry and brown save where a spring makes a green oasis under some oak trees. The Forester is sawing a dead limb from an oak tree. Near by is his ax. The Forester stops sawing, wipes the perspiration from his face and leans against the oak tree where he commands a fine view of the mountain landscape.

FORESTER

I wish more people could enjoy my forests. Few ever see them at all and fewer still enjoy them as they might. They come whirring through here in touring cars frightening the birds and squirrels and deer, perhaps camp a day or night and think they have seen the mountains. Little they know of mystery and color and wild life. As for the rest of humanity in the lowlands they stay cooped up in their stuffy houses and die there without knowing what clean air and clear water taste like. I'll get me a drink of that spring water right now. (he goes to the spring and drinks and then reclines restfully on the grass.)

I alone here to enjoy all this beauty. I alone the prospector of this beauty and this wealth—worth millions just for lumber—and millions more for health and recreation—I alone the guardian of it for generations to come. (he is silent for a few moments. Then the warm sun and weariness from labor make him drowse—and dream.) This is what he dreams:

(enter a wood-fairy, Chipmunk. He tip-toes up to the sleeping forester and peeps under his hat. Then he beckons to his five companions, Nuthatch, Hummer, Vireo, Bush-tit and Lizard, who come in silently and roguishly and trip about the Forester on the grass.)

CHIPMUNK

Say fellows, let's do the sleep magic over the Forester. We haven't played a joke on him for many moons.

VIREO

I say jolly. It is time we had some fun. Hallowe'en is too long to wait.

BUSH-TIT (in a fearful, whining voice.)

But suppose some harm comes to the forest while the Forester is under the spell. The Guardian Spirit of the Woods would be very angry with us.

CHIPMUNK

Oh Bush-tit, you are always afraid (he dances about and says half singing.)

A frolic today does Chipmunk say
While the breezes play and the tall trees sway,
Come let us be gay, there's none to speak nay.

(all jump about noiselessly, clap their hands softly and swing their arms signifying their willingness, save Bush-tit who looks solemn and shakes his head.)

CHIPMINK (continued)

Well, let's get busy—he might wake up. Nuthatch, you bring the milkweed tassels. Vireo, you gather a sheaf of spiderwebs of the Black Widow and bind up his legs and arms. Lizard, find some poppy petals with the dew still on them. I will make the magic sleep potion out of the purple juice of this nightshade and some blue elderberry wine (he gathers these berries as he speaks slowly) mixed with the sap of the yerba manza. Hummer, get me some yerba manza by the spring and a bit of resin from the sugar pine.

(while Hummer brings some yerba manza and a bit of resin, Chipmunk is mixing the potion in an acorn cup of the Maul oak. Bush-tit takes no part in the proceedings. Vireo comes in with the spiderwebs and begins to bind up the Forester's limbs) Nuthatch arrives with the milkweed seeds and toys with them, blowing them away singing:

Oh who will sail with me
 Upon a golden sea,
 A sailor brown as a pine-seed's wing
 And every whit as free.
 Then brother let us go
 While winds of summer blow
 For soon will come the cruel Frost King
 To lay our shelter low.
 And what shall be our stars
 To guide our silver spars?
 Oh we will sail till we meet the Spring
 We roving milkweed tars!

CHIPMUNK

I wonder why Lizard is so long—Oh here he is! (Lizard comes in breathlessly with the dewed petals.)

LIZARD

I had a hard time—finding—the dewed petals—and I'm afraid—the Guardian Spirit—spied me.

CHIPMUNK

Well, then, we'd better hurry. Come Nuthatch. (Nuthatch floats the seeds over the Forester's head, saying:)

As the milkweed tassels blow
O'er you as you lie asleep,
Thus may cares and worries go
Leaving you in slumber deep.
One for noon, for morning one,
Wake not till the set of sun.

CHIPMUNK

Now I'll smear the potion on the poppy petals and paste them on his eyelids. (Chipmunk pastes the petals on the Forester's eyelids. Then all the brownies, Bushtit reluctantly, make a circle with hands and walk thrice round the Forester, once in one direction, twice in the other. Then they sing the following song to the accompaniment of pantomime)

Bind up his limbs with cobweb twine
Gathered by elves of the Magic Sign;
With poppy petals fresh with dew
Seal up his eyes with elfland brew.

Let all his cares and worries sail
Off on the milkweed tassels frail;
Sweet be his dreams without a frown
He will not wake till the sun goes down.

(the brownies begin to dance joyfully round the Forester in celebration of their sport when in walks the Guardian Spirit of the Woods. At sight of him they scatter and disappear, save Chipmunk who lingers at the edge of the forest.)

GUARDIAN SPIRIT.

Mischief-makers, what have you been doing?

CHIPMUNK (sings in glee)

Sweet be his dreams without a frown
He will not wake till the sun goes down! (he disappears)

GUARDIAN SPIRIT

They have put their sleep spell over somebody (approaching the Forester) Why—it is—the Forester! Oh those mischievous elves. I ought to have followed Lizard faster. This is no time for the Forester to be asleep—warm weather, a dry east wind,

campers in the forest. But only one thing can break the spell before sunset. The Forester's favorite tree must wave a spray three times above his head and say the right words. Would that I knew his favorite tree! I must summon them all. (he steps to the edge of the forest and calls.)

Trees of the woodland all come here,
Danger perchance to us is near;
Come, wake the sleeping Forester;
Come, Pine and Redwood, Oak and Fir,
Cedar and Maple, Sycamore,
Willow and Elm I do employ;
Come speak until his favorite tree
Shall break the spell and set him free.

(enter the trees, each with a branch. They follow one another each speaking their words slowly and waving their spray three times over the Forester's head and passing on. Guardian Spirit stands to one side intensely watching silently during the pageant)

THE PINE

You meet my shaft on every height
Where any tree for life may fight;
And in the cities on the plain
For men I brave the storms again.

THE REDWOOD.

Wealth of the centuries stored in me,
Giant of plants—the redwood tree.

THE OAK

I give you shade for summer days
And make your winter hearth-fire blaze.

THE FIR

Grand mountain vistas for your eye
The while I live, and when I die
Lumber for ships and houses high.

THE MAPLE.

Fires on autumn hills I bring,
Sweets for winter, green leaves for Spring.

THE WILLOW

I fringe the streams with waving green
And breezes flash my silver sheen,
While at my feet the rushes lean.

THE ELM.

Perhaps on some far distant shore
I grew beside your childhood door.

THE SYCAMORE.

Of valued wood I cannot boast
But there are some who love me most;
My gold-green branches in their pride
So many happy bird homes hide.

(when Sycamore finishes speaking the Forester begins to move.)

GUARDIAN SPIRIT.

The spell is broken! The Forester awakes!
(Guardian Spirit, all the trees including Eucalyptus, Walnut
and Cedar who are following Sycamore disappear quietly and
rapidly as if fading away.)

FORESTER.

(suddenly rising as if with effort breaking bonds and lifting
a weight) Why, I've been asleep! What a remarkable dream!
I thought I was tied down and being covered up with branches.
(he smells the air) Good Heavens! I believe I smell smoke—
I ought to be in my watch-tower. (he hurries out.)

(Curtain)

ACT III. THE FOREST FIRE.

Scene, a rocky point of the mountain on which the Forester has
his lookout platform. The Forester is just ascending this tower.
A Ranger comes up excitedly. The telephone station is slightly
distant from the tower.

RANGER.

I couldn't get you over the phone—it must not be working
so I came to find you. There's a big smoke down on Bear Creek.

FORESTER.

Which side?

RANGER.

South side, near Great Forks. Jim says there was a party
of campers in there this morning.

FORESTER.

When did you sight it?

RANGER.

About noon—its got an hour's start on us.

FORESTER (after a moment's reflection.)

Take ten men, Frank, and make a stand on the Crest Trail—back fire carefully. Better take a couple of pack horses and provisions for twenty-four hours.

RANGER.

Can I take Jim Cramer?

FORESTER.

No, leave him for emergencies. Work quickly Frank. You've got an awful wind against you—thirty miles here—good luck to you. Say Frank, tell my wife to come up and answer telephone.

RANGER

All right.

(the Ranger goes out and the Forester climbs his watch-tower with field glasses in hand and looks out over the mountain landscape. He talks to himself.)

FORESTER

Pretty bad blaze already—lucky I didn't sleep any later. All this loss and trouble and danger due to some one's carelessness. (his wife comes up.) Why, Grace, how did you get here so soon?

GRACE

I was on my way when I met Frank—thought you would need me. The wind is furious—nearly blew me off the trail. (the phone rings.)

FORESTER

Just answer the phone for me, Grace—I've got to watch the fire.

GRACE (at the phone)

Hello—yes—all right—(calling to the Forester) Wilbur, Jim says the Auto campers are surrounded by flames—auto burned—the party in peril of their lives—must be rescued immediately.

FORESTER

Tell Jim to go at once with what help he needs.

GRACE

Hello—Jim—Wilbur says to go at once with necessary help—do be careful Jim—goodbye—Jim—(hangs up phone)—he was too excited to say goodbye. (Grace climbs to the platform and

watches with the Forester a few moments. The phone rings again and she goes to answer.)

Hello—yes—isn't it too bad—poor old man. Brother Jim has gone to rescue the auto party—goodbye. (calling to Forester) Frank says all the south side of Big Horn Mountain is burned over and the flames are nearing the top. They are back-firing on the Crest Trail. Mr. Thompson's big dairy barns are gone and old Mr. Shepherd has lost everything—house, barn and three hundred stands of bees—all he had in the world. (she goes up and gazes at the fire with the Forester.)

FORESTER (no longer able to suppress his angry and excited emotions)

Oh this awful waste of natural wealth year after year! Forests going up in smoke, rich soil washed into the ocean by floods, animals exterminated that man can never replace. It's like war—blind, senseless destruction. Thompson has lost his pasture. Old man Shepherd has lost his bees. In one year the grass returns, but it will take three more to bring the sage bloom back, and seventy-five, a man's life-time to restore the timber, even if there are no more fires; but the soil will never come back. (the phone rings again.)

GRACE (at phone.)

Yes—Grace—won't I do?—all right—(calling to Forester) Wilbur, one of the men with Jim wants to speak with you. (clasping her hands.) Oh I hope nothing has happened to Jim.

FORESTER (at phone)

Hello—yes—all the party safe—what—Mollie Williams terribly burned—(after a pause) Oh no, Bert it can't be true—(after another pause) I'll be down as soon as possible. (he hangs up the receiver in a dazed manner and puts his hands over his eyes.)

GRACE

What is it, Wilbur? Can't you tell me? Oh I was afraid of it. Oh why should it be Jim! (she buries her face in her hands. The forester has recovered his composure and is standing beside his wife. Suddenly she rises and calls wildly) I don't believe it—he wouldn't leave me that way—without saying goodbye—he is just overcome by the smoke and flames—I am going to him—I must (she starts to run and the Forester catches hold of her arm.)

FORESTER

Grace, be brave—I am here—I will go with you presently. (Grace kneels down with her hands over her eyes. The Forester climbs the tower for a last look at the fire. The phone rings and the forester comes down to answer.) Hello—Frank—thank Heavens! (calls to Grace) Grace, Jim is not lost—he reached Frank's camp by another trail—got separated from his party.

GRACE (rising)

Oh, I am so thankful!

FORESTER (still at phone)

Well, better stay over there tonight for safety. All the men safe?—that's good—goodbye. (addressing Grace) I think we can go now, Grace, Frank says the wind is changing and the fire is checked on the Crest Trail. Jim's hands are just badly burned, but he needs you. You can't lose Jim in the woods—he knows the trails like a fox.

(the Forester and Grace are picking up their belongings, preparing to go when Williams appears, out of breath, hatless, with clothes torn and dishevelled. The Forester looks at him but does not speak.)

WILLIAMS

Mr. Graham—I came up—to surrender myself. I was to blame for this fire—and all the suffering it has brought. God knows—I have suffered too—my only daughter is disfigured for life. (he cannot speak for a few seconds.)

FORESTER

I am very sorry for your daughter, Mr. Williams.

WILLIAMS

I can never repay you for our rescue. This is one of those tragic days that changes a man's life. I see things—differently—now.

FORESTER. (deliberately, his eyes on the far-off mountains.)

No truth is ever won without sacrifice. I think you have learned the lesson of the national forest—the wealth of the land is for the benefit of all the people. If you will spread that truth the trials of this day will not have been in vain. Let us go down the mountain.

(Curtain. End.)

THE NATURE-STUDY REVIEW

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Editorial

THE DUNES

To one who lives in a locality where vegetation runs riot, where the hills are patched with forests and the valleys green with the meadow lands, and the untilled fields are exuberant with many colored weed blossoms, the dune lands look dreary and hopeless, even though one can see the purple in the shadows that allure the painter and the artist.

How different seem the shifting sands to those who love and understand Nature's ways. To such they are teeming with life and there are evinced the many intricate ways of outreaching vegetation to bind the sands and reclaim the region for plant and animal life. Never was there a better example of the glamour which enthralls the naturalist than is shown by the members of the Chicago Nature Study Club in their love for and study of the dunes of Lake Michigan, where they watch the struggle between the sand and the wind on one side and organic life on the other. It is a region where Nature is ever house-hunting and masterfully pitches her tents where she may not build of sterner materials. These dune lands offer many problems of surprising interest that will for years engage the energies of the very energetic and enterprising members of this Nature Study Club.

A DISARMAMENT OF NATURE

The relation of food supply to abundance of life was never better exemplified than by the return of and multiplication of beasts of prey on the land reservations where animals are protected. Under this protection the deer multiplied in numbers as did many of the smaller herbivorous animals and wherever this occurred wolves again appeared in the region. The timber wolf was exterminated years ago in the New England and Middle States but as soon as the deer became plentiful in the forest preserves they mysteriously appeared again. In 1907 we spent a summer in the high Sierras and our guide, a man of experience and good judgement, declared that if the Government wished to protect the deer, it would have to send hunters to kill the mountain lions which were destroying large numbers of deer every year.

The Government has now done this and during the past six years nearly 700 mountain lions have been killed and more than 3,000 timber wolves and more than 100,000 coyotes have been exterminated by official hunters. However, the cunning of these wary animals will insure that enough elude the traps and the guns of the hunters to start a new generation that will multiply and flourish in the region of plentiful food.

How like our Disarmament Conference this is! Though we scrap the dreadnoughts and limit their number there will still be enough left for war if a nation decides to undertake it. Meanwhile the chemists are working on deadly gases that the aeroplanes may distribute over wide areas and exterminate whole populations. Not until the nations have learned loyalty to the Prince of Peace will Wars end.



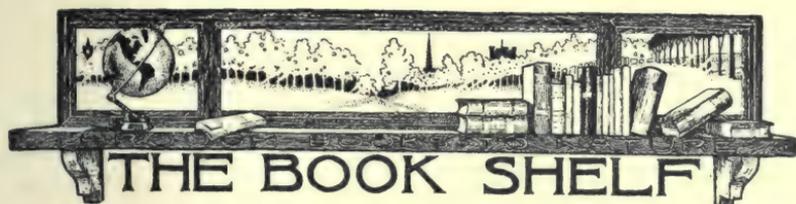
Explanation of Star Map

Al. Aldebaran in Hyades	NC. Northern Cross
An. Andromeda	NS. North Star or Pole Star
Aq. Aquarius	O. Orion
B. Betelgeuse in Orion	P. Pegasus
BD. Big Dipper	Per. Perseus
Cap. Capella in Auriga	Pl. Pleiades
Ce. Cepheus	Pr. Procyon, Little Dog Star
D. Deneb in Northern Cross	QC. Queen Cassiopeia's Chair
Dr. Dragon	R. Rigel in Orion
F. Fishes	S. Sirius, Great Dog Star
Fo. Fomalhaut	T. The Twins
Hy. Hyades	V. Vega in the Lyre
JC. Job's Coffin or The Dolphin	W. Whale or Cetus
LD. Little Dipper	

As November wanes and December comes, the attention of the Star observers are turned to the East, where magnificent Orion makes beautiful the Southeastern heavens. This is the most beautiful of all the constellations. It is identified by the three stars which make the belt which is just three degrees long. The sword hanging below the belt is really a curved line of five stars although the naked eye detects only three. Above the belt glows the great red star, Betelgeuse which was measured last year and found to have a diameter of 260 million miles. Below the belt glitters white sparkling Rigel. Above Orion is beautiful Aldebaran, in the V-shaped Hyades, and still above them, the misty Pleiades. To the North of Orion may be seen the Twins and below them Procyon, the Little Dog Star, and his companion, like a second pair of twins. At nine o'clock about December 1st, we may see a wonderful white, glittering star rising in the East; this is Sirius, the Great Dog Star. If we imagine a straight line drawn from the Pole Star direct to Rigel, a little above its middle, it will pass through a brilliant, yellow star which is Capella in the constellation Auriga. During December in the early evening Queen Cassiopeia's Chair is nearly above our heads; the three stars that mark Perseus extend South below the chair in a curve while Andromeda and Pegasus stretch over the Western skies and low near the Western horizon may be seen the Northern Cross, Lyra, Altair and Job's Coffin.

Uranus is the only evening star and is not easily seen. However, there is a splendid group of morning stars. Venus rises about an hour before the sun and Mars, Jupiter and Saturn are in the constellation of the Virgin and light the Eastern skies.

To use the Star Map to find the constellations, hold it above the head with the North at the North and the South toward the South.



Arithmetic Essentials. Drushel, Noonan, Withers. Three volumes illustrated, published by Lyons and Carnahan, Chicago & New York.

As one recalls the various arithmetics that have been written in the past fifty years, one doubts if there could be anything new in a text of this basic study. However, these three volumes are new, for on every page they get at the principles of arithmetic from the angle of arousing the interest of the pupil. Book I is for the little folks and its aim is to make the children realize many of the uses of arithmetic. Games of mathematical sorts are introduced,—dominoes for children to make them count, playhouses, marbles, the buying of play things, postage stamps, tickets for the movies, fruit, candy, pie, chocolate, nine-pins, furniture, clocks, baseball, all used to interest the children in numbers. Book II deals with the interests of grown-ups that may also interest children of the intermediate grades, using as a means the problems of the thrift garden, of elementary business, drawing to a scale, making maps, etc. Book III is for the seventh and eighth grades and teaches the use of graphs, tables, and equations in problem solving. Business forms and practices, construction and the measurement of surfaces, time reckoning and travel, taxation and interest, and thrift saving accounts and many other interesting means are used to train the pupils in the principles and practices of arithmetic.

This series is as interesting as it is practical and is practical because it is interesting. The authors are teachers of high standing and broad experience. They are J. Andrew Drushel, A. B., Teacher of the Pedagogy of Arithmetic, Harris Teachers College; Margaret E. Noonan, Ph. D., Professor of Elementary Education, New York University; and John W. Withers, Ph. D., Dean of the School of Education, New York University.

These arithmetics are already in use and the following is the testimony of the Principal of one of the most noted schools in the

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WHY IS THE NATURE STUDY REVIEW LATE?

It is late this month for the same reason that it was late last month and for the same reason that it will be late next month, - because the presses of our printer are overwhelmed and overworked by the great congestion of matter, text books etc. held up by the long printer's strike so that we have to await our turn. The composition on the December number is now going on and we shall try to catch up by making January and February issues into a double number. We entreat our subscribers to be patient, because really there is nothing else to do.

NATURE-STUDY REVIEW

Devoted to Elementary Science in The Schools

OFFICIAL ORGAN OF THE

American Nature-Study Society

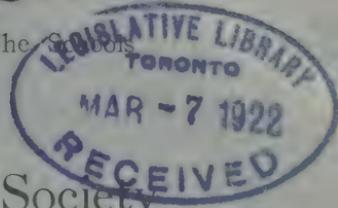


Photo by W. P. Alexander

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DECEMBER, 1921

VOL. 17 No. 9

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THE NATURE-STUDY REVIEW

VOL. 17

DECEMBER, 1921

No. 9

A Nature-Study Paradise in Western New York.

W. P. ALEXANDER

Buffalo Museum of Natural History

In the fall of 1920, the Buffalo Society of Natural Sciences together with the Erie County Society for the Protection of Birds, Fish and Game, started a movement to have the State acquire for the people of Western New York a tract of wild mountainous country that would be to the western half of the State what the Palisades Interstate Park is to the east: a great tract suitable for recreation, Nature Study and health building. Under the masterly leadership of Mr. C. J. Hamlin, president of the Buffalo Society of Natural Sciences, a committee composed of prominent men from several counties in this part of New York began its work which was consummated with the signing of the Ames Park bill by Governor Miller on May 2d of this year. The initial purchase of 7000 acres was made directly after the Park Commission was appointed by the Governor on June 6th, and as Mr. C. J. Hamlin, an energetic man, became one of the Commissioners it was decided to put the new Park to immediate use by establishing a camp therein for the benefit of the members of the Roosevelt Field Club, an active auxiliary organization of the Society of Natural Sciences devoted wholly to field Nature-Study.

Where the New Park is located. The Alleghany River flowing from Pennsylvania enters our State, and making a gigantic bow through the mountains of Cattaraugus Co., sweeps back into the Keystone State again looping within its 50 odd miles of valley the wonderfully picturesque highlands that forms the New State Park domain. At least, when the Park Commission has completed its work of extending the present nucleus, the entire 65,000 acres bounded by the Alleghany river on the east, north

and west and by the Pennsylvania State line on the south will be the playground of Western New York and the Nature-Study Paradise of which this article treats. The territory is wholly mountainous in character; the Alleghany Valley being 1390 feet above sea level is not included, owing to the fact that at present most of it is comprehended as the Alleghany Indian Reservation and consequently cannot be touched, but the Park area with its more elevated valleys, and richly forest-clad mountains, can well do without the valley of the river, for within it are scenic beauties comparable to much of the Adirondacks and the far famed Catskills in the East. The peaks often reach an elevation of 2500 or 2600 feet and the valleys extending from east to west contain clear, stony mountain brooks that in the vernacular of the region are called *runs*. Thus we have Quaker Run, Stony Run, Coon Run and many other fine trout streams that are equal to any that the writer has seen, and these gurgle their musical way through gorge, hollow and broad valley to empty their limpid waters into the turbid and black currents of the Alleghany.

Five or six miles from the broad black river up the beautiful Quaker Run Valley, the Roosevelt Field Club Camp of the Buffalo Society of Natural Sciences was established. The Camp site was ideal, being situated, as it was, in a grove of young deciduous trees on the banks of Quaker Run with noble Mount Seneca towering above and protecting it to the north. The Camp was a model institution large enough to accommodate 100 campers at a period. It was opened on Aug. 1st and ran for 5 weeks filled to capacity by young and old Nature Students alike, to the closing date. The writer was in charge of the field work at the camp.

Why the New State Park is a Nature-Study Paradise. In age, the region is mainly upper Devonian although the early Carboniferous is represented on some of the loftier peaks. Geology, then, played an important role in the field studies undertaken by the visiting students. In some fine outcropping ledges fossils, mainly Devonian, were found in abundance. Brachiopods and Crinoids created great interest among the students, owing to their fine state of preservation and extraordinary numbers. The Olsan Conglomerate, most beautiful of all the conglomerates, owing to the abundance and beauty of the pebbles found in it,

forms ledges on several of the mountains, and on Mount Onondaga two small caves have been located formed by the splitting and toppling of gigantic fragments of this rock. Originally the mountains of the present Park domain were covered by an almost pure stand of giant hemlocks. Some 30 or 40 years ago this virgin forest was wholly destroyed, the timber being cut for tan bark chiefly. The mountains today are reclothed by second-growth deciduous trees of which the hard woods are most in evidence. Hard Maple, Yellow Birch, Shagbark Hickory, Pignut, Chestnut, Beech and Hophornbeam are the predominating species. The Conifers are but sparsely represented, White Pine and Hemlock being the only kinds noted by the writer. Am. Yew is quite abundant in most parts of the park area. There is a curious overlapping of the Canadian and Austral floras and

faunas in the Alleghany State Park, making the area more interesting in many ways.

Among the more beautiful trees that are common here but reach their maximum development south of New York, are the Cucumber and Tulip.

These are found on all the mountains, but the oaks are few in number, White, Red and Chestnut being the only kinds found. Sassafras and Sourgum also find a place in the park and here and there one finds excellent specimens of the rather unusual Black Maple. Of the shrubs Mountain Laurel, Leatherwood, Moosewood and Mountain Maple are abundant. Hobble bush and



Mr. Alexander with some lively specimens for Nature-Study classes.

the Alternate-leaf Dogwood sparingly represent the Viburnums and Dogwoods although the writer discovered a single plant of Flowering Dogwood and the tiny Cornel known as Bunch-berry is quite a typical plant of the new Park flora. Of the plants growing in the Alleghany Park region 25 species of ferns, 5 club mosses, 17 true mosses, 325 flowering plants and 187 species of fungi were listed. It should be remembered that this list includes hardly any of the spring species and when these are added the catalogue will be materially increased.

Twenty-one species of fish occupy the waters of the park streams proper; of these three species are trout, the Brook, Rainbow, Brown. The new domain will prove a bird paradise, it is felt, for 102 species were listed during the first brief season of the new playground's existence. Two pairs of bald eagles were seen, and it is highly probable that this great bird nests within the territory of the Park. It is also worthy of note that the Hermit Thrush is the common thrush of the region. Five species of harmless snakes were taken, the Ringneck, Red Belly, Garter, Milk and Water being rather common. Unfortunately the Timber Rattler is also a denizen of one Valley at least, a fine four foot specimen having been killed in Wolf Run about the middle of August. The mammals of the Park, however, made Nature Study a genuine pleasure. Black bear abounds. The two small caves already mentioned in this article were discovered to be regular winter dens, excrement to the depth of a foot having been found in each. Bear tracks were disclosed on every field trip, often palpably fresh and these never failed to awaken keen interest in the nature students. Deer tracks and fresh evidence of browsing were also frequently seen. Fox dens were of frequent occurrence in all parts of the Park. The most common larger mammal that was actually seen was the Porcupine; it is thicker than the proverbial Spatterdock in the Alleghany State Park, and several of these grotesque animals could be seen most any evening on an old hemlock bridge not far from camp, a structure that they were bent on wrecking with their powerful gnawing teeth. Raccoon, Woodchuck, Snowshoe Rabbit, Cottontail, Skunk, Redback and Deer Mice, Red Squirrel and Chipmunk as well as Little Brown and Red Bats were regular denizens of the Park and numerous. Weasel and Mink were also reported but

the Gray Squirrel was conspicuous by its absence. Chipmunks and Deer Mice swarmed in the camp and of the latter several litters were born in the tents of the campers during the camping season. All of this afforded great opportunity for intensive Nature Study and such occasions were made the best of by all concerned.

It is to be hoped that next season that many more nature lovers will avail themselves of this splendid New Park and enjoy the experience that so many had this past season, that of being thrilled by finding here in Southwestern New York a mountainous region comparable to the much vaunted Adirondacks. It is wholly accessible by railroad or by automobile; one has but to travel to Salamanca and from that point either by train or auto, a ride of a dozen miles through the picturesque Reservation of the Seneca Indians will take the visitor to Quaker Bridge on the Alleghany River which is the gateway to the new State Park.

The visitor wishing to camp in the Park will find August an ideal month in which to enjoy the open life of the forest. The days are pleasantly warm, never oppressive, however, and the nights are cool and refreshing; in fact the entire region is astonishingly salubrious and invigorating. There are no mosquitoes or biting flies to fight, there being few places in which these pests can breed in the entire region. Campers will appreciate *the lack*



Photo by W. P. Alexander

Studying the denizens of the stream.

of insect attention that is conspicuous during the season in which the Park is open, at any rate, and this is but one feature that goes to make the place a paradise for nature lovers. Those wishing further information on the subject should write the Buffalo Society of Natural Sciences, Public Library Building, Buffalo, New York.

Prairie Dogs

ALICE M. PHIPPS,
Buffalo, N.Y.

The Cynomys were first called Prairie Dogs by the early French explorers and trappers in the West although they are not dogs but rather typical rodents. The name was doubtless given them because of their cheerful, puppy-like actions. While their cry could hardly be called barking, it is more like the short, quick, yet weak-toned barking or yelping of very young puppies. They are quick, and somewhat petulant, and seem full of sport, business and public affairs. The prairie dog is bright and vivacious, showing a hearty enjoyment of life, and is probably the most cheerful object of the western plains. Washington Irving says, however, that when hard pressed they assume a look of impotent wrath and defiance. They were also called "Barking Squirrel" by Lewis and Clark, who were the first to give a detailed description of the little animals.

They are from fourteen to seventeen inches in length and weigh from one and a half to over three pounds. They are brown in color and have a very short, flat tail about two inches long. They are robust little creatures with very strong limbs and claws. Hornaday says of one, "His legs are so short that when he is running along he looks as though he were on casters, and his short, black bordered tail seems at first to be a mere afterthought."

Although there are five species they are divided into two groups. The most widely distributed and best known group has its tail tipped with black, while the tails of the other group are tipped with white. They can be distinguished from the ground squirrels by their larger size, and shorter tail and from the gray gophers of the Canadian plains by their slightly larger size, distinctly brownish color and very short black-tipped tail.



From Country Life in America

PRAIRIE DOG AT THE DOOR OF HIS BURROW

Prairie dogs are found exclusively in the interior of North America, not only on the treeless western plains and valleys from North Dakota and Montana to Texas but also extending west across the Rocky Mountains to Utah and Arizona and southward into Mexico. Their vertical range is from 2000 feet on the plains to above 10,000 feet in the mountainous parts of Colorado and Arizona.

Their gregarious instinct is very strong and their "towns" may be found scattered all over the districts named. These "towns" are of every size, containing from a few individuals to millions in one "town" or colony, which number into the hundreds of millions. Towns twenty to thirty miles long are not rare. Probably the largest colony of all is in Texas and covers 2500 square miles.

These little animals are early risers, and the well-beaten tracks like lanes and streets thru the towns, are frequently used in making early morning calls on their neighbors. There is little grass or vegetation in the "towns." This is probably for protection but is exceedingly injurious to cattle ranges. When the town becomes over-crowded the citizens wander many miles away to start a new colony.

They are very easy to introduce but hard to exterminate. The only way to keep them within bounds in zoological parks is to build walls of solid masonry down to bed rock.

Their burrows are from four to five inches in diameter and are located on flat or gently sloping ground. They descend abruptly from eight to sixteen feet and then turn at a sharp angle and extend horizontally from ten to twenty-five feet. There are several branches from the main channel which usually end in rounded nests, family rooms, or storage chambers for fodder or refuse, altho they sometimes return to the main passageway or form a second entrance at some distance from the first. A little niche about five feet below the surface and at one side of the entrance tube provides a convenient resting place when they are forced to flee from danger. Here they stop and bark until notified that the danger is past or are warned to retreat further in to their burrows.

The black tailed prairie dogs, which are more numerous on the plains, pack the soil which they have dug from their burrows



From Country Life in America
A BURROWING OWL AT ENTRANCE OF PRAIRIE DOG'S TUNNEL.

around the mouth of the opening in a crater shaped pyramid, which is made firm by a great amount of tramping and pressing with their noses. It is often from one to two feet high and three or four feet in diameter, and serves not only as a dyke to keep out the water but also as an observation tower where the owner can sit and watch for the enemy or sprawl out and bask in the sunlight. The white tailed prairie dogs pile the dirt in a great mound on one side of the entrance.

Only one family of from four to six young are raised during a season and when about half grown they scatter and prepare burrows of their own. In fact, in spite of the gregarious habits of the prairie dog, it is seldom that there is more than one occupant to a burrow.

They hibernate during the most severe weather. In the south the hibernation is irregular and may last for only a few days, while in cold climates they sleep five or six months.

Burrowing owls often live and breed in deserted dog holes but never when the dogs are present as many people believe.

The prairie dog's food is mostly grass and herbage, including clover, lettuce, celery tops, carrots, potatoes, apples and the stems and roots of gramagrass as well as any native fruits. It also eats grasshoppers, but is very destructive to grain, alfalfa, and other cultivated crops, as well as converting fertile grass covered cattle ranges into dreary wastes by cutting irrigation canals across them, with great loss to the cattle owners. It is said that 2500 prairie dogs eat as much as a cow, and the pasture consumed by the large colony in Texas would support over 1,500,000 cattle.

There is a common belief that their burrows go down to water but, as water is practically inaccessible in many of the regions which they inhabit, this cannot be true. Like many rodents, however, they have the ability by chemical action in the stomach to transform starchy food in the stomach into water. They do not, therefore, require water.

They have many enemies in the fox, coyote, wild cat, eagle, hawk and especially the rattle-snake and other serpents. It is claimed that when a snake glides into a burrow the owner gives a special kind of bark and immediately all his neighbors come and fill up the hole with dirt, packing it hard and burying the

snake alive. Badgers and blackfooted ferrets, however, are their worst enemies as they can easily dig up a burrow and capture the occupants. It is even said that the Navajo and Pueblo Indians are extremely fond of them and in times of heavy rains capture them by directing the rush of water into their holes.

Since their plump little bodies make such good food for their enemies, it is necessary for them to keep continually on the lookout for their foes. This is done by sentinels sitting at full height on the watch tower. At the slightest sign of danger he begins a sharp bark which seems to say "Skip! Skip! Skip!," at which signal all the other prairie dogs rush for their homes, barking, and vibrating their tails, ready to disappear in their holes if necessary but, as they are very inquisitive, usually waiting for a second alarm signal, or, if they have disappeared, returning in a short time for another look.

Owing to the practical extermination of many of his natural enemies and the increase in his food supply due to the cultivation of large tracts of land, civilization has been of great help to this little rodent and he is fast becoming a national pest. Both the Federal government and the local authorities are trying various methods of relief but are almost helpless. One of the most successful methods is the placing of a spoonfull of poisoned wheat in the mouth of each burrow. However, the campaign of extermination is on and they will doubtless soon disappear from much of their present range.

YARROW

ROBERT SPARKS WALKER

Dear Friends:-

To me it seems an awful shame,
That I'm called a weed by name;
Now as I scatter my ripe seeds,
I join the ranks of other weeds.

My feath'ry leaves are much ad-
mired,
Their perfume sweet is oft desired;
My stem from one to two feet high,
Is covered with soft hairs awry.

My many grayish, white, small flow'rs,
In flat-top clusters catch the show'rs;
My rays of white or crimson pink,
Are rich enough to make you think,

To call me e'er a flower dear,
And when you see my blooms appear,
And say "a weed" I'll think you narrow.
I am

Your floral friend,

A. Yarrow.

Australia's Remarkable Lizard

DR. R. W. SHUFELDT
Washington, D. C.

There are a great many extraordinary lizards in the world's fauna, and nearly every country is inhabited by one or two of them. We here in the United States—at least those who have any knowledge of the species—are of the opinion that few forms in this group can vie with our own *Heloderma*, or with the Horned Lizards, erroneously designated by many as "Horned Toads." Should we journey to Australia, however, we would come across lizards there that easily take the palm as being among the most curious of any lacertilians known to naturalists. Without attempting to enumerate the various species of these—there are altogether too many for that—attention is here invited to the far-famed Moloch lizard of the family *Molochinæ*.

A few months ago, Mr. Dudley Le Souëf, Director of the Zoological Gardens of Melbourne, Australia, sent me an unusually fine specimen of one of these curious animals, which are very rarely seen in this country. Shortly after receiving this acceptable gift, I made a life-size photograph of it, a reproduction of which illustrates the present account.

In Australia this lizard is called the York or Mountain Devil, while science long ago placed it in the Agama family as *Moloch horridus*, the specific name having been bestowed upon it on account of its "repulsive" appearance. The animal is, however, entirely harmless and inoffensive. These Molochs belong in the fauna of Central and Western Australia; they rarely exceed seven inches in length, the one at hand measuring a trifle over six inches. It will be noted that the Moloch has a very small head, with minute eyes and mouth. The body is of a rich tan color or even darker, with certain symmetrical dark brown areas, emarginated with white, on the body and limbs. These characters sink into insignificance, however, when we come to note the remarkable array of spines of various sizes that cover all parts of its body—head, limbs, and tail. These spines resemble the largest thorns of a rose-bush, only they are not curved. Regardless of locality, they vary in size, and they are as sharply pointed as the sharpest of needles. There is a curved one over



The Moloch

either eye on the fore-part of the forehead, and one on either side of a curious median tumor on the back of the neck. While perfectly harmless in every respect, this lizard must be picked up with great care, or else a number of little wounds, like those inflicted by a bramble-briar, will at once be received.

In nature the Moloch is slow of movement, physically feeble and low of stature; doubtless it would long ago have been exterminated had it not been for its defensive armor of spines and prickles.

Its upper teeth are directed in a horizontal plane inward; but for what reason it is difficult to conjecture, as the Moloch subsists entirely upon ants, of which it will eat from 1000 to 1500 at a single meal. Those who are familiar with these proclivities often, where ants are very troublesome keep a number of these lizards about to exterminate them, or at least to greatly reduce their numbers. The ant upon which the Moloch usually feeds is the tiny black one with the offensive odor, which is such a pest in the country houses of the country where it is found.

Australia also has a most interesting Water Lizard that gets up on its hind legs and runs with marvelous rapidity. Another of its wonders in this line is the Bearded Lizard, known among the colonists as the "Australian Jew," possibly on account of its having a beard. Still other extraordinary representatives of this group in that most wonderful country are the Stump-tailed Lizards, the Spine-tailed Lizards, and the great *Cyclodus* or Blue-tongued Lizard, which has a large, flat tongue of a brilliantly blue color.

NEWS NOTES

Professor and Mrs. Liberty Hyde Bailey and their daughter, Miss Ethel, have again set sail for Southern Seas to gain a closer acquaintance with the flora of the West Indian Islands. They expect to explore The Barbadoes and hope to visit other islands and perhaps the South American mainland. They do not expect to return before April or May.

The Nature Lore School for Camp Councilors is to be held the last week of June at Camp Chequasset at Wellfleet on Cape Cod. Those wishing to attend should write to Professor W. G. Vinal, State College of Education, Providence, R. I.

A Nature-Study Project for the Grades and High-School

H. CLARK BROWN
Charles City, Iowa

No sane person of to-day would claim that the introduction of Nature Study into the school curriculum has been a wrong movement. Yet it seems to me that Nature Study as such is flat. What good does it do a child to know the number of successive moults of any given species of insect if the mathematical calculation is the extent of his use of that knowledge? Nature Study is following the beaten paths of traditional subjects and is most certainly going in the way of its own ruin. A Nature Study background is not merely a good thing for a child to have acquired in the schools, but it is quite essential, I believe, if he is to understand his environment, his social obligations, his instincts, his emotions, his play and his work. But as soon as Nature Study does not succeed in bringing forth these values, it fails in its most vital significance. Literature has failed and is failing in retaining the children's interest merely because there is no connection with life, with necessity, with humanity. It is time that we got away from that old standard of English teaching and that we adopted a more real, more valuable sort of method for teaching literature. One method whereby we can break away from the old rut of conservative English teaching, is in insisting upon American literature in our schools. A country which does not teach its own literature is not worthy of having a literature which it might teach. We may help increase interest in our literature by fostering it first and above all others. The child may get the world literature, later. He can understand American literature because it came from the same conditions from which he came. He knows that literature because he knows that life which it portrays. There is a certain delightful pleasure when one happens upon something which he already has thought about or seen. To have an author express your inexpressed motive gives one a sense of familiarity, which is very pleasing. And the child in his world is much quicker to take up resemblances and ideas of this sort than we are usually ready to acknowledge.

I would not put any more material into the hands of the school. We have too much there as it is. I would not suggest the following program as an extra. It is an attempt to coordinate to a certain extent the work in the departments of *English*, *Art*, and *Music*. And all of this is to be woven into and to be shown a part of the fabric which is known as human life. That is, Nature is studied as the background, the setting of the human stage. The present plan then is a union of the nature work with the literature. That is, the nature aspect of the American Literature has been emphasized.

Of course any such suggestion as this is in need of very great and careful revision to suit the needs of the individual class and time and locality. There is no sense of finality about the inclusions in any grade, as the outline is here given.

The advantages of such a project to the course in literature are that Nature is shown to be a part of life and literature. It is the background of the literary stage. Art is taught to be resident in the least labelled thing. Life is a succession of tableaux, of character sketches, of the man's soul expression in a landscape or a dwelling place.

Unless the teacher knows music, drama, sculpture, painting, and poetry quite as well as he knows his prose biography and prose tales, he is not prepared to carry out such a program as here represented. In selecting art and musical illustrations I have seldom chosen great masterpieces. The masterpieces of music would be beyond most of the students, and the masterpieces of sculpture and painting seemed to me to be too far removed often, from the particular interests of the student. Therefore, I have often taken little things of minor worth which seemed to me to be more like the poetry of James Whitcomb Riley, nearer to the heart, than many another more elaborate, and less loved thing. The American product has come first in our selection of literature, and always first when possible in both music and art. However, more often the exact illustration seemed so perfect when chosen from another land, as in Millet's, "Sower," etc., that I could not Americanize my subordinate groups.

A word might be said concerning the class room which would be required for such a project as this. An ideal classroom would be well lighted, would have one portion screened off for an aviary,

fountain, gold-fish pond, and conservatory. All of this should be so that it could be screened from the pupils entirely if the instructor so desired. However, the screening would defeat many purposes of the course. Then, in one corner of the room would be a piano. The walls of the room would want a number of good prints of pictures which were of greatest interest in the study. There should also be much in the way of framed portraits of the great dreamers whom the class studies. I think it a good plan to have an easel in front of the room where a frame is always ready to retain a picture as long as needed for study by the class. Authors may be celebrated on their birthdays by appearing in this constantly changing easel frame. This celebration of birthdays will work in especially well in the Biography project of the fifth grade.

The program suggested for the twelve school years follows:

GRADE ONE

Show the child in this grade the relation of the out-of-doors to himself. That is, teach simple stories about the naming of the flowers and birds. The story of the Robin's red breast, the old woman being turned into a red-headed woodpecker, etc. All of these simple tales will fascinate the children. Always have many pictures of birds and beasts which are studied, around the room. Make use of Mother Goose rhymes of such stories as that one about the old woman who lost her sixpence. Bring in nonsense jingles and lullabies. Few writers will be found more valuable to the children of this age than Eugene Field and Robert Louis Stevenson. The former in his "Love Songs of Childhood," and many another book of verse will be found to suit this age. The latter in his "Child's Garden of Verse" has constructed a child's world which can not be equalled in my estimation by any other sort of teaching material which can be found in the whole realm of literature. The human relationship of the boy to his nurse as shown in the dedication, and then the freedom and joy which comes from swinging so high that the boy gets a glimpse beyond the garden wall, seeing "rivers and trees and cattle and all," this is a thing which most children have experienced and which they can interpret.

From Field's "Love Songs of Childhood," the following seem to me to possess the greatest values for the first grade pupils:

1. "The Night Wind."
2. "Picnic Time."
3. "Swing High and Swing Low."
4. "The Brook."

Use the fourth of these, which is a lullaby, with such songs as the "Cradle Song" from Brahms, or the similar one from Schubert. The song "Sweet and Low" might be introduced at this time. Not for the children to sing, but for them to interpret and come to love. The group singing wants to be stressed, of course, but that more in connection with such things as "Mary, Mary Quite Contrary," "Twinkle, Twinkle Little Star," etc.

Much interesting material can be found for the first grade teaching. Every now and then one will come across little verses which do not seem to be great, yet which have a simple loveliness about them which makes them very well worth while for teaching material. Edwin Markham's, "Little Virgil's Window," is such a four-lined verse as could be understood and interpreted by the first grade children. Let them have many flowers about them. The teacher should bring them in from the woods and gardens as often as possible, and discuss them with the children. Let them know the superstitions about some of the flowers. Let them see the little man with his feet in a tub which the violet shows.

SECOND GRADE

We pass from Mother Goose and childhood jingles to folk-lore. I think that it is desirable that the children be introduced through the teacher to the folk-lore of our country. The negro stories, the Indian and then from them, some of the old-world tales can be brought in. The stories of St. Nicholas are good material. Let the children see how stories about animals talking might arise, how impossible stories about a man are built up. The origin of such literature may illustrate the need of discriminating in acceptance of much which is mere legend. The children should become acquainted with the animals and birds of their own locality. The Mumford colored bird plates can be hung around

the room, and the children might be encouraged to copy some of them in colors. They will enjoy drawing and coloring some. The teacher can have printed outlines ready, such as the Audubon societies and the Comstock Publishing Co. furnish, and thus reduce accuracy of the student to merely the color observation. Let the students make up stories of their own about what a bird which they have come to know might say to another, or about how the turkey got his gobble, or the bluebird his russet breast. Let them retell some of the stories read by the teacher. Most of the literature will have to be read by the teacher. This of course involves a regular and definite reading program to be carried out, entirely separate from the Nature-project work. That is, there is need for a student reading program here, but I have not found any folk-tales which are simple enough for the need.

As background reading, I should have in the classroom such books as Olive Thorne Miller's, "First and Second Books of Birds," and her "Queer Pets at Marcy's."

Then, for folk-tale literature to be read by the teacher, I should suggest Indian myths from any tribe which lived in the locality of the teaching, and, from Joel Chandler Harris, selection could be made from any of the following:

"Uncle Remus and His Friends."

"On the Plantation."

"Mr. Rabbit at Home."

"Told by Uncle Remus."

THIRD GRADE

For the third grade, I should develop with great care what I call the Nature Calendar. This can be arranged by the teacher and should contain only material which seems to her to be very good illustrative and accurate descriptions of the out-of-door world. Nothing sentimental, nothing having much ideal suggestion, nothing morbid should come into this year's work. The idea is simply to have within the year a calendar of verses which shall chronicle the changing seasons. Let the students keep notebooks and copy from the board from time to time the verses of songs or poems. Many of the loveliest little poems have

been set to music. In such a case, use the music always, but be certain that the poem means something as a poem first. Of course a copy of the poem if placed in the children's hands at a time of study will prove a great time saver, but I believe that only copying from the board will bring out the fullest response from the children. There is always danger in such a program as I am about to set forth that it will be taken too seriously. I should not wish this followed throughout for any one of the grades. But as a suggestion of the sort of calendar which one might construct, I have filled in, partially, a calendar for the third grade. Of course it is very incomplete, but it will suggest the sort of thing which I would carry forth. The year if it would mean anything at all to children, should be a celebration of great days. Children often reckon time from Thanksgiving to Christmas, etc. The main idea of this year's work then, is to give to the children some interpretations of the days which go to make up a year's calendar. Interpretations in terms which they may understand, so that the days of that and of other years will bring back memories and recollections which shall make the days more wonderful in spirit, more lovely in the thought element which compose them. The school year is divided in such a way as to render impossible the study of patriotic motives at the Fourth of July when they should be studied. However, I have put that motive in the calendar in the year schedule rather than the school program. The thing can be carried out by studying as the very last thing in June, the patriotic motive.

New Year's Poem and Stories.

Lowell—A New Year's Greeting.

New Year's Eve, 1850.

General Background.

Riley—A Child's World.

Morning—(Illustrate with Inness—Early Morning, Tarpon Springs.) Story and picture of Aurora, and Michael Angelo's figure of Dawn.

February 12.

Song—"The Little Log Cabin."

Tributes to Lincoln. Story of "A Perfect Tribute"—Mary S. Andrews Stories of Lincoln's boyhood, especially those which deal with the humanity of the boy. The pig story, the turtle, etc.

February 14.

Valentine verses. Origin of the day. Story of the Saint.

February 22.

Song—"Where Potomac's Stream is Flowing."

Tributes to Washington, incidents of early life, etc.

February 27.

Story of Longfellow's love for children. Account of children passing his place at the time of his death. The chair gift, etc.

March 17.

Story of the Exotic. St. Patrick's life and some of the best legends.

Songs—Oh Paddy Dear.

St. Patrick Was a Gentlemen.

Wearing of the Green.

Spring Motive.

Field—The Robin and the Violet.

Riley—Green Fields and Running Brooks.

Markham, E.—Joy of the Morning. (Illustrate with Breton's Song of the Lark.)

All of these themes can be used in coordination with the following in art:

Metcalf—Ice-Bound. (Painting.)

Rousseau—Spring. (Painting.)

Bringhurst, Robert, Awakening Spring. (Sculpture.)

For music—Beethoven's Minuet in G will give something of the joy and easy lilt of the season. Songs of wakening flowers and bird songs may be used. "Pussy Willow Has a Secret" is typical.

This is kite time and the kite literature should be made a day's study. Such interest in the things which are being done at that time by the children will prove valuable. Adapt the story of the old settler from Carleton and the quatrain giving the lesson will be clear,

"Boys flying kites haul in their white-winged birds,

We can't do that when we are flying words," etc.

May.

Story of the May-pole.

Irving—May Day Customs—and May Day From "Brace-bridge Hall."

Mother's Day suggestion. Use some favorite poem of the

teacher concerning Mother. Illustrate with Whistler's "Mother."
Bird Motive.

Sharp—Spring of the Year.

Van Dyke—Bird Poems. (Select especially those which imitate in words the song and rhythm of the bird's notes.) Use Victor bird records in connection with this study. Encourage repetition of bird calls on part of students. Hold guessing contests of calls in which the teacher does the imitation. Give these contests not alone for notes, but for quality of tone, and for rhythms. That is, let the woodpecker's various drums and tatoos be used. For spontaneity and rhythm and joy use with the songs such sculptural illustrations as Troubetzkoy's Danseuse. Alexander Wilson's bird poems can be used to good advantage here.

Lanier—The Mockingbird.

Abbott, C. C.—Blunders in Nest Building.

—My Elm Tree Oriole. From Birdland Echoes.

—A Morning in May.

Plant Motive.

Arbor Day.

Meaning and History. (Let the class actually share in the meaning, and plant a tree.)

Carry over the bird element throughout the spring, making use of Grinnell's, *Our Feathered Friends*, and *Birds of Song and Story*. Use Bryant's nature poems with great care. Look out for the moral. There is plenty of time for that in future time.

The Planting of the Apple Tree—Bryant and

Robert of Lincoln—Bryant, seem to me to be good illustrations of points which the students can understand and appreciate if rightly taught, at this time. The Goodales, both Elaine and Dora Reed, have written some delightful seasonal verses for children about this age. The poem, "Apple Blossoms," which is found in their collection of verses, is good as an example of the sort of material which the teacher of this plan wants to be on the watch for in building up the plant phase of this work. The Carey Sisters have done much in the way of nature poetry. A great deal can be got from them for all of the year's work. Helen Hunt Jackson has also written many very splendid nature verses.

Eugene Field, in "Lullaby Land," can be used here with such poems as "Buttercup, Poppy, Forget-me-not," and "Telling the Bees."

This brings us to the June program.

Summer Motive.

Insect life

Emerson—Humble-Bee

Field—The Oak and the Ivy.

—The Mouse and the Moonbeam.

—Frost, Robert—Blueberries.

Irving—The Angler.

Whittier—The Barefoot Boy.

Markham—The Butterfly

—The Cricket

Larcom, Lucy—Rock and Rill.

—In the Rain.

—Nature the Book and other nature verses.

Emerson—Holidays

Illustrate all of the summer motive with such works as:

Inness—After a Summer Shower. (Use legend of pot of gold.)

Corot—Summer Woods. (For dreaminess and nymphs.)

MacDowell—To a Wild Rose. (For pure idyllic purpose.)

Patriotic Motive.

Holmes—Old Ironsides.

Whittier—Barbara Frietchie.

Ballads. Develop the idea of the ballad, its origin and value.

Illustrate with group singing.

Yankee Doodle and the earlier national songs can be shown as coming from the ballad form.

Use any simple, easily understood flag or histrionic poem or prose bit.

Fall Work.

I think that as an introduction to the fall work, a few days spent with birds and pets would be interesting. That is, lead up to an interest in birds through an interest in pets. Black Beauty will well illustrate the sort of side reading story which boys will like. Again, Muir's "Stickeen" will be well studied in this place. Bring out the heroism of animals. The endurance, the strength, the nobility of some animal characters can be emphasized. Stickeen should be studied in class.

Next, the following course could be followed:

Whittier—The Huskers.

Frost—After Apple Picking.

Riley—"When the Frost is on the Pumpkins."

Larcom—The Indian Summer.

Abbott—An October Outing.

Halloween songs and ghost stories may be brought in.

For painting, I should use such as

Inness—Autumn Woods.

Van Marcke—Golden Autumn Day

and some works of Monet.

Thanksgiving Motive.

Bowell—The First Snowfall.

Bryant—The Twenty-Second of December.

Hemans—Landing of the Pilgrims.

Warner—Snowfall in the Woods.

Field—Ezra's Thanksgivin' Out West. (In *Profitable Tales*)

Larcom—Watching the Snow.

Seton—Thanksgiving and the Yule-Log. (*Country Life* 19:37)

Longfellow—Woods in Winter.

Emerson—The Snow-Storm.

Kilmer—Thanksgiving.

—The Snowman.

A special program should be held at which students might present some of the results of their work on this motive. At such, a play might well be presented in which the various Puritan characters would enter. Or, the play might be allegorical and introduce the Thanksgiving turkey, cranberry sauce, etc. There are all manner of great possibilities here.

Christmas Motive.

This should be the most emphasized of all the year's projects. The legends of St. Nicholas, the stories of Christmases of other lands, and the miracle legends about the birth of Jesus with the other birth stories can be used. Such material can be supplemented with the following:

Clark—" 'Twas the night Before Christmas."

Christmas Carols of all sorts (Longfellow—Christmas Bells
God Rest Ye Merry Gentlemen, Silent Night, etc.)

Field—The First Christmas Tree. (In *Profitable Tales*)

Longfellow—The Arrow and the Song. (To illustrate the meaning of the carol, At Christmas Time.)

Abbott—Christmas Out of Doors.

Irving—Christmas in England. (Sketch-Book.)

—Christmas Day.

—Christmas Eve.

Poe—Bells.

Van Dyke—The Other Wise Man.

THE FOURTH GRADE

I should divide the work of the fourth grade into the four major divisions of Nature work, Legend, Conservation and Patriotism. The first would have three distinct minor topics, and these would play into and between the other divisions. The program as outlined, therefore, would be much as follows:

I should open the work of the term with a few days discussion of pets. Children enjoy telling about their pets. They will often go into quite detail about them, and they thoroughly understand a person who can enthuse over a new rabbit or white rat, or, on a larger scale, a pony, or a horse. I think that in our school work we have neglected this interest whereas we might well indeed, have turned it to good account. I should have the teacher or the pupils read the story by Sydney Lanier, "Our Mockingbird." This would lead to stories by the children of birds which they have had. Again, John Burrough's "Squirrels and Other Fur Bearers" might well be read. And certainly no more charming account of pets can be found anywhere than in Marshall Saunders's volume entitled, "Our Pets." Use as illustrative art material for this part of the work, such things as Rude's, "Neapolitan Fisher Boy Playing with a Tortoise," Landseer's, "Saved" and Troubetzky's, "Little Girl and Dog."

This essay into the pet world will have afforded a good introduction to the sort of work which I plan to follow it with. The next phase of fourth grade work I have termed Animal Biography. The former introductory work will have been mostly in telling things, and in writing. The students may have written stories on such subjects as "My Favorite Pet," "My most beautiful pet," "My most troublesome pet," etc. Now we turn to a reading phase. There need be little written work in connection with animal biographies, but a great mass of reading. As a background

for this work, such a book as Hornaday's, "American Natural History," should be in the room for reference. The material chosen for the reading work, will be from such a list as the following:

Hawkes, Clarence—Black Bruin.

—Shaggycoat.

—Shovelhorns.

—King of the Thundering Herd, etc.

Roberts, Charles G. D.—Haunters of the Silences (and other works).

Seton, Ernest Thompson—Biography of a Grizzly.

—Biography of a Silver Fox.

—Further Annals of a Hollow Tree.

(Country Life 22:64)

(Excellent material to encourage observation and stories upon a favorite tree and its inhabitants of which each pupil will probably have a choice.)

—Lives of the Hunted.

—Trail of a Sandhill Stag.

—Wild Animals I have Known. (Probably the best specimen of animal and bird biography in our present day literature.)

In connection with this work the teacher may do well to invent games. That is, let the children make up animal biographies in class, giving their contribution aloud, each child adding one sentence to the story. As soon as anything which is not natural to the animal is brought in, that child is ruled out. Much interest is shown in keeping close to Nature, so that they can be among the last few left, as the game draws to a close. Let the children make miniatures of some such individuals as "Wild Animals I have Known" or the "Biography of a Silver Fox" pictures. Then, by use of a home-made stage and magnets, act out the animal biography before the class. It will make it very real. Visit zoos if possible, and museums also, for sketching work, and for habits of the animals discussed.

My next project for the fourth grade is an introduction to the world of legend. Lay this foundation carefully, and go slowly. It is very easy to go wrong here. Lead up to the study by introducing bits of description of foreign countries. Such a thing as Jackson's, "Bits of Travel" will serve well. Then take Haw-

thorne's "Tanglewood Tales," adapt the stories to the need of the grade, take his "Fire Worship," and other bits of exotic description, weaving all into the foreign background. Then begin with the Greek and Roman hero and legend material. There is no need to go into the detail of sculpture which would be in place here. The "Wrestlers," the "Discus Thrower," and many others will illustrate the life and games of the people who created the myths, as well as illustrating the games in which the heroes themselves indulged. There is a wealth of material such as is too great to present in such a broad outline as this. Everyone knows Greek and Roman sculpture and would have no difficulty in picking out the things which are most worth presenting as illustrations of the stories.

Then come back once more from this wonderland, and close the legend project with a glimpse of what our writers have done to our little characters of this country. That is, take up the modification of the folk-tale in the "Legend of Sleepy Hollow," "Rip Van Winkle," etc.

The conservation project which I should next include would come in the Spring. The hero and legendary material will have occupied the winter months. Then, when the sap begins to mount in the tree branches, and the flowers waken and the birds come, strike hard, hard as ever you have done, and then harder still, on the theme of conservation. Teach this by any method you please, save the old wishy-washy one of sentimentality. The boy doesn't care whether it is nice to kill a bird or not, but if he can see that the bird is the farmer's helper, if he can see that the bird is a living, feeling, thing, then he will not be so wantonly cruel. Be certain to extend the work to the protection of hawks for they are among our most abused and our most noble of bird helpers. Good poems always help in the nature work. Markham's, "A Blossoming Bough" is good in having caught the quick, eager spirit of Spring. Saintaine's "Picciola" will make the wonder of plant life greater. The "Song of the Cardinal" by Gene Stratton-Porter teaches bird protection without the usual moralistic accompaniment. Let the children make notebooks in which bird poems are kept. Emerson's "The Titmouse," and many other simple, beautiful things will find place here. The teacher may do well to use frequently such works as Harold Baynes,

"Wild Bird Guests." Interest the children in bird houses. The manual training department can be brought into coordination with the other work in this particular.

Next, I should introduce a short discussion of the circus. I know that this is a long departure from the orthodox method of doing things, yet much can be learned from the wild animal side of the circus which is lacking in any other project. Bostock's, "Training of Wild Animals," brings out the individuality of animals as few books do. It also emphasizes the animals treatment of men. Their contempt for certain bad traits in the human species, etc. Barrie, of our American animal sculptors, and Bonheur of France in her lion heads, Landseer of England, and Thorwaldson with his powerful "Wounded Lion," are all excellent material to draw from. Then, in music, there is a series of circus pieces, among which I think that the "Snake-Charmer" is one of the most perfect. Riley's enjoyment of the circus can be brought in here. Also, other circus poems, such as Joyce Kilmer's "The Big Top." Carl Hagenbeck's, "Beasts and Men," is very splendid material for use in this project. It has the advantage of being autobiographical, and thus leading up to the next year's work, and also has a distinctly nice, precise and perfect style.

Then I should close the year with the patriotic appeal as it comes from such poems as Longfellow's, "Paul Revere's Ride," and Emerson's, "Concord Hymn." There is splendid chance for bringing up history here, and also for the union of art in the statues of Daniel French, and of St. Gaudens. Their figures of the men of that period are excellent.

GRADE FIVE

For the fifth grade I have planned a study in biography, and more especially in autobiography. I feel that the latter should be emphasized more because it is real, because it comes closer to the author, and because it tends toward personalities rather than letters. The list from which choices are to be made, follows and is, I think, self explanatory.

Abbott, Charles Conrad—A Naturalist's Rambles about Home. (Simple, sauntering, Burroughsesque.)

Audubon—Life of John James Audubon. (By his wife) Contains much diary material, and some letters, and is extremely interesting. John Burroughs "Life of Audubon" could also be used here.

Bryant, Wm. C.—A Lifetime. (Poetic account.)

Burroughs—Boyhood Days with John Burroughs (Craftsman—22:240-52)

Burroughs—John Burroughs Life Revealed (Lit. Digest. 48-1441-2)

Clemens—Life on the Mississippi. (Will appeal to the roving boys of this age.)

Eastman—Indian Boyhood.

Garland—A Son of the Middle Border. (Parts to be read by Teacher.)

Hawkes—Hitting the Dark Trail. (Autobiographical.)

Hornaday—Two Years in the Jungle. (Invigorating.) (Will appeal to those of scientific turn of mind.)

Howells—A Boy's Town—(Very picturesque.) Take sections from this and have students choose a subject suggested here for an account of their own, adapting it to something in their life of which this reminds them. Let them write an account of an imaginary trip to some one of the places studied in one of these biographies, or let them pretend they are visiting one of the men whose autobiography they are reading. Parts of Franklin's "Autobiography" will appeal to the scientific sort, and also to those who are interested in the wittiness of the almanacks. Let them describe the house which would mean most to them if they were writing an autobiography. Ask which autobiography of those read is liked best, and why. Also, which author they think they come to best know through the autobiography and why?

Hudson, Wm. H.—Book of a Naturalist (An Englishman but of interest here because he is a contemporary, and because of his splendid style.)

Larcom, Lucy—A New England Girlhood.

Lewis—A Journey from Talapasco in Maryland to Annapolis. Apr. 4, 1730. (Worth considering as a piece of trip autobiography. Have students attempt something of sort

but in prose of course.)

Longfellow—My Lost Youth.

Lowell—Men, Women and Ghosts—(Hoops and Garden Games) Shows a bit of childhood recollection. A place biography.

Mitchell, D. G.—Dream Life. Only short selections to be read from this by teacher, to show the sort of thought or dream autobiography, in strict contrast to the fact of the other authors. "My Farm of Edgewood" is the same author's fact autobiography.

Muir—Story of My Boyhood and Youth. (I should make this quite the most important work in the whole list.)

Porter—Homing with the Birds.

Porter—What I have Done with Birds.

Porter—Why I wrote A Girl of the Limberlost. (World's Work 19:125 45)

Porter—Life Story and Ideals of the Bird Woman.

Thoreau—Journals (Portions from only)

Whitman—Autobiographies.

The autobiographical themes which will fit into this work will consist of accounts of a given time, a given occasion, a given place and a given journey. These will all be illustrated in the works studied so that the student will know exactly what is wanted. Biography will become through this method, I think, a living factor, and literary men will be real humans.

GRADE SIX

This is a period in which I should develop ideas as such. The story, the lyric is forgotten, save as it strives as an expression or mode for carrying the idea. The introduction to this year's study can be found in Whitman's, "There was a Child Went Forth." This is a study in the interpretation of the child. It is the thing which the grade tries to do. It is an attempt to relate the purely natural, the purely beautiful in art and the out-of-doors to the life of man. It is the expression then of art and nature in terms of ideas. One of the cheapest and commonest expressions, is an interpretation in terms of the practical. Yet even here there

is poetry and beauty. Harwood's, "New Creations in Plant Life" which deals with the work of Burbank is of great interest in expressing this relationship.

The first project of this grade then is the relation of literature to the home, to every day life of the family. This can be studied from such as the following:

Harlow, Joel—The Hasty Pudding.

Carleton, Will—Farm Ballads

Dunbar—Lyrics of a Lowly Life.

Frost, Robert—North of Boston—(The Code)

Longfellow—The Bridge—The Old Clock on the Stairs—The Psalm of Life—Birds of Passage—Evangeline.

Whittier—Snowbound.

The value of poetry as a vehicle of fable is seen in Whittier's, "Double Headed Snake of Newbury," and Emerson's, "Fable." Prose is served the same purpose, in Hawthorne's, "Twice Told Tales."

Then follows a series of poems in which there is characterization by application to the human attitudes or comprehension. Bret Harte's poems are excellent descriptive, vigorous bits, true to the out-of-doors. Begin with those in which there is little of the human element projected. Then continue through Freneau's, "Wild Honeysuckle," Bryant's, "June", "To the Fringed Gentian" Lanier's, "The Bee," "Sunrise," "Clover," "The Corn," and Bayard Taylor's, "Home Pastorals." Then compare the loneliness which nature inspired in Burns with the feelings which were experienced by nature poets of this country. That is, try to develop the difference in temperaments. Conclude this part of the study with William A. Quayle's account of "Winter Trees" in which the human characterization has reached a very high and remarkable degree.

This leads to a characterization of men. And Lowell's, "Agassiz" Markham's, "Lincoln," will well serve here. Of course there is a great sufficiency of statues to illustrate this work. St. Gaudens's Lincoln is the most notable for the last poem.

Patriotism then through symbols is easily suggested through Drake's "The Flag," and Whitman's, "O Captain! My Captain!"

From this we come to literature in a wider sense, for we are to consider literature as a mysterious vehicle for the conveyance of

not characterization now, but mood. Poe with his exquisitely exotic flavor, can be compared with Hearn in his melody and rhythm. The symbolism in "The Raven" is a new use of poetry as well as a new use of what once was a bird. Many simple, pretty little songs from Bohm can be introduced in the interpretations of nature as moods. The "Swallow Song," "Dance on the Lawn," "Leaflets in the Wind," are examples of only several of many. For prose at this time, bits from Burroughs's, "Wake Robin," and "Birds and Poets," might be chosen.

From the interpretation of moods, poetry goes to an interpretation of spirit. That is, the mood is an individual possession. The spirit is the possession of the race. And here we get the feeling of the eternal youth, the ever-returning Spring, the dawn, the glory of fresh, new things. The delicate, beautiful music of Mozart after he had been wandering in a wood often has the suggestion of the eternal laughing Spring in it. Bring this into the literary class-room. Bohm's, "La Zongana" has the rapid, eager, pulsing, strong spirit of this youthfulness of the race. It is not heavy, but pulsing, and eager. Lowell's, "To The Dandelion," is rich in suggestion. It develops the idea of Eldorado. The story of Spanish conquests with all of its symbolism and allegory can be brought in here. Also the meaning to the writer (Lowell) of Italy and of the eternal sunshine.

The "Chambered Nautilus" breathes the spirit of evolution which comes from this universal spirit of youth. The mystery of Poe, of Hawthorne, the mystery which was like MacDowell's, "Will O' the Wisp," is gone, and in its place there is the deeper mystery of life, the mystery of a Beethoven spirit in a sonata or better yet, in a fifth symphony. Use Emerson's, "Rubies" and other lovely fragments here.

Then, lest this be too far for the student, let us bring him back to earth in the last project of the year, and study for the moment the application of literature to the prose occupations of life. Markham's, "The Man with the Hoe," illustrated with Millet's painting, and Whittier's, "The Shoemakers" are admirable in this connection. The "Simple Cobbler" of Ward, in adaptation can be suggested. Longfellow's "Village Blacksmith" belongs in this same craft study.

SEVENTH GRADE

To those who would find fault with the last grade on the grounds that it is unorganized and too fragmentary, there can be a definite relief in this work. My seventh grade project deals with the Indian. The last grade studied ideas and thoughts in general. Now I propose to center attention upon a single piece of human thought as projected in one long work. And I have chosen for that work, as a nucleus of the year's study, Longfellow's, "Hiawatha." I do not think it is necessarily made any greater by having been given this place, but it will afford a guide to much material which I think the student needs, and which he would not get elsewhere. The study outlined briefly follows:

Playing Indian. (Introductory to the poem to be studied.)

Seton—Two Little Savages. (To be read outside of school as an extra, and discussed briefly in the classroom.)

Eastman, Charles A.—Indian Boyhood. (Excellent as a real background with which Hiawatha can be compared for truthfulness, detail, beauty and interest.)

Primitive Emotions and Life.

Ancestors of the Indian (Primitive men of stone age.) Illustrate with literature upon the subject, such as cave and stone dweller series and in art, Bartlett's, Primitive Man and Bears, "Barrias," "The First Burial," etc.

Hiawatha. The basis of the study. Present this with constant reference to pictures. Illustrations of Indians, paintings, photographs, etc.

Present the meaning of the woods and lakes to these early men, with some sort of definite illustration in art. That is, the hold of the "Shining Big-Sea-Water," can be illustrated with reference to the Ferguson Memorial Fountain of Lorado Taft in which Lake Superior stands above the rest. It is a wonderfully pretty display of symbolism in sculpture. If the students understand it they can interpret the meaning of the lake's fascination in this Indian legend. Let Taft's, "Blackhawk" be in a conspicuous place about the room throughout most of the project. It is worthy of much study and high appreciation. A story might be suggested about it which would parallel the Great Stone Face. If the students have not already had it, introduce it at this time.

The customs of the Indians can be developed at length. The character will come out gradually. Use besides, adaptations from Morton's, "New English Canaan" to show the attitude of an exceptional in old New England. Use Irving's, "Traits of Indian Character" (in Sketch Book), and Philip Freneau's, "Indian Burying Ground."

Introduce the Indian's attitude toward animals with Hiawatha's childhood, but amplify that with such things as Eastman's "Red Hunters and the Animal People," "Wigwam Evenings" and other Indian lore. Use MacDowell's, "From an Indian Lodge," with the folk-tale material. Also introduce the real Indian songs, such as "Worn out Moccasins", "In the Still Night," "Hiawatha's Departure," etc. If possible, a masque or pageant of some sort should be given which would represent this Indian theme.

Stray away from "Hiawatha" at the close, and take up the sort of Indian which Cooper represented in the "Last of the Mohicans." Have the children decide as to the reality of the Cooper Indian. Then wander for the last several weeks of study into the South-west and take up the study of Jackson's, "Romona. There is much splendid illustrative art material here in Ufer, Henri, Reni, and many others of the Taos Pueblo School. MacNeil's, "Prayer for Rain," is very good as a sculptural bit upon this strange Western land.

Close the Indian year study with a general view of the Indian. Use parts of Eastman's, "The Soul of the Indian." Interpret the Indian in the more human light of just attitude, and unbiased opinion.

EIGHTH GRADE

. This is again a period of ideas. Much the same as the sixth grade in that it strives to interpret poetry and prose in terms of ideas, but beyond anything which that grade attempted. The meaning of the sea, the forest, the prairies, the lakes, the interpretation of the whole of Nature, the adjustment of it to the moods and interests of man is attempted in portrayal here. The great value of the course lies in showing the general relation of our natural background to human thought life. There is a more insistent attempt at combination of nature and art and literature.

Literature in Interpretation of Every-day Life.

Kilmer—Main Street.

Roofs.

Irving—The Farm House. (From Bracebridge Hall.)

Courtship in old New England (Longfellow—Courtship of Miles Standish)

Whittier—Maud Muller.

Life of a country child—Porter's—"Laddie." Use with this the simple statues of plain home life. Walker's, "Her Son" is good as illustrative of the true-blue character of Laddie. "Little Sister" is a simple, lovable little character, and will be far more at home and more easily understood by these pupils than will one of George Elliot's. I prefer taking a less great thing artistically, and using the home appeal, the appeal of that which can easily be interpreted to arouse students to a liking for literature.

Comradship and Brotherhood.

Holmes—The Boys.

Whitman—Song of the Open Road.

Literature and the Out-of-Doors. An Interpretation of the Essay Meaning.

Abbott—Upland and Meadow.

Porter—Hidden Treasure—Intimate study of the moths of Limberlost swamp. (Country Life. 22:29-)

Long—Whose Home is the Wilderness (Illustrate with such paintings as Davis—Northwest Wind and Twilight. Whistler's—Nocturnes.

Porter—Moths of the Limberlost. Fuertes—Bird Portraits.

Porter—Music of the Wild.

Bryant—Forest Hymn and To a Waterfowl.

Hearn—Frogs (In Exotics and Retrospections.)

—Insect Musicians.

Ingersoll—Wild Life of Orchard and Field.

Sill—Our Tame Hummingbirds.

—Cheerfulness of Birds.

—Rhapsody of Clouds.

—Human Nature in Chickens.

Emerson—The Rhodora.

Mitchell, S. Weir—The Comfort of the Hills (Meaning of the Hills.)

—The Sea-Gull (The silenced song of unrest
of wave and wing.)

—Storm-Waves and Fog on Dorr's Point,
Ben Harbor. (Rich in imagery)

Song—My Heart's in the Highlands (use with the Hill and
Mountain urge.)

Abbott—Notes of the Night.

Carmen—Poems.

Burroughs—Bow in the Clouds. (Country Life 22:24)

Burroughs—Hay-barn Idyl (Atlantic 112:530)

Burroughs—Animal Wit Indoors and Out (Atlantic 109:196)

Illustrate all of above material with paintings of out-of-door
scenes, and with such music as comes from MacDowell, "In
Autumn," "To a Water-Lily," "A Deserted Farm," "Told
at Sunset," etc.

Double Nature of Man.

Make this a separate project in the years work. Take up
Stevenson's "Dr. Jekyll and Mr. Hyde," as a basis for the study.
Use Barnard's, "I Feel Two Natures Struggling Within Me."
Bring in the Bible stories of temptation as suggestion of the sort
of myths which have grown up around this figure of the two natures.
Use music which has two themes playing into each other and
struggling. Kreisler's, "Caprice Viennois" shows in part what
I mean by the musical illustration of the double nature.

Art Studies.

Markham—The Man with the Hoe.

—The Sower (Illustrate with Millet's painting and
Polasek's statue, "The Sower." Then bring in
Millet's, "Gleaners," and other pictures
dealing with the fields, thus completing the
whole song of the grain.

Prayer can be used as a study. I would let the instructor
select what he thinks best here. For simple child prayers, Rey-
nold's "Child praying" is excellent. For some of the noble
prayers of leaders, other illustrations will have to be found.
And for the simple prayer of common folks, use Millet's, "The
Angelus," and in music, Massenet's, "Thais."

Idealization.

Appreciation of human character. Many things may be chosen here. I only suggest one, Whitman's, "When Lilacs Last in the Dooryard Bloomed."

FIRST YEAR OF HIGH SCHOOL

This is the time when the boys are anxious to be up and away from the school-room. I believe that psychology would bear me out in the statement that often literature will serve as a release of enthusiasm which might otherwise be spent in actually leaving school and taking to tramping. That is, I think that if we put into our school work a period of reading in which tramping is the project, we will have turned the interest of the boys for the time being, away from leaving school. They will be better satisfied to remain.

Introduce the study with roaming songs. Horn's, "I've Been Roaming" is one such. Then follow something of the order given.

London—"Call of the Wild." (Excellent background interpretation of the year's work.)

Carman—Kinship of Nature.

Thoreau—Essay on "Walking."

“ “ “Wild Crabs.”

Muir—A thousand Mile Walk to the Gulf—(Compare with Audubon's Journal.)

Burroughs—Camping and Tramping with Roosevelt (A type of sophisticated, convenient, polite tramping in the Yellowstone.)

Taylor—Byways of Europe (For a bit of the exotic)

Thoreau—A week on the Concord and Merrimac Rivers. Develop classical allusions. Use Offenbach's, "Barcarole" for music. Also Debussy's "Afternoon of a Faun." Use here also, Emerson, E. W.—"Thoreau as remembered by a Young Friend."

Knowles—Alone in the Wilderness.

Lindsay—Adventures While Preaching the Gospel of Beauty. Sociological value of the tramp, and of these various expeditions. Muir's solitary expedition, and compare with this, the society of Thoreau and his brother on their trip.

Chapman, John—(Story of his life and work.)

Gray—Essay on Sequoia (Something of the flavor of the real tramping botanist is caught here.)

There is now a vast wealth of material which has come from the literature teaching of the nine grades. The job of the first year High should now be to assort and assimilate all of this material. That is, the historical development of our literature is our next project. The things which have been studied must be put in a chronological program. They must be related to each other now, not in content, but in their historical order. The natural is not dealt with at all, save as you bring all of the authors studied into this year's table. I can give very little in the way of suggestion for the work of this year. It is practically an American Literature course. There is this exception, however. Most of the materials studied for such a course have been taken up in one way or another, so that the year can be given over largely to biography. The short story has not been much used, and a certain period should be given to it at this time. Also, the drama deserves attention at this point. An interest in periodical literature may be excited by reference to it for review of the authors studied, and for short stories and critical comments upon drama and the arts and literature. I have followed this grade with a short list of suggestive materials. Not that I mean that all of these should be used, but it is the sort which will be helpful in a formulation of the course. Of course the content of the course will depend most of all upon what sort of thing has been most lacking in the literature study which the students have had previous to this grade.

Much of the following is teaching material rather than the sort of thing which I think the student should be asked to read. The instructor should scan periodicals for intimate studies of the men presented. Just a suggestion of the sort of material applicable to this year's work, follows:

Burroughs—Fifty Years of John Burroughs—(by D. L. Sharp in *Atlantic*. 106:631)

Burroughs—Indoor Studies (Especially the chapters on Gilbert, White, Thoreau, Science and Literature, and Solitude.)

John Burroughs' Supremacy as a Nature Writer—Current Literature 49:681

Burroughs—Whitman—a Study (For teacher especially.)

Ellwanger, George H.—*Idyllists of the Countryside* (Especially the chapters on Thoreau, Jefferies, Walton, White, Hardy, and Burroughs.)

Howells—*Literary Friends and Acquaintances* (Very valuable as an informal, friendly introduction to American authors of the nineteenth century.)

Mitchell, D. G.—*Am. Lands and Letters* (2 vols.) Conversational and interesting. Covers men from the time of John Smith to the Concord group.

Mills, Enos—*Story of a Thousand Year Pine* (For short story type.)

Morton,—*Song*—(Introduce the convivial lyric. Bring in Richard Hovey and the Stein song.)

Muir—*Steep Trails*—Use chapter on "Wild Wool." Compare with Thoreau in his discourse about nature's ways and wildness.

Traubel—With Walt Whitman in Camden (Excellent for a humanizing of Whitman. To be used by teacher in preparation.)

Warner—Study of countries as given in "Saunterings" and of literature and its relation to life in work called, "Relations of Literature to Life."

THIRD YEAR HIGH SCHOOL

The keynote of the second year's work would be localization of literature. That is, the students have a rather definite idea of the pageant which has come along from the earliest time up to the present. They know the great literature of this country. Now let them work with the literature which their own especial section of the country offers. Localize the work for the year. If the school is in Indiana, use the works of Mrs. Porter, of Riley, and others. If in Iowa, use Hamlin Garland and William Quayle. Introduce less artistic material for the sake of relating literature to life. Let it be represented as something which is in the making to-day. Use the Braithwaite Anthologies as backgrounds for the study of poetry. O'Brien for the short story and collections and criticisms of present day writers should be introduced. Then specialize upon the authors of whatever district the school is located in. Study the representation of the myths of the region, the legends, the folk-lore, as represented by the authors of that

part. Then study the pioneer motive. See where it has been used in the literature of that region, and how effectively it has been introduced. Discuss its further possibilities. Study the early lives of the authors taken up. Show how their environment produced the thing which they did produce in the literary field. For the Western Mountains, Mills', "Rocky Mountain Wonderland," Bret Harte's western tales, Joaquin Miller's "Songs of the Sierras," and many other like materials may be coordinated. In the prairie region, certainly Carl Sandburg's poem, "The Prairie" deserves especial study and thought. Each teacher must work his own program for this grade. There are as many possibilities as there are localities. And certainly one of the pioneer regions of our country which has only been slightly touched by literature offers as full and interesting material as does the older type.

Then, I should close the work of the year with the study of some such book as Hawthorne's "Marble Faun." I know of nothing which combines so successfully, art and literature as does this book. It is a marvel of delicacy of treatment. It will serve admirably as an introduction to the work of the following year, and will give the student the method of a careful, exact study of a piece of literature. Of course there is a great deal in sculpture which can be used with this. And with this excursion to the exotic, we are prepared for the work of the last year.

FOURTH YEAR OF HIGH SCHOOL

In a study of literature, certainly it would not be just to make the study merely American. We do not want such a well satisfied, cozy, tea-table literature such as England is contented with. And if we do not want that, then we must do all which is possible, to prevent it. I think that a study of connections, or exotics, in the last year of the teaching, would help to broaden our literature. There is no especial arrangement of the countries taken up, nor of the life studied, as I have given them, and the program is far from complete. As I have done throughout this paper, so here, I merely give a few suggestions. Because Lafcadio has such a remarkable style; I should begin with some of his things. He is part American at least, and offers a starting point, a landing

from which we can more easily push our boat away from our own shores. Also, as have most of the authors taken up here, there is the hint of the cosmic, the note of the universal which I think needs to be stressed more in literature at this time than ever before.

From Hearn, then, I should select some of the following:

“Insects and Greek Poetry”—Atlantic 111:618.

“Exotics and Retrospectives”—Chapters on “A Serenade”, and “Azure Psychology.”

“Japanese Miscellany”—Chapters on “Dragon-flies” and “Buddhist Names of Plants and Animals.”

Illustrate some of his Japanese fairy-tales with such suggestive music as Kreisler’s “Tambourin Chinois.” It is typically Oriental. Use Hearn’s, “Diary of an Impressionist,” for marvelous descriptive illustration.

Introduce the English study with such things as Mitchell’s, “Wet Days at Edgewood.” His literary appreciations of Burke, Piers the Plowman, and Goldsmith, will be of help to the instructor.

Use some of the best of the imagery and life in the “Idylls of the King.” Don’t labor over it. Hurry through the thing, emphasizing only occasional passages for their poetry, but most of it for its legendary value. Take up Jefferies’ “Life of the Fields.” and “Story of My Heart.”

In the French, read some from Fabre, especially the autobiographical portions in the “Life of a Fly.” Compare his ideals of life with Burroughs in such a thing as his “Gospel of Nature”—Cent. 84:195, or with Thoreau or Crevecoeur, or Muir.

Take up the Bible as a literary value. Forget the Theology. Use Mrs. Porter’s, “Birds of the Bible” in studying some of the psalm verses. Use Michael Angelo’s “Moses” and later, in connection with the brotherhood ideal, in the story of David and Jonathan, use Michael Angelo’s, “David.” The union of Michael Angelo and the story of David is a colossal undertaking at any time, for any person, but I believe that it will be infinitely worth while to get literature into terms of sculpture and painting whenever possible.

Try to develop criticism and a sense of values here. That is, read from such books as Howells’s, “Literary Passions,” and get the students to tell why they like things. They must express their

opinions and express them definitely. Such a book as this will help them to understand what opinion is worth, perhaps, and how it is formed.

I should close the study of the last year with emphasis upon the ideal of the brotherhood of men, as given in Whitman's "Calamus." And then let that idea of universal brotherhood work into and through the cosmic ideal as found in a brief review of the great pieces of literature which have been studied. Whitman brings this to one of its greatest expressions. Emerson urges it in "The Whole Soul," and Lorado Taft has put it into stone, in his "Fountain of Time." "Time goes we say, Oh no;—alas, Time stays, we go." This is the whole culmination of teaching, to show that time goes on, but we, the transitory things in which thought for a moment flows and expresses itself, are soon lost. Our passions, our emotions, our thoughts, these are the lasting things in the universe, and it is to make these immortal that poets have written and musicians have sung and sculptors have worked through the ages.

The Story Told by Hop High

VIRGINIA BAKER
Warren, R. I.

My name is Hop High but I'm not a Chinese child. I'm an American—a little American toad.

I was born in a pond last June and a very funny baby I was. I had a tiny head, a tiny tail, no legs, and not much body. You see I wasn't a real frog then. I was only a tadpole.

In my neck were two wee breathing gills and instead of a mouth I had two little suckers. From these I sent out a sticky fluid with which I glued myself to a big weed growing in the water.

As soon as I felt strong enough to look about me I saw hundreds of other tadpoles clinging to weeds and grasses. I noticed that some of them were wiggling their tails, so I began to wiggle mine. My! how fast I could make it go.

I clung to my weed a week and then I grew very uneasy. I felt very brave indeed, so I plunged right into the water. Then I discovered why my tail was made to wiggle for, by wiggling it, I could paddle anywhere I chose.

The other tadpoles plunged into the water, too, and we had a splendid time. At first we were afraid to venture far from our weeds; but we soon became bolder and chased each other all over the pond, every one trying to see which could make his tail wiggle the fastest. I beat in that game.

After being in the water a while my looks began to change. From the back of my head a membrane slowly spread over my neck, covering my gills and making me appear to have no body at all. I found, too, that I had a mouth and, with my strong horny jaws, could bite off the ends of small plants. Those plants tasted good for I was hungry all the time.

The more I ate the larger and stronger I grew. Then a strange thing happened. One day I found I had two long hind legs and that, by using them, I could swim about very swiftly.

Next my eyes began to grow large while my mouth widened and widened until it stretched quite across my face. At the same time my tail began to grow shorter and shorter. Then, suddenly, a pair of front legs shot out from my shoulders.

While these changes were taking place I kept longing to find another home. Many times each day I went to the edge of the pond and jumped out of the water. I found I liked the land very much. Hundreds of my little friends came out of the pond, too.

You see our gills had turned into lungs and we could breathe more easily on land. When in the water, we had to keep rising to the surface to get fresh air.

Not long afterwards we lost our tails entirely. Of course we didn't mind, for with our splendid legs, we really didn't need tails. Besides, we were now ready and eager to say good-bye to the pond. And, one night, a great crowd of us left our watery home forever.

Oh, such tiny creatures as we were! And how timid we felt! We were so afraid that, for several hours, we kept close to the pond's edge. When day dawned we were still more scared and hid under the leaves and grass-blades. But at the coming of darkness, again, we began to hop about a little.

For two or three days we remained in hiding. Then, as nothing harmed us, we plucked up courage and started off to seek our fortunes. We did not go far, however, before we found that there were enemies all about us. We discovered that snakes,

crows, hawks, hens, and ducks like to eat tender baby toads. Many of us were killed by these hungry creatures.

On and on we went for three weeks. One by one my friends found homes that suited them in fields and cellars until, at last, I was left quite alone. But, one day, I came to a beautiful garden and then I, too, stopped for I knew that I should never chance upon a more delightful place.

I was now an inch and a half long and a regular roly-poly of fat. All over my smooth brown back little spots were beginning to show.

The garden was full of bugs and worms and I didn't do much but eat all night long. During most of the day I slept quietly in a nice damp place under a pile of white rocks. Toads don't like warm dry bed-rooms.

I found that the garden belonged to a dear old gentleman and his wife who liked toads. Often I heard them talking about me. They called me their "little helper" because I ate so many creatures that were harmful to their beautiful shrubs and flowers. I was not one bit afraid of either of them.

But, at last, I got a terrible scare. The old people's little grandson came to visit them. It happened to be a rainy morning and I was out of bed for awhile.

The boy came racing down the garden path, where I was sitting, and, at sight of me, set up a shout. I was afraid to hop, so quickly turned upon my back and pretended to be dead.

The boy kept very still and did not touch me. Indeed he was so quiet that I thought he had gone away. So, after a time, I decided to come to life again. But the moment I moved my little orange paws I heard him laughing again, close beside me. Quick as a flash I was on my feet and hopping off as fast as I could go.

Then the little boy clapped his hands and laughed again. "Oh, Grandma!" he cried. "Your dear little baby toad jumped way up in the air. I'm going to call him Hop High."

After he called me "dear" I wasn't afraid of the little boy any more and we soon became fast friends. Near the garden gate was a large flat stone with a hollow in its centre. On hot, dry days the boy kept this hollow filled with water. And when I came out at sunset I would sprawl in the water and soak myself through and through. Those nice baths kept me well and strong.

Of course I was growing bigger daily and, at last, my coat became very tight and uncomfortable. So I took it off. This is the way I managed.

I sat down with my back humped, my head bent down, and my feet drawn under my body. My skin had already begun to split across my breast and down my back.

Then I puffed out my body and used my lips and front feet to pull the skin over my head. Next I rubbed my hind legs against my body until they were free. Lastly I stripped the skin off my throat and front feet. All this skin I swallowed and it was a big mouthful.

But didn't I feel proud of my new suit? It was so handsome and so comfortable. Now, as I grow larger, I am obliged to have new clothes every few weeks.

I stayed in the garden all summer but, as cool weather approached, I burrowed backwards into the ground and slept snug and warm all winter. I didn't wake again until spring. And here I am ready to eat all creatures which harm flowers and fruits and vegetables. For anything, from a gypsy moth to a spiny caterpillar or a long wriggly earthworm tastes delicious to me, little Hop High.

Notice

The publishers are glad to advise readers that the congestion at the press is practically cleaned up and we can soon look for *THE REVIEW* to appear on time. The January and February Numbers will be mailed about the tenth.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN
ELEMENTARY SCHOOLS

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Editorial

"The study of birds and trees and animals fills any regular fellow with a sense of justice" was the statement of fifteen year old Jimmy Bradley before the Congressional Committee that had in charge the affairs of the District of Columbia. Jimmy was pleading for the continuance of nature study in the Washington schools and it is to be hoped that the Committee received enlightenment through his testimony. Jimmy's statement is worth the consideration of educators; this phase of the value of nature study has been ignored by too many. As soon as a child becomes interested in a plant or a creature and comprehends the way it solves its problems in order to keep on living, he becomes its protector without any preaching on the part of anybody. That is,—he does if he is "a regular fellow" and happily to that honorable class belongs a majority of American Lads.

A sense of justice is an invaluable asset to a citizen of a republic. Upon it depends our future as a Nation. As we wax greater in numbers and in diversity of interests, the greater is the danger of cleavage between classes struggling for what they believe are their "rights." Therefore it is most essential that our citizens possess a sense of justice whose motto is "Live and let live." An enlightened vision that sees the other fellow's standpoint and a will to treat it justly may well have their origin in the protection of song birds or trees given in early boyhood by "any regular fellow."



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