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## UNDER THE OPEN SKY

#### BY THE SAME AUTHOR

# The Study of Nature

By SAMUEL C. SCHMUCKER, Ph.D.

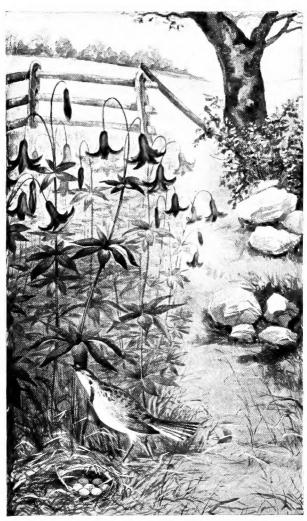
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THE MEADOW-LARK WITH HER STREAKS OF BROWN AND BUFF

## UNDER THE OPEN SKY

## Being A YEAR WITH NATURE

By SAMUEL CHRISTIAN SCHMUCKER

WITH ILLUSTRATIONS BY
KATHERINE ELIZABETH SCHMUCKER

PHILADELPHIA AND LONDON
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""Go forth under the open sky, and list
To Nature's teachings."

-BRYANT.

#### **PREFACE**

The purpose of this book is a very humble one. The writer makes no claim to scientific discovery or to remarkable insight into Nature. But the woods, the hills, the stream, the beach, with their animals and plants, have been his chosen study and his constant companions through many years. He has tried at the same time to keep abreast, through both laboratory and library, with the modern movements in biology. During much of this time he has been a teacher of teachers and a lecturer on these subjects in their untechnical aspects.

His aim, then, is to help people who are feeling in themselves the quickening modern longing for contact with, and understanding of, Nature in her simpler manifestations. It is these he would send out-doors, with the alphabet of nature lore in their possession, that they may themselves spell out the wonderful language—easy to read in its beginnings and inexhaustible in its profundity—that is inscribed over the face of Mother Earth.

About one-third of what has been written here has previously appeared in the pages of the Ladies' Home Journal. The kind-liness with which it was then received has suggested a fuller and more connected treatment of the subject than was there possible. The thanks of the author are due to Mr. Bok for many kindnesses, not the least of which is the permission to use again the material then contributed to the Journal.

S. C. S.

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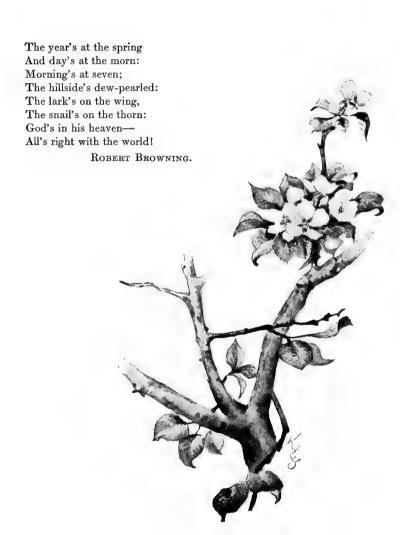
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## **SPRING**



## MARCH

#### WHEN NATURE'S YEAR BEGINS



HE nature lover's year begins in March. That is when God's year begins; and any one who loves God's out-doors cannot but begin his year when it does. In the history corner of the

library, in the office of the business man, on the engagement list of the society woman, the year may begin on the first of January. But the real year, God's year, Nature's year, begins, for those of us at least who live on this belt of the earth, when the sun crosses the equator. For six months the southern half of the world has had its turn; now ours comes again. The sun begins to smile on us earlier than this, and we warm up to him; but now the smile breaks into a joyous laugh, as he comes across the line. The long days are with us, and the short nights. Our friends in Buenos Ayres and Melbourne must be content with short sun visits, as we were driven to be a few months since.

#### THE SUN A POOR TIMEPIECE

At this season the sun joins in the general rush. He is trying hard to catch up with the clock, which in February was fifteen minutes ahead. Our sun, to tell the truth, is a very irregular timepiece. Astronomers, who need time, and need it correct to a fraction of which even a railroad never dreams, cannot use him at all; and they set their timepieces by the stars. The old sundial went out of use, not simply because the shadow was not sharp enough to tell the time closer than within five minutes at the best. The great trouble is it does not keep unvarying time. So we have contrived a clock, which shall make the interval from twelve of one day until twelve of the next always of the same length, and still come out even with the sun in the long

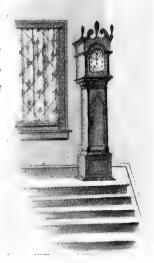


MARCH 21

run. So four times in the year the clock and the sun are together in their race. From the middle of April until the middle of June the sun is ahead; then he drops back of the clock until, startled, he recovers himself and in September again drives ahead. But the spurt does not last and the steady, unemotional clock leads from late December until the April meeting comes once more.

The truth is, the unvarying regularity of Nature's laws does not produce the dead uniformity of our mechanical creations. She allows so many laws to act at once in the same matter that there results a divine unevenness, underlaid by an all-pervading rhythm, that is never monotonous, yet always accountable when once we know the forces that are at work.

And, by the way, it is only a part of our general egotism to lay all this seeming irregularity at the door of the sun. Of course it is our own old earth that is to blame. If she travelled in a circle, time would be evenly divided. But her circle is flattened and the sun is nearer one end. She



parts with him to go to the far end, quite reluctantly, and hastens to near him as she turns her most distant point. And for all this natural reluctance and equally natural haste, because for sooth it does not keep pace with our cold and calculating clocks, we blame the sun. But he goes on undisturbed and now he is bringing us our great spring feast.

#### EASTER COMES

How blithely man packs together in his mind the most incongruous things and makes of them a charming mixture whose ingredients it is often most difficult to untangle! So it comes that on Easter we have our eggs, and of all eggs in the world, rabbits' eggs. How strangely the ancient world, the Christian era, the old religion of our pagan ancestors as they roamed the European forest, and our modern returned sympathy with nature join to make this a joyous feast.

The old Hebrew tribes, celebrating their feast at the return of the sun, with the sacrifice of the young lamb, and linking it in their minds with their escape from their MARCH 23

bondage, furnish the earliest traceable link in our chain. The Christ, whose visits to the central city of his race at the time of the great spring feast are the dividing points of his life, met his death at the hands of his foes the day before the feast. Two mornings later the joy of the woman who mistook him for the gardener, and whose happiness has since spread over so much of the world, moved the festival one day later in the calendar. The earnest Bishop Ulfilas and his coadjutors who brought their good message to our Teuton ancestors of the European forests found there too a festival of the returning year; and while the good Bishop could cut down the sacred oaks, in his desire to show them the helplessness of their gods, he could not so easily root out of their hearts the old pagan faith. new, as it always must be, was tinged with the old, and our spring feast has taken the pagan name of Easter,—for Easter was the name of the goddess of the dawn, and in our home and amongst our children we celebrate the feast with the eggs of the rabbit. So on the first Sunday after the first full moon after the sun crosses the line we celebrate our Easter. It is true that, as we use the clock for a conventional sun, so in finding Easter we use a conventional moon. But in most years the result would be quite the same, and probably is never more than one week out.

But in the newness of the times we are growing back to a touch with nature; a tender, sympathetic, spiritual touch, closer than any of our forebears ever knew. And so we celebrate the feast with our purest and fairest flowers, a sacrifice more innocent than the blood of lambs. And we sprinkle not the door-posts only, but our whole homes and hearts with the sweet offerings of nature's oncoming New Year.

#### NATURE'S SPRING PLOWING

Nature, the most industrious and persistent of farmers, is now getting the soil ready for the spring planting. All winter long she has been pushing her frost down into the ground and loosening it up, to make

it airy and porous. Now she is spreading the soil she has made over the places where she best can use it.

The farmer who owns but a small area of ground must content himself with patiently stirring up, over and over again, his little plot. Perhaps he may buy in concentrated form the few elements his plants are robbing from the soil, and throw them back again in the form of fertilizers. Nature is richer in land and may be more prodigal. She will be content on her highlands with a more meagre crop. But it is the meadows of her farm she dearly loves. It is into them she pours out her best resources, and they reward her by giving her their most lavish returns. On that old backbone of the mountain amongst the crags of gneiss and granite, she has been breaking up and getting ready for transportation the alumina and potash and the magnesia. From that rounded knob she has slowly been loosening the lime; from the edges of these cliffs she has been cracking off the sandstone. So, all winter

through, the materials have been gathering. Then on the hill-sides the old leaves and the sticks have been accumulating. they have been softening up and getting ready to disintegrate. But all have been held in place by the ice and the snow. all is ready. Once more the sun is "as a bridegroom coming out of his chamber," once more "as a strong man" he "rejoiceth to run a race." The snow melts,—the ice loosens up; the water which has so long lain chilled, too stiff to run down hill, now too feels the quickening impulse, and yields to the enticement of Mother Earth and to its own most natural inclinations and goes leaping and bounding down to the lowlands. With it is carried its most precious freight. Clear, beautiful, limpid water is the water we admire. That is because it so best serves for drinking. Our most immediate need blots out our perception of the blessing of mud. But when the spring floods pour down our valleys they carry with them all the loosened richness of absolutely virgin soil from the highlands and

all the mouldering, enriching, fertilizing admixture of leaves and sticks. But when the river meets the meadow lands it spreads out and carries all over this level ground, which it had made by this same method in years gone by, a new and richer layer. When the water has gone back into its winter channels, the plain at first glance may seem a sorry sight. Fences are down, houses perhaps are swept away, a coat of mud covers everything, while against every projecting twig and stone hangs an untidy coating of leaves. But the fences and houses are not of Nature's making, and it is not strange if she is sometimes careless of the intrusions on her fairest fields; and all the untidiness will soon be mantled with a splendid wealth of grasses and sedges, of alders and cat-tails.

It is on these broad meadows that men first won enough subsistence from Nature to gather themselves into stable groups. From the mud of the Nile and of the Euphrates sprang the first blossomings of the new plant of civilization. Here to-day men swarm in the densest clusters. A surpris-

ingly large portion of the human kind is born, lives, and dies on the alluvial soil of the Nile, the Ganges, the Yangtse, and the Rhine. And just as from the hills comes the renewing soil, from the hills come the rulers of the population in the valleys, or the guiding spirits of their settlers if the settlement is of modern happening.

I think it would surprise most of us, if we could see a map of our own country with a red line drawn around all its patches of alluvial soil, to realize how much of the fairest and richest of our land would be found thus encircled.

#### THE REVIVAL OF LIFE

The newness of the year first shows itself in the bird world, in the greater activity of those feathered friends who have been with us all winter long.

#### THE MEADOW-LARK CALLS

The song sparrows who have simply chirped about the thickets, only on rare occasions bursting into genuine song, now send out their distinctive triple challenge before launching out on their sparrow strain. And the meadow-lark, who has fed industriously but quietly all winter on the weed seeds and scattered grain until he looks as fat as a quail, before March is over will send out his long-drawn "Now see here" in calm irony, for he knows that you cannot see him.

The meadow-lark has come to have as elusive a suit of clothes as can well be found on a bird. The color of his feathers is by no means a hap-hazard matter. Slowly and gradually they have become what they are; and, while he himself is doubtless unconscious of the change, he could certainly choose no better for himself if he tried.

There are three well-defined purposes that color may serve in the bird world, and the meadow-lark has taken all of them for his own. A bird may dress himself so as to elude his foes, to woo his mate, or to summon his children and friends. When he dresses to escape the notice of his enemies he must look like the background in which

he lives; and in our latitude a groundloving bird must be sombre in color. The meadow-lark, with his streaks of brown and buff running lengthwise of his body, is practically lost in the maze of grass stems and shadows amongst which he chiefly lives.

But he is not doomed to wear altogether sombre clothing. While he and his mate have backs colored with reference to their enemies, their breasts are surely colored for each other. The whole under surface is a rich canary yellow, with a beautiful crescentic necklace of black. It is chiefly in the heart-to-heart talks of lovers, or in the congregation of their friends, that this beautiful adornment is conspicuous. The casual observer might see meadow-larks over and over again, and never suspect that they turned towards the earth so lovely a vest.

#### A BIRD TRICK

These two color schemes are plain in their purpose, but the third was long misunderstood. "Showing the white feather" MARCH 31

has always been recognized as a common bird trick, and almost uniformly it has been misinterpreted. It is not a sign of cowardice at all, but at least of brotherly, if not of parental, love. Later in the season, when she is followed by her young, if you are walking through the fields you may flush a mother meadow-lark. Away she flies, alternately fluttering and sailing, in low, level course much like that of our bobwhite. But she soon reveals her identity by spreading her tail, showing white feathers on either side. These are her signal for her young to follow her. When they fail to come she often lights on a fence-rail and flirts her tail, spreading and furling it repeatedly so as to catch their attention and gather them to her as they scamper through the grass.

During the earlier part of this month the turf is so short and curly that the meadow-lark feels that it is a poor protection. So he is very apt to sit in the trees, where he can see from afar the coming of his foes. His reedy whistle too is withheld, until later

in the month. And because his yellow breast, now growing more brilliant in readiness for his nearing courtship, would betray him amongst the bare branches, he is quite in the habit of turning his back to any living thing in the neighborhood whose movements he mistrusts.

But it is not only or even chiefly the animal world that feels the glad return of the sun. The plants too are peeping out to welcome him, perhaps none so signally as one of our most despised swamp plants.

# SKUNK-CABBAGE SPROUTS

A flower pushing its way through ice is certainly enterprising, and this the skunk-cabbage can do. It puts out its first flowers long before its leaves come, and it almost seems that one should call them the last blossoms of winter rather than the first of spring. One crisp February day I found in a swamp, beneath a clump of alders, a number of these blooms. One was standing in a pool and was frozen tight in the

ice, another had lifted the ice as it pushed up, and a thin sheet was propped slantingly against it. A flower which is liable to venture out so early must, of course, be suitably provided with a good, stout overcoat.

Our humble friend is built like his more pretentious, old-fashioned cousin the calla lily, only on a more buxom scale. The great white enfolding spathe of the calla here becomes a purplish-red and firm coat, and, while the calla keeps hundreds of little flowers on the slender yellow rod that sticks out of its back-turned white cape, the skunk-cabbage clusters only about fifty on its firm rounded head.

But March is more congenial than February even to this enterprising plant, and this month sees the lurid cones pushing their way through all our swamps, while beside them soon will come the tender green spears which are to unfold later into the great, crisp, wide-spreading leaves that have given the plant the name of cabbage.



What an important part it is these swamp plants have to play! No sooner is a stream dammed back by any obstruction than Nature tries to fill up the lake so formed. From the hills above and around she brings her mud and dumps it into the upper end of the lake. The first high water would wash it all farther down did she not bind the soil firmly in place. For this purpose she uses swamp plants. The spatter-dock and the arrow-leaf grow well out in the water, and induce the first settlings of mud about their roots. Then come the cattails, with leaves erect and yet yielding enough to stand an occasional flood, and about their roots the soft ooze falls in a tenacious mass. Still farther back stand the bristling clumps of sedge, binding down the soil the others have gathered, but allowing runways for the water when it is high. These are followed by the sheet of lush meadow grasses, pinned down firmly with deep anchors of skunk-cabbage, every good-sized clump of which puts down about a hundred roots, each as thick as a leadpencil. All these plants are slowly marching down to wrest the land from the lake. It is true, no one plant ever moves, but it will be found each year that the new plants of each kind are growing a little farther forward and that they keep steadily on, always preserving the regular order of their An observing and quick-witted companion of many of my earlier walks used to speak of the skunk-cabbage, and its two close allies, the calla and the Jackin-the-pulpit, as "the aristocrat, the hypocrite, and the prodigal son." The fashionable associations of the haughty calla made its name most appropriate; Jack stands constantly in his pulpit, but those who know him to the very bottom know he is a most peppery fellow; while the skunkcabbage has associated so long with the swine as to carry a most unsavory odor. Under the circumstances, one is scarcely surprised that its doubtful fragrance should not suit our perhaps rather fastidious sense of smell. But there are animals other than ourselves that certainly enjoy it. Our honeybees, when they first come from the hives after their winter rest, find but scanty food. The earliest pollen they bring home to feed to the bee babies is the pollen of the skunk-cabbage. The delicate, honey-loving flies have scarcely appeared, and perhaps the lurid color and abundant pollen are more attractive to less dainty kinds, for it is they that visit these flowers at this season when we rarely find them elsewhere.

It is unkind to nickname a plant after its one fault. If it could defend itself it might not be so bad, but a plant is helpless. I wish some one could rebaptize this healthy, hearty friend of mine and give it some more appreciative name—"spring herald,"—perhaps, for it is our first spring flower, and it carries a trumpet beautiful enough in form and color to fit any message.

But it is not only on the ground and in the air that we see the signs of renewed activity. Even beneath the ground the creatures that have kept far below the frost line, or buried in deep sleep, are beginning to awake, and in the morning we find those long winding ridges in the lawn whose source is unmistakable.

#### THE MOLE AWAKES

"Dig" is expressed in every line of the mole's body. Digging is his life-work, and to this Nature has adapted his every organ. His eyes are of no use in this underground life, and so they have dwindled away until externally there is little sign of them. Objects he probably never sees with any distinctness, though he still can tell light from darkness. But he seems to recognize light only to avoid it. In the darkness of his tunnels not only would his eyes be useless, but dirt would be apt to get into them while he is digging; so they are gradually leaving him.

The ears, too, or that part of them that projects from the head, would be in the way. So they have been discarded. The inner and essential part of the ear, however, still remains, and the mole hears quite well.





The most remarkable deviation from ordinary animals is in the arms. These are very short, and the hands are broad, hard, and horny, and have very firm claws. When I catch a good, vigorous mole, I find I scarcely have force enough in my thumb and forefinger to hold his front feet together. He can often separate them in spite of all my straining. His other muscles are comparatively weak. The hands have been altered into great shovels, and when he tries to walk over smooth, level ground or on a floor he moves with odd, quick steps, resting on the sides and not on the palms of his hands. He reminds one of a wound-up toy that is held in the air and allowed to run down. But when he gets under the sod, the heaving line that forms over him as he digs shows that there he is in his proper element. Most animals would get dirty leading such a life, but you never see a cleaner animal than the mole. He comes out of the loose earth and squirms about a little, and he is clean. His smooth gray fur, shading to a silvery hue when it is

ruffled, is very short and close and exceedingly dry. Indeed I know no animal with a more velvety coat. He would be a delightful pet to handle were it not for his ceaseless wriggling. Then too he carries a strong musky odor. This latter, indeed, is his only defence and I fear it is a poor one. Certainly it does not usually deter a dog from snapping him up. But perhaps it is meant for his friends rather than his foes. Congenial moles may scent each other from afar, being denied the, to us at least, clearer recognition of the eye.

The mole is a reversible machine. He can run forward or backward at will. Probably as a result of this habit, it is wonderful how alike are the two ends of his body, his nose and his tail. Each is slender and each is bare; each is very sensitive, and the tail is just about as long as the nose. I think he uses whichever happens to precede, as a feeler, when he is making his way through his tunnel. For once having made a good big runway, he is very apt to keep on using it through the season. I doubt

not he is often forced to travel backwards through his burrow. Then his tail must serve him as an effective guide.

# NATURE'S USE FOR THE MOLE

When Nature wants something done, her plan is to inveigle an animal into doing it. The mole is bent only on catching earthworms. He makes his long burrow near the surface, and then travelling up and down its length he picks up all the worms that stumble into his way, his slender nose serving as an effective instrument for withdrawing them from their burrows. I think, too, he eats the beetles and cut-worms that lie in his path.

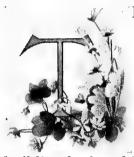
But while he is intent on his own work he is at the same time loosening up the soil and letting the air through it, and mixing up the leaf-mould with the earth, thus enriching the land. It is aggravating to see the ridges that mar the surface of our lawns and gardens, but we must put up with that for the sake of the good of the soil. Besides I suspect his claim to the land is older than ours.

# APRIL



ARBUTUS IS CERTAINLY THE FAVORITE

# THE GREAT SPRING RUSH



HE great spring rush is on. Out of bulb and tuber come the sweet spring flowers that are starring every sunny bank; out of the roots and trunks comes the rich store of sap that is

building leaf and blossom on our trees; out of the ocean come the schools of fish whose strange run up our rivers is one of the characteristic features of the spring's advance; out of the warm southland come the birds whose songs for the next few months will be the sweetest music Nature renders.

Ever since last July the trees have been getting ready for this moment. During the whole of the summer the water came up from the roots, carrying with it the small

but much-needed supply of dissolved soil. This current of crude sap runs through the white wood that lies between the bark and the torpid centre of the tree so inaptly called the heart. Out through the branches it flows and into the leaves,—for nowhere else is this sort of sap of any use to the tree. In the soft tissues that fill the gaps between the veins of the leaf this crude material meets the gases the tree has breathed in from the air through the many little mouths on the under side of the leaf. Wherever a plant is green and has the sun shining on it, there water and air and dissolved soil can be built up into sugar and starch and such like plant food. These are useful to the tree because in them is stored the power of the sun's rays, in such form that the plant can use it for doing its own work. This material too we use for food and from it we gain our energy. All the life power in the world, be it in the trees of the forest, in the beasts of the field, or in man himself, comes from the sun and comes by the way of the green tissues in the plant. As fast as this

rich sap is built up in the leaf it is taken away to be distributed to the growing portions of the plant. Its pathway now lies through the inner layers of the bark. Much of the precious substance, not being immediately needed, is stored away in the silver grain that runs from the centre of the tree to the bark, but probably most of it is carried down to the roots and gorges them with food, stored beyond the reach of frost. As soon as winter begins to break, and even before the snow has left the forest, this sap starts on its return journey up the tree, this time travelling, not through the inner layers of the bark, but up the outer layers of the wood. It is this rising flow of richness that is tapped from our splendid native sugar-maples.

#### HOW SAP ASCENDS

One of the very perplexing questions which the plant suggests to the mind of those who are trying to gain an insight into the very life of the tree is that of the nature of the forces which drive or draw or coax



the sap up the trunk. Certain it is that many agencies unit in this work. The tips of the roots of the trees are covered with a fine plush-like coating of delicate hairs. Into these the water soaks from the ground, and once there and mixed with the substances inside, it cannot soak out nearly so readily. This is just what happens when, to use a familiar illustration, prunes are put to soak in water over-night. By morning the water has filled the fruit until it is plump, and if then a tube were inserted through the skin from this a stream of prune juice would slowly flow.

The watery sap taken up by the rootplush is passed by the hairs to pipes beginning near the heart of the root, and then up the stem. The very fact that these pipes are small makes the water rise in them just as ink soaks into a blotter or oil rises in the wick of a lamp.

Meanwhile the water is evaporating from the upper part of the tree, and is in this way producing a diminished pressure which serves to draw the sap to higher levels. The most perfect pumps can raise water only thirty-four feet in an unbroken column; so this would be of little value in tall trees were it not for the introduction of small bubbles of air into the column of sap. This makes of it an alternation of bubble and sap, bubble and sap. In such a column, known to science as a Jamin chain, water rises to higher levels, though of course in far less quantity than if the stream were unbroken.

Meantime the tree is swaying with every breath of wind. With each quiet breeze the branches bend, and at every sweep the little tubes are flattened. This, of course, lessens their capacity, and a part of the sap is forced upward out of them. As the bough returns to its first position, once more the tubes fill from below, only to unload a part of their burden with the next puff of air. So, as the tree sways from side to side under the freshening wind, the quiet stream goes ceaselessly on. When the storm sweeps furiously over the forest not the least of its results must be the renewed vigor of the trees from the hastened flow of sap; much

as a man in winter may warm his fingers by lashing his arms and thus increasing the flow of the blood.

But not any, nor all of these put together, seem enough to account for this work of bearing the life-giving stream up the stem. We are still waiting for the master mind who shall fathom the forces which work so silently.

# THE RACE OF THE FLOWERS

What flower will win this year? Will the bloodroot or the arbutus come in first? It seems to me quite a question of location and of the kind of weather. On a cleared bank with southern exposure, if we have a sudden burst of very warm spring weather, sometimes the bloodroot will get here first and its white stars will catch every eye. Farther back in the woods, if the sun is warm, the hepaticas will keep even with the bloodroot, but if the weather grows gradually warmer the arbutus always beats them both. What an entire readiness there must be when plants so small as these can so sud-

denly spring into flower! The truth of the matter is the arbutus buds have been there, ready to open, for at least six months. At the same time the leaves of this hardy plant have remained green all winter, and though they are scarred and battered they are prepared to take advantage of the first warm rays. The hepaticas too still bear their fall leaves, and they have kept them in much better condition than the arbutus. But, in addition, the hepatica has a knob at the base of the leaves swollen with stored food. And this it draws on as soon as it may. Its flowers are so tender, however, that they need every precaution against the cold, so each night they wrap themselves tight in their furry coats, opening them again when the new day brings new hope of insect visitors.

But the bloodroot is the most dashing worker of them all. Last year it stored its building material in a long, fleshy, underground stem. And from this it brings the red sap in the spring to build up flower and leaf together. Hardly, however, have they gotten above the ground before the flower pushes on ahead, spreads its radiant white petals for a very few days, and then, like so many of its sister poppies,—for the bloodroot is a poppy,—throws them away. Only now may the broad single leaf take its turn. The quick running sap is thick, like that of the rest of the family, though here it is "bloody" rather than milky. But here too a hurtful ingredient, like the morphia of the true poppy, serves to keep animals from pilfering its winter store.

## ARBUTUS BLOOMS

But whatever the order in which they come, the arbutus is certainly the favorite with most people. The bloodroot and the hepatica droop quickly, and the arbutus keeps beautiful long after it has been plucked. It is one of the few wild flowers that is commonly offered for sale, during the season, in our large cities. And it is a charming flower to hunt. There is something so elusive about it, and it is so satisfactory when found. Few odors are more

delicate than that of the arbutus, and when the perfume has for its accompaniment the woodsy odor of freshly disturbed leaves and moss the charm is complete. When it grows out in the open sun arbutus is rose-red, in more protected situations it is a faint pink, but when it nestles under the leaves it is a clear, beautiful, and waxy white. We are told, on the authority of Eugene Field, that "the color doesn't matter when you're seein' things at night." But it does. Most night-blooming flowers are white, and when the arbutus nestles in dark places it, too, is white. For white is the best color for a flower that in the dusk needs to catch the eye of the roving fly or bee or butterfly. To this whiteness, nightgrowing flowers usually add a powerful fragrance. The arbutus, when found beneath the leaves, has a most delicious odor, while that which grows in the open is often quite lacking in perfume. Here the rosecolor catches the eye of the hovering fly and attracts him to the nectar. In this way the flower is helped to set its seed. But all the allurements of a penetrating scent and of lustrous whiteness are necessary to guide the fly to the flower that nestles in the dark.

## WHY FLOWERS HATE ANTS

This nectar, lying so close to the ground, is a great temptation to ants, and the flowers hate ants. They are only willing to give honey to insects that can carry pollen from blossom to blossom and thus set the seed. But ants are so smooth that pollen falls off them as from a coat of mail. The arbutus has provided itself with a defence against them. It stuffs the throat of the flower with a bunch of hair. For some reason a hairy surface is quite distasteful to ants. I suppose the fine tips get into their spiracles and are like grass blades getting into our nostrils. So the tuft of fine hair in the mouth of the arbutus flower keeps out the ants and reserves the nectar for the longer tongued and more hairy insects who will better answer its purpose. Then, too, this furry covering keeps the pollen from accidental wetting. The arbutus like most flowers carries the family likeness very One needs be but an indifferent stuwell. dent of plant life to see that the tough stem and leathery leaves hint to us, what less obvious characters confirm, and to associate this little plant with our much-loved rhododendron and laurel. Most members of the family have ingenious and sometimes complicated devices for getting the insects to carry their cobwebby pollen effectively. The arbutus is still in a very undecided state of mind, or at least of flower, in this respect. Apparently it will end up by adopting the plan taken by the melons, having those with stamens on the one plant and pistils on the other. But it has not yet quite arrived at this result. The flowers vary much from each other in little details, and quite commonly set no seed at all, though I have found wellfilled pods. Hence the little plant must rely chiefly on its creeping habit if it is to spread and multiply. This is one of several reasons why, wherever it is much picked, it is so apt to be soon cleared out of the neighborhood. It is one of the first flowers to disappear from the vicinity of our large towns.

As was mentioned, the arbutus has many more or less distant relatives, such as the wintergreen and the partridge berry, the prince's pine, the rhododendron and the laurel. But there is only one of them genuinely close of kin in the world, and it lives in Japan. This tells, to the botanist, a strange story. When the climate of the northern hemisphere was warmer, the common ancestor of these two plants grew in the northern parts of both America and Asia.

## OUR FLOWERS AND THE ICE AGE

Then came that strange glacial period, when the coating of ice and snow crept down from the far north, covering all New England and parts of the line of States out from Pennsylvania through Ohio, Missouri, Kansas, and Montana. It is this great glacial sheet that scraped out and dammed

up thousands of lakes throughout northern United States and Canada. With the slow descent of the ice-cap the plants were forced to move downward through Asia and through North America.

With the return of warmer seasons the ice has retreated until now its southern limit is in British America and lower Greenland, and all these plants are slowly moving. back again. The ancestral arbutus broke into two migrating parties, one of which went down through Eastern Asia, the other through Eastern North America. the time came for the return, these two sets of arbutus had been separated just long enough and had been under surroundings just varied enough to have brought about a little difference in their appearance and habit, and yet their common origin is still clearly traceable. It may seem strange to many, to have the botanist speak of plants migrating. Of course it is not to be understood that any one plant uproots itself, travels over the country, and replaces itself again. But every plant tends to spread

itself as far as it may in all directions, by means of seeds or runners or by some such If the climate of any region grows warmer, inevitably those seeds which fall or are carried towards the equator will meet surroundings which on the average are too warm for that plant; while those that are carried to the northward meet, again on the average, conditions a little more favorable since the change. Hence it is that the line of chestnuts must be moving north followed slowly by the chinquapins. And such a procession of wheat and corn and cotton must also be moving northward. But our lives and our histories are too short for us to notice it in the case of our cultivated plants. It is such facts as the resemblance of our arbutus to its Japanese relative that lead us to the conclusions I have mentioned.

# THE RUN OF THE SHAD

Not the least strange of all the spring movements is the run of the fish up our rivers. An odd procession too, it is. On

the front of this great wave comes the little alewife usually known in our eastern fish markets as the herring. These fish are very closely followed, indeed their run is overlapped, by that of the shad. This finest of the marketed fresh fish of the eastern United States is succeeded by the oily menhadden.

#### WHY FISH ASCEND RIVERS

Such fish as leave their home in the sea and take their long journey up the rivers to lay their eggs are known to fish students as anadromous or "up-running" fish. We used to say of fish having this peculiar habit that they had originally been inhabitants of the fresh water, and that generations ago they had taken to the ocean as a better feeding ground. The changed life we thought had not gone on long enough for their entire adaptation to the new conditions, and that the fish came up the river in order that their young might find, in the tender period of life, the ancestral conditions to which their inherited constitutions

were best adapted. I think now, however, the theory which receives most acceptance is that these fish belong primarily and ancestrally to the ocean. But the large number of predatory animals in the sea makes of its waters, especially near to the shore where the crowding is particularly heavy, an unusually dangerous locality in which to rear baby fishes, large numbers of which would fall a prey to their ravenous enemies. Accordingly the salmon in the western waters and the shad and their companions in the eastern rivers have learned the trick of retiring to a safer region to lay their eggs and to have their young come to maturity. But whatever may be the origin of the habit, the fact itself is a most interesting one.

#### THE HOME OF THE SHAD

Where the shad live during the balance of the year no one is yet quite sure. Too few of them have been caught in the ocean to make the fact clear. Quite possibly they keep to the deep water just off the

"continental shelf." As we pass out into the Atlantic from the eastern shore of the United States, the water grows deeper only very gradually until we have gone out about one hundred miles. Here it drops very abruptly into depths far greater than any known nearer the land. This is the true edge of the American continent; and just beyond is quite possibly the home of the shad.

The pressure of the water at great depths is so heavy that few fishes are adapted for life there and at the surface too. But the shad has a strange series of tubes in his head to which water may be admitted, and these probably are a part of the mechanism that helps him to adapt himself to these varying conditions.

## THE RUN UPSTREAM

As spring comes and the water grows warmer the shad rise to the surface and make their way to the nearest river. It was for a while thought that each shad returned necessarily to the river in which he was

born; some good students even thought, to the exact locality in the river. So that a shad which had been hatched not far above Trenton came in turn to the same region to lay its eggs and did not follow its fellow-voyagers to the bars farther up the river. But the artificial introduction of shad into the rivers of San Francisco Bay and their gradual spread into those farther up the coast show that this cannot be strictly true, though it is quite probable it is generally the case. As the ice melts at the head of the river and its water grows rapidly warmer than that of the ocean, the shad crowd about the mouth of the stream, often entering the bay and there waiting until the water shall reach a temperature of fifty-five or sixty degrees Fahrenheit. In a backward spring the fish may lie in the mouth of Delaware Bay for weeks, sometimes venturing up a little but again going back; the regular run may come three weeks late.

When the great time comes, the horde moves on up the river in a strange zigzag procession. For the fish seem to want to swim against the current, and this is regularly changing with the tide. Hence, when the river current and the tide are both downstream, the fish run rapidly against it, but, when the tide turns against the current and the water moves slowly upstream, the fish turn their heads once more to the ocean and go a short distance back.

#### DRAWING THE SHAD NET

It is just at the change of the tide that the fisherman puts out his long seine. On a flat platform in the back of a great row-boat of twelve or more oars, lies piled in careful fashion the seine, sometimes half a mile in length. Attached to each end of the net is a long rope. One end of this is fastened to a windlass on the shore, and the boat starts Far into the stream the rowers take it, paying out the net steadily as they advance. When they have crossed as far as they may go without obstructing the navigation of the channel, they turn the boat downstream and, swinging in a great circle, they bring up at a point on the shore some

distance below that from which they started. Here is a second windlass, and to this the rope attached to the other end of the net is now tied. Horses are harnessed to the two windlasses and the ropes are wound in until the net is drawn up to the shore at Since the boat landed, the both ends. rowers have been sitting along the banks waiting. Now they grasp hold of the net and draw it in, piling both ends carefully on the shore. Occasionally a shad that has run his head through the meshes of the net beyond the gill-covers, and then could not withdraw it, is pulled up and taken out. But the great majority of the fish are simply trapped in the semicircle enclosed by the net, and as this grows smaller the water begins to be rippled and ruffled by the fins of the fish swimming about in the narrow Their pen grows smaller smaller until the water fairly boils with the struggles of the captives, and the harvest is at hand. One by one the fish are thrown back on the sand, where they lie gasping. All sorts of strange débris come up with the

net, and after it has been drawn the bank is literally alive with crayfish,—the small freshwater crabs,—which go scurrying about.

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## THE WORK OF THE "FISH-HAWK"

Meanwhile a boat with a white-suited oarsman has drawn near. To this man the fishermen are respectfully deferential, though he comes to take from them at nominal price a part of their proceeds. Taking one of the finest of the shad between his hands and holding it back down, he runs his thumb steadily and firmly along its abdomen, pressing out the eggs or the milt, as the case may be, into one or other of his pails standing in the bow of the boat. ing gathered this material, he rows to the little white government steamboat, the "Fish-hawk," that is lying not far away. It is the work of this boat and its crew that prevents the extermination of the shad from our eastern rivers. For the way of the shad up the river is beset with seines and its chances of escape are small. Then too it is on its way to spawn, and this tremendous slaughter of fish just before they have had a chance to deposit their eggs is the quickest way possible to end the race. So the government steps in and picks the best shad from the seines. The white-coated "stripper" draws the spawn from the body of the fish into his vessels and carries them to the "Fish-hawk." Here the fertilized eggs are put into jars through which runs a constant supply of fresh water. The eggs soon hatch, and when the young are old enough to take care of themselves they are carried to the upper waters of the stream and allowed to go free.

Meanwhile the few fish which have escaped the seines reach the higher waters of the river. Towards evening the "does," hunting out the quiet reaches of water just below the sand bars, deposit their eggs, and the "milters" following soon after fertilize these eggs. The parent shad take no care of their young, but begin almost immediately their return to the ocean.

All of this long run has been made absolutely without food, as is the quicker re-

turn. It is no wonder that after a two or three months' fast the leanness of a "June shad" should have become proverbial.

Comparatively few of the young shad escape the vicissitudes of infant fish life, though it often happens that a female shad lays 200,000 eggs. Such, however, as outlive the summer have grown by November to be strong enough to follow their parents down to the great deep,—to return perhaps in about three years themselves to provide for the future of their race.

But the voice of a more careful parent, who has returned once more, salutes the ear.

### THE BLACKBIRD'S CACKLE

The blackbird's name is a reproach to us. He is not black. That is only the setting. Over his head and breast plays the most exquisite series of peacock-blues, and greens, and down his back runs a splendid sheet of browns and bronzes, while across the lower part of his back and across his tail flashes a set of bars made of all the colors of the rainbow.

These are magnificent hues that depend on surface structure and not on patches of pigment. They are the colors of the motherof-pearl, and not of the emerald; of the opal and not of the ruby. They are the colors that shimmer and gleam, that alter with every altering angle of light. Beneath this is the sombre hue that every one knows. The gorgeous colors are so faint that they only catch the eye of his dusky mate and of the genuine lover of birds.

Already in February the Caleb and the Joshua of the advancing hosts reached us, spying out the promised land. Apparently the inhabitants did not seem to them like giants, for some night in March the advancing hosts arrive. As if they had been tempted beyond discretion, and had come too soon into a region hostile to their windpipes, it is the cackle and chatter, the chuckle and cough of our visitors that on the following morning greets our awakening ears.

Whatever doubts we may have had of the advent of spring are now dispelled. The



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flock soon breaks into small tribes that settle each in its own clump of evergreens. Our broad-leafed trees are still bare and would offer small concealment to a blackbird's nest. Fortunately, however, our pines, spruces, and hemlocks are more hospitable. Any one who has several of these on his place is almost sure of a colony of his own, and a cemetery with its shady cluster is certain to be seized upon.

By April the nests are quite well under way. To this part of his duty the father blackbird is very faithful. He is quite willing to take care of the eggs while his wife goes out for a little exercise. This is the more creditable because in this matter many bird husbands do not have any realizing sense of their duties, lacking the impulse to do more than provide their homekeeping folks with abundant food.

While he has young in the nest, the blackbird gathers insects almost exclusively. When the farmer begins to plow, the bird follows him fearlessly through the furrows. It is a cut-worm now and a wire-worm

then, and a big white grub still later that he gathers. And here he does the farmer the utmost service. He is quite a stately bird as he walks through the rows. Most of our common birds that fly well walk indifferently, and are very apt to hop along the ground, lifting both feet at once. But the blackbird walks deliberately and with dignified poise; he also flies very well indeed. Even here he has a marked trait of his own. for when he has no great distance to go he keels his tail until the end of it looks like the letter V. To these little eccentricities of manner he adds a cast of eye that is absolutely awesome. That a blackbird should have a bright yellow eye seems altogether out of place, and it gives him a look of pert inquisitiveness that with his fearlessness and his eternal cackle makes him quite an original character.

### ARE BLACKBIRDS OUR ENEMIES?

The long debate as to whether the blackbird is the farmer's friend or his foe has, I suppose, been fairly well settled by this time. He is his friend in the spring and his enemy in the fall. In the spring he eats insects and in the fall he eats grain. In the spring the colonies are scattered and the farmers reap the benefits of this good work. In the fall the colonies reunite into a great horde, and the bad work is chiefly detrimental to a few farmers in each locality. That these should be his uncompromising foes is not unnatural.

# MAY

### $\mathbf{III}$

### THE BLOSSOM MONTH

NCIENT man, when he made the orchard, builded better than he knew. He planted for the body and he reaped for the mind as well. Unconsciously he gathered about the home

his little stock of fruit-trees, and left the more distant part of the farm for his other crops. Each returning spring surrounds him with a wealth of charm which appeals even to those who scarcely realize that they care for flowers. When an old homestead nestles in a bower of apple- and peach- and cherry-trees, its May beauty is sweeter and more fragrant than the most elegant of parterres can make the finest of villas.

God set the plan for the fruit-trees and we have carried it out. Rarely has man worked better along lines laid down by the Creator. The original trees were doubtless hardier, but that was because they had to take care of themselves. We have relieved them of that necessity, and the new strain has responded to our kindness and rewarded most magnificently man's skilful endeavor. So it comes that every little country home is glorified at each return of spring by the gorgeous beauty of the blossoming trees. The peaches; show the sunny home from which they came in the tender rose of their rounded corollas. The cherries and the plums try to make up by the profusion of their bloom and the purity of their whiteness for their lack of the warm softness of the peach-blossom. Last of all, the apples surpass both of their predecessors by putting the purity of the cherry on the inside of the blossom and the warmth of the peach on the swelling outside, and letting each suffuse into the other until no one is surprised when the botanist tells us that all

these flowers are near of kin to the rose. And if the rose is queen of the family, most surely the apple is king.

#### THE FRUIT IN THE BLOSSOM

To the observing eye each blossom has a prophecy of its own and already foretells the character of the fruit. The peaches bloom before their leaves are well out, so their flowers run no risk of being hidden. Accordingly they waste no material in making stems, but each rose-colored blossom, with its delicately bitter fragrance, nestles close to the twig from which it springs. Of course, when the fruit comes, it must hug the branch. So you find practically no stem on the peach. Then, too, if you look right into the heart of the peach-blossom, you will see, already formed and deep hidden at the bottom of a green cup, the little globe that is to become the peach. The more showy parts of the flower stand on the edge of the cup, quite away from the forming fruit, and they are thrown aside when the blossom fades. When the little globe swells





into the meaty fruit, it pushes up out of this green cup and leaves it behind as a shriveled border about the point where the peach is fastened to the branch. For this reason the peach has no star opposite the stem, as the apple has, but ends instead in a little point that is almost lost in the general plumpness of the fruit. For this reason too it lacks the papery case we call a core in the apple.

### WHERE THE APPLE GETS ITS CORE

The apple, coming late in the season, finds leaves already before it. So it is compelled to put stems to the flowers, though even these are not so long as those of the cherry. But the crowning peculiarity of the apple-blossom is the rounded green knob on the under side of the flower. Looking at this bloom from the front, one cannot see so deeply into it as he did into the peachblossom. The portion of the blossom which was the cup in the peach closes in over the knob and grows fast to it. Hence, when the fruit ripens, not only are the seeds covered with the pulp, as in the case of the

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peach, but they are also cut off from the rest of the fruit by a leathery case forming the core. The bright white petals, touched with pink, fall away with the passing of the season, but the rest of the flower remains dry and withered as the star of the apple, opposite the stem.

If any one ever feels inclined to eat the core with the apple, I would suggest that he examine this star end with a magnifying glass. After he has seen the menagerie of animal life that takes refuge there, I think he will be willing thereafter to discard the core. This is, of course, the only condition on which the apple would insist if it could. Its purpose in maturing all this rich pulp is to persuade some animal for love of its fine flavor to gather the fruit and eat the pulp. But the leathery core is intended to deter the animal from eating the seeds, which it is hoped will be dropped in some new locality, thus furnishing them with fresh soil unexhausted by the growth of previous apple-trees. This is Nature's method of securing her rotation of crops.

#### THE PEACH AND THE ALMOND

How much man can do to mould Nature's creations to his own fancy is rarely better shown than in the case of the peach and the almond. There seems much reason to believe that each is descended from the same wild ancestor and that each owes its present delightful qualities to the fostering care of man. Two nations, whose needs were altogether different, selected and then, perhaps quite unconsciously, accentuated different qualities in the same primitive fruit.

Thomas Moore tells us,

- "A Persian's heaven is eas'ly made,
- 'Tis but black eyes and lemonade."

To such people succulent fruits appealed most strongly, and they seized upon and strove to improve the amount and flavor of the pulp, and the luscious peach is the result of their labors. To the stone they gave no heed, and here Nature took care of her own. The hard coat protects the kernel against the jaws of its enemies. Even where, by reason of unusually heavy

teeth, an animal could work his way through the shell, the kernel itself is filled with a substance bitter in small quantities and in larger amounts even poisonous. So, doubly defended, the seed has held its own.

Meanwhile the wandering tribes of the desert had quite other needs. To them a successful food must be both portable and So, neglecting and even perimperishable. haps discriminating against the pulp, they selected and cultivated such fruits as were provided with particularly thin shell and Gradually they improved sweet kernel. the native fruit until now in the finer varieties the shell can no longer serve as a defence even from man's unaided fingers. The kernel too has lost every trace of its bitter taste, and we have the modern papershelled almond. Even yet the coarser varieties have heavier shells, and the ancestral flavor is well known as that of bitter almonds. If one will look over any large quantity of almonds as they come to the dealer, he can scarcely fail to find at least one nut covered with a dried and furry coat that proclaims immediately its connection with the peach. But be the blossom what it may, its best friend is the bee, whether bumble or honey.

### BUMBLE GOES ROVING

Blossoms and bees belong together. They were made for each other. The blossoms give the bees honey; the bees carry the pollen from blossom to blossom and set the seeds. By the time the fruit-trees bloom honey-bees are roving abundantly, but bumblebees are few, and, what is more, they are all blackheads now, and big ones at that. Every one of them, too, is a queen in her own right, but her kingdom is yet to arise. She must choose it for herself. She must build her own castle, or, at least, must adapt it to her own royal purpose.

### BUMBLE DOES NOT KNOW HIS CHILDREN

Strangest of all, she must people her kingdom with her own subjects, all of whom will be her own children. Her husband died last fall. He never sees his queen established or knows his children, for he dies before the kingdom has come or the children have been born.

After their September wedding they had the pleasant fall before them, but I fear that even then each went the way that pleased him best. So that when the cold of winter came, and the husband died, his wife did not miss him very much, especially as she herself must have felt a drowsy stiffness coming over her. Of the winter I doubt whether she has any recollection at all. But with the approach of warm weather her wings began once more to quiver, her legs to regain their old suppleness, and out she came in good time to see the first flowers in bloom. Over them she is now busily creeping. She meets no others excepting queens, who are perhaps to be her neighbors, for as yet they too have no subjects.

Hunting about the fields our bumblebee finds some hole that runs beneath the sod. Most likely it is one of the little tunnels

that the field-mouse has built. Perhaps a mink, a hawk, or an owl has relieved the home of its proper owner, and she takes immediate possession. Perhaps it is a hollow fence-rail that catches her eye. But whatever be the hollow she preëmpts, in it she carefully puts together a few little cups of a yellowish-brown wax, which she fills with a pasty mass of pollen and honey, and in each of which she lays an egg or two. These hatch before long, and from them come her first subjects. They are workers; females, though never to be queens. Nature has doomed them to be old maids and drudges. But they know no better, and go contentedly to work.

The queen now gives up all employment outside the palace, and inside her duty is almost confined to laying eggs. The one great badge of their sex which the workers share with their queen is the sting, for it is a part of the egg-laying apparatus, though eggs they will never lay.

But the possession of this instrument by the workers is one of the proofs amongst

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others that these humble beings have not always been so lowly. There was primitive woman amongst the bees too, and then each was the equal of each. But with the refinement of modern bee civilization class distinctions have arisen, and queens and drudges now live side by side. Even here the lines are not so closely drawn as in the more sophisticated hive, where the haughty queen of the honey-bees disdains all work and brooks no rivals. But now the eggs are laid, and soon the field will be full of workers, and hosts of bees will haunt the clover.

### A QUEEN'S OLD AGE

Later in the season her royal children are born. Then white heads are abundant, for the white heads are males, and of course, having no egg apparatus, they have no sting, as every country boy well knows. These new bees are just in time to take the place of the old queen mother. She has reached her ripe bee age of twelve months. If by reason of strength her months be



fifteen, yet are her latter days labor and sorrow, for her battered wings are but a weak dependence beside those that greeted with their deep-toned hum the first spring clover, and honey getting is no longer easy.

Farmers in Eastern Pennsylvania have often told me there is little seed in their first crop of clover, while the second crop carries abundant, well-filled pods. I wonder how many of them understand who are their friends in this matter. If they did, I think the sport of destroying bumblebees' nests would not be so common as it is amongst country boys. The first crop of clover blooms while as yet there are few bees. By the time the second crop comes on, bees are abundant, the pollen is well carried, and so clover-seed will be abundant as well.

Of all the trees I have ever watched, none seems more wonderfully beloved by insects than the wild crab-apple. For some time past, swelling red globes have been warning us that the festive day is near. But

it is as if the tree restrained the forward buds until the more backward ones were ready.

#### CRAB-APPLE DAY

Then comes a warm, clear, sunny day, and that is crab-apple day, for that tree at All over the tree the red globes swell into open bowls of the most delicious nectar, of an odor so pervading that even our poor nostrils can catch it, in a gentle wind, nearly a quarter of a mile away. The flower is so alluring and the odor so enticing that all sorts and conditions of insects gather from near and from far to join in the vernal revel. Industrious hive bees, too busy for dissipation, delve assiduously at the bottom of the coral cup; filmy little flies hover round the red stem, filling the air with the constant hum of their rapidly moving wings. Wasps gather too, and their vellow-banded bodies add a new note to the beautiful color Hornets gather, not so much to feast on the nectar as to gobble up the other feasters. But of them all the Bumble is

most happy. This is his day of wildest glee. Not content with drawing up the sweet nectar, he robs the flower of its golden pollen. Fairly intoxicated with delight, he rolls over and over amongst the stamens until he is covered with the yellow grains. Then, retiring to one side, he combs himself with his front legs and rolls the pollen into balls which he claps into his bristly pockets on his hind legs. These pellets he carries home to be food for the bee babies.

### THE GLEAM OF THE HUMMING-BIRD

But while the bumblebees are hovering over the clover and the crab-apple, performing for them their very helpful service, a far higher and daintier animal is doing a similarly valuable work for the wild azaleas that are blooming in such luxuriant profusion on our hill-sides.

Where did the humming-bird learn its flight? It is surely all its own. The hawk may soar, the kingbird may hover for a few seconds, but the hummer can poise in the same spot indefinitely. Soaring is like the



flight of a skilfully thrown card and needs little effort. But the humming-bird flies by main muscle, and he works that muscle at a rate of which we can scarcely conceive. Nothing hums, to human ears at least, that does not shiver at a rate of at least sixteen times each second. We can tell the rate by catching the pitch. Our grouse, rapidly as his wings seem to the eye to move, flutters but little oftener than just enough for the beats to blend into a very low hum, and this is obscured by the whir of the separate feathers, which is quite a different and much higher note. More rapidly by far goes the wing of the hummer, and this for him is not in the short, infrequent flight of the grouse. In long-sustained, constant exercise, the humming-bird probably keeps continually a wing motion of perhaps twenty-five or thirty beats to the second. With this quick stroke he can advance, stop in mid air, veer from side to side, and retreat with precision. Indeed, so constantly is he on the wing that his feet are but puny affairs in contrast with the firm legs of the

ground-loving birds, like the meadow-lark and the blackbird, and not to be compared, even in proportion to the size of his small body, with the firm scratching feet of the grouse or of the chicken.

#### WHAT THE HUMMER ONCE WAS

The modern scientist is a great pedigree He is never content with knowing what an animal is: he wants to know even more why he is so, and, most of all, how he became so. The answer to this last question is often very perplexing and sometimes quite unsatisfactory. But in probing the ancestry of any of our birds one of the main helps is the study of his relatives. When they all differ from him on the side of simplicity, it needs little shrewdness to decide that he was probably once much as they still are. When we know that the nearest of kin to the humming-birds are the whippoor-wills, the night-hawks, and the chimney-swifts, the story begins to loom up before the scientific imagination.

The humming-birds must once have been

dull-colored, short-billed birds, that while on the wing fed on little insects that hover in the air. While their old-fashioned relatives, the whip-poor-wills and the nighthawks, flew at night, and their nearer cousins, the chimney-swifts, skimmed and swam the air after smaller flies and gnats, somewhere down in the tropics the ancestors of the hummers learned the trick of going to the flowers for the insects that gather there in the search for honey.

Whenever a hummer came to have a longer bill or greater precision of wing, he found a richer feast, grew stronger and more active, and left behind him at his death a more vigorous offspring, possibly with his own superior traits accentuated. Gradually, and of course quite unconsciously to the birds, longer bills arose, and quicker wings developed. As the tongue and bill penetrated deeper into the corollas the birds began to get the flavor of the nectar that is now so dear to them. But to this day they have never lost their taste for insects. I have seen the hummer desert the flowers

and take to cleaning from the bark of the white oak the little bugs that infest it. Even when feeding at the flowers he probably gets as much of his food from the insects as from the nectar.

### WHERE MARRIAGE DEPENDS ON BEAUTY

But perhaps the strangest part of the transformation is yet to be told. Living as they do among bright-colored flowers, the hummers have become gradually more æsthetic in their tastes and more fastidious in the demand for beauty in their mates. The dull ones failed more and more completely in the matrimonial market, until now only the brightest members are left to tell the tale,—that is, the brightest males, for here, as in so many cases, the females must sit on an open nest. The dainty bed covered with its protective crust of lichens. in which the female rears her tiny brood, is so open that a metallic-green mother would invite her own destruction. It is doubtless an added influence in the bright color change that the quicker movements of the male MAY 95

and his greater virility—for he is a most pugnacious fighter—gave him a quicker circulation that contributes to the remarkable brilliance of his coloration.

# THE HUMMER'S NEST

Not only is the hummer more exquisite in his tastes and more dainty in his coloration than his coarser congeners, his home partakes of the same exquisite qualities. The boldness with which he dares the gaze of the passer-by is justified by the result, for few people find the humming-bird's nest. Scarcely large enough to serve as a thimble for your finger, it perches openly on the limb. But the owner has concealed it by covering it with a coat of lichens, that makes it look like a mere swelling of the branch itself. Meanwhile, that his mate may rest more cozily in her dainty bed, he has gone to the springing ferns, and from their tender, uncurling fronds he has stripped the filmy brown fur that kept them warm. With this he makes the soft lining on which the eggs, scarcely so large as the average cherry-stone,



shall lie securely until the emergence of the little hummers. Strange to relate, these are short billed, in reminiscence of the ancestral condition. But before they leave the nest the bill has lengthened, and their identity is plain.

Nature jumbles together, in strange juxtaposition, the most dissimilar creatures, and here comes a humble brown visitor, just out from his winter nap.

### THE "JUNE-BUG" AWAKES

The "June-bug" is not a bug, nor does he arrive in June; he is a beetle and he comes in May. It is true he keeps on coming all through June, and that gives some little excuse for half of the name. But the other half has no justification whatever. By persons not versed in this sort of lore almost any insect is called a bug. In truth that name should only be applied to such insects as, inserting a piercing tongue into the tissues of animals or plants, suck their juices. The May-beetle, for such is the proper name of the June-bug, does no such thing. With a pair of small cutting jaws

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he nibbles the leaves of trees, rarely, however, enough to do serious damage.

The sudden appearance of these mysterious visitors is their most striking characteristic. One day there are none to be seen. That evening thousands of them will collect about open lamps until they can be swept with a broom into heaps. The truth of the matter is they have not been far away, but they have been beneath the ground.

One day, about three years ago, the visiting beetles of that year had laid eggs by the dozens in little hollows in the ground These soon hatched amongst fallen leaves. into the soft, fat, white, curled larvæ, which the fisherman knows under the name of white worms and uses for bait. For about two years these things had lived under the ground, often chewing the roots of the grass so badly that, in one case I knew, we could roll back the sod and it was as loose from the ground beneath as if it were a rug. Of course such sod is very apt to burn out when warm weather comes. After lying in a quiescent stage for a few weeks the May beetle took his final shape. But this is in the fall, and this is no time to come out. During the winter he lies there perfectly quiet, and in the spring begins to travel about in the soil. Now comes our May day with its appropriate conditions, and, as if by a common impulse, out of thousands of holes come the hosts of May beetles to swarm about the electric lights.

This is indeed a final experience of not a few of them. Plunging blindly against the shade of the light, the blow is shock enough to paralyze what little wit they have, and down they drop in that strange state which we are apt to call "feigning death," but which is simple fright paralysis. Slowly they recover from this condition, and it seems as if they regained the use of the legs sooner than that of the wings. In any event, instead of flying, away they start to This is the fatal step. For beneath the light, in anticipation of this joyous feast, there has gathered a worshipful congregation of kneeling toads. Woe betide the unlucky beetle who allows himself to get within an inch and a half of one of those sleepy-looking creatures. A pink flash, which the initiated know to be the flip of the animal's sticky tongue, and the beetle is gone.

#### AN ANCIENT COUSIN

It was a member of the same family that excited the wonder of the early Egyptians. The sudden appearance of the insects in large numbers, then as now, attracted at-When to this was coupled the tention. habit, common in their species, as in the "tumble-bugs," of depositing the egg in a mass of droppings covered with earth and then rolling the ball away to a safe place, all the needed suggestion was at hand. The scarab, for so they called him, seemed to be without natural birth, and he was engaged, when making his clay ball, in the act of creation. Naturally this made him sacred to the creator god, Ptah. So they cut him out of stone, carved their names on the under surface, bored these jewels, strung them on strings, and then wore them about their necks to gain the favor of the god.





# **SUMMER**



# JUNE

CARNET HINTREITY.

Ithaco.

# IV

# THE TREE MONTH



URELY June is the tree month. At no other time are the leaves so firm, crisp, and green. By this time the trees have gotten the greater part of their annual stretch.

Few twigs lengthen much after this month, though the stems may grow stouter. The truth is, the trees as a class are very provident. All the remaining months of the summer they will be storing up material in root and trunk for the quick dart of next spring. Now that the branches have gotten their length, the leaves spread in splendid cascades catching the sun at every possible point. For the whole tree is one great organism stretching out after sunlight.

# THE SHAPE OF TREES

Let them grow in the crowded forest where the light can come easily only from above, and the trees vie with each other in the race toward the blue sky. As they grow higher, the lower limbs have the light cut away from them and they soon shrivel, die, and finally drop. This may continue until many of our tulip-poplars, cucumbers, and hemlocks will tower for fifty feet without a branch, while not a few may even reach seventy feet from the ground before we come to a limb of any material size. On the other hand, if the tree can grow out in the open, not only will it attain greater bulk, but its shape will be completely altered. Its lower limbs will spread quite as rapidly as its trunk ascends; and, instead of the majestic erectness of the forest, we get a well-rounded contour, but scarcely half the height of its woodland congener of equal age.

#### GREEN LEAVES AND HEAT

The trees too are actually greener in June than they will be later in summer. Just as little red plaques floating in a colorless liquid form the red blood of our bodies, so little green wax grains of chlorophyll, scattered through the transparent protoplasm of the plant, give to it its green coloration. When the sun is not too warm, these little grains swarm out into the sunlight to catch its every beam, and the result is, the plant looks very green. As the sun grows warmer, the chlorophyll grains will not come out so fully on the surface of the leaves, but are inclined to hide behind one another so as to avoid the extreme heat. As a result, in July the leaves at noonday are distinctly lighter and less vivid in their green than they are earlier and later in the day, or than they are all day in June.

## STRAWBERRIES REDDEN

But while the trees are struggling for sunlight in the upper air, a host of humbler plants, less ambitious than they, are creeping about their roots and contenting themselves with the stray gleams of sunshine that filter through the crowded leafage above. Wherever the trees stop, the vines clamber out profusely, and one of the charms of a June bank is the rambling wild strawberry, its dainty red fruits entrancing alike to the eye, the nostril, and the palate. "Doubtless," says Dr. Boteler, "God could have made a better berry, but doubtless God never did."

#### WHAT IS A BERRY?

But the strawberry is not a berry at all. At least the scientist will not consent to call it so. To him a berry is a very definite kind of fruit. It must be pulpy, and this the strawberry is, but it must have its seeds buried in the pulp, and this the strawberry has not. A cranberry is to the scientist a berry, and so is a currant; a strawberry is not, nor is a blackberry, a raspberry, or a mulberry. But, then, to him the grape deserves that name, and so does the tomato. In this case I believe Nature and the people agree, and the scientist is on a side-track.

To the popular mind any small pulpy fruit is a berry and Nature, I think, has classed them all together, for they are the fruits with which she tempts the birds. The pulp is theirs, if they will but scatter the imbedded seeds. It is the birds we are robbing when we eat the small fruits. The apple, the peach, and the plum are for us and our like. But as we have taken the wild strawberry under our care and taught it to make fruit as big as plums, I suppose we are entitled to our own share, though we certainly have no right to be indignant when the birds come for theirs. The cultivated strawberry is not simply our own wild plant brought into the garden and tickled into fatness. Its native home is on the drier plains of Chili. To this fact is due the hairy coating over the stem and leaves so common to higher and drier situ-Possibly in time our Chilian fruit may grow smooth, like our own wild strawberry.

The strawberry has a double safeguard against extermination. When an old plant dies, a new one may spring up either from the seed of the old or from runners.

# THE RUNNER HABIT

Seeds are, of course, the usual provision against such danger, and are used by all higher plants unless interfered with by overcultivation, as in the case of the banana and But the runners are unsome oranges. common. These are long, slender branches whose leaves have degenerated into scales. They stretch out just above the ground and root at the end. Then a new plant springs up from this point, and later the link connecting it with the original stalk dies, as may the parent plant itself. But when this is gone, there are left round about it half a dozen baby plants. The interesting point about these shoots is that, being actual parts of a single parent, they are as much like it and each other as it is possible for plants to Hence, when the gardener has produced a fine strain of berries, he "keeps it true" by propagating it by runners. In this way no new blood is brought in, and, with proper care and nourishment, the plant may keep up all its good qualities for many generations, if generations they may properly be called.

#### HOW NATURE BETTERS PLANTS

But Nature's reason for using this method so seldom is a valid one. It furnishes no chance for improvement. Seeds are ever so much more hopeful. Each of them has been produced by parts of two plants, and when it grows up it will be something between them. Of course this is quite as likely to be poorer than either as to be better. But this is easily corrected. Nature simply kills out the poorer ones. Some go because they cannot endure drought, others have not strength of stem to stand up, or they lack brightness of flowers to attract insects. The competition is so keen that the defective ones die and only the good ones grow Better still, there comes now and then a strawberry genius that is quite as successful in its own world as a human genius is in our world, and here is the starting-point for a better and stronger race. The experimental gardener, who is always on the lookout for new features, has two sources on which he must rely. Careful and slow nurture with its gradual improvement is apt

to produce plants that will rapidly revert to their former state when the care is relaxed. For permanent results he must rely on crosses and sports. By a cross he means a plant which has for its parents two plants that while nearly allied are not alike, each one of which has qualities he would like to fix. In this way the Kiefer pear was made by crossing the gritty Chinese sand pear with the fine-flavored and juicy Bartlett. This resulted in a pear which, while lacking the splendid table qualities of the latter, had some of the firmer consistency of the sand pear, thus producing a fruit firm enough to handle and ship in bulk.

On the other hand, the Sharpless seedling strawberry was a sport, a plant genius, that in one generation immediately shoved ahead of its parents, and has since maintained its place. It is plants such as these that are the gardener's hope. Hundreds of them turn out worthless, but now and then his efforts are rewarded by a new seedling that repays him for his seemingly lost labor.

# THE CHIPMUNK GATHERS HIS STORES

But while we are bent on satisfying our immediate desires with the taste of the berries on the bank, along the neighboring fence scampers the little chipmunk, whose provident habits put us to the blush.

#### A MISSING LINK

The "chippie" is one of Nature's "links" —an animal that lies close to the borderland between two groups. It is only recently we have come to recognize how many of these there are, and they often furnish us our most interesting forms. The great squirrel family in this country starts with the humble, clumsy, stupid woodchuck, who has earned for himself the disrespectful title of groundhog, and it ends with the active, soft-eyed, beautiful flying squirrel. Just about midway in the series, no longer so servilely bound to the soil as the groundhog, and yet not released from it like the squirrel, comes our sprightly, thrifty, comely chipmunk. Scarcely any other of the four-footed wild animals is more familiar or better loved in

the regions not too near the large cities. His bunchy body, not so slender as that of his true squirrel cousins, with its yellowish brown coat and its striped back, is dear to every country boy who is not mean enough or thoughtless enough to stone it on sight.

## PROVIDING FOR WINTER

The little fellow is the most provident of all his tribe. He makes a burrow sometimes of considerable length under the ground. Along its course are often several storehouses, and these he fills with his winter provisions, and in them he stays from December until March. Then he comes with the first song of the robin and bluebird and the first cheerful cackle of the blackbird. Soon he will begin to hide cherry-stones. Often in climbing over a worm fence an old hollow rail has broken under my hand, and from the open end have come pouring cherry-stones by the hundreds. What numberless journeys this must mean! One chipmunk of my acquaintance became quite a household pet,

though all the time he maintained his wild home. But he ran freely over the porches and through the living-room of the mountain cabin in which we were spending the summer. We always kept a plate on the porch for his especial benefit, and on this plate we placed the stones of all the cherries eaten in the house. Pecan kernels and almond pits, both doubtless entirely new to him, he ate from the first without hesitation and relished exceedingly. Indeed, so fond was he of them that he would climb up into the lap of a young girl in the party, and burrow into her clenched fists for the toothsome dainties. While not quite so familiar with other members of the party, he nevertheless freely came and fed from the fingers of any of us, though the presence of a stranger made him considerably more The little fellow has fur-lined pockets on the inner side of his cheeks, and these he fills with the materials he is to carry home.

One day I counted the cherry-stones our provident friend could take away at a single trip, and found that he could stretch his cheek pouches until he had stowed away thirty-nine. This process made his cheeks bulge until the shape of his flattened head gave him a ludicrous, snake-like look.

One of the daintiest wild sights I have seen was that of a chipmunk who gleaned a mountain lane after a wagon loaded with wheat sheaves had passed by. The little fellow would pick up a stalk of grain and bite off its head. Then, holding it up with the beard pointing downward and away from his mouth, he worked quickly through the entire spike. To see how the chaff flew and his cheeks swelled with the store of wheat kernels was most delightful. When he had hulled three or four heads his pockets would hold no more, so away he scampered. Along the fence he ran in his quick, jerky way, as if he never could assure himself of his safety for more than five seconds at a He would look about him, make a dash, look about him again and take another spurt. Still, I thought he soon learned when one was friendly to him. He would



A CHIPMUNK WHO GLEANED A MOUNTAIN LANE



come quite close, but any quick movement in his direction sent him scurrying away.

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The entrance to his home lay between two big stones used to prop the worm fence, and beneath the lower end of the slanting rail was a fine chamber. A later visit to his quarters proved that in the fall he found material easier to gather. He had hoarded up nearly a half-bushel of chestnuts.

The only point in which our little friend falls short of his squirrel cousins in beauty is in the matter of tail. Squirrels have developed great, broad brushes that serve for rudders in their splendid leaps from tree to tree. The "chippie" has a far inferior tail, but to make up for it he has a black stripe along his back, and a dark stripe with a white central line along each side. The result is, at least to me, more pleasing than that possessed by any true squirrel.

I fear, however, his mania for gathering and storing food has made him selfish. At least he rarely, if ever, shares his home and his stores even with his mate. He is peaceable and cheerful when not disturbed, but so unsociable that he quite resents the intrusion of another chippie upon his customary feeding ground. In this respect he is far inferior to the little red squirrel, who, however inclined he may be to quarrel now and then, will play tag by the hour with a wantonness of sport rarely seen in a wild animal. It is interesting to see how the other wild things learn to notice the scolding tone in the chippie's voice and to use it as a warning of the near approach of a possible enemy.

# THE SAFETY OF INSIGNIFICANCE

The whole rodent family, of which the squirrels are important members, is a striking example of the safety that lies in insignificance. There are more species of rodents than of all other fur-bearing animals combined. Man's incursions into a neighborhood simply seem to relieve them of their enemies. Rabbits and squirrels are perhaps more abundant to-day than they were when the Indians roamed our forests. Certain it is that the advent of man in the Northwest increased the numbers of the

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Jack rabbits. This set of animals is unusually adaptable to all the varied possibilities of life. The muskrat takes to the water, the chipmunk to a burrow in the ground, the rabbit to the brush, the squirrel to the trees, while the flying squirrel almost takes to the air. But one and all they are cautious, fearsome, and alert, and for the most part extremely rapid in their movements. Not a few of them find safety in venturing out chiefly at night. So they have found for themselves a secure footing where the bear and the wolf, the deer and the bison have failed. And as it is one of the largest so it is one of the oldest groups of fur-bearing animals that to-day has any prominence. Other old animal families are for the most part decadent, but the rodents show no sign of diminishing prosperity.

# VIOLETS BLOOM

While the strawberries are creeping along the bank and the chipmunk is scuttling along the fence, back in the fields the children are plucking violets.



# WHY THE BEE LIKES THE VIOLET

Children and bees love the violets. Older people seem to need highly scented or double kinds, but the commonest road-side violets are quite attractive enough to satisfy the children, for they gather them by handfuls. I have just asked a little girl why she is so fond of them, and her answer is, "I like the color," and that certainly is the bee's first reason. Nectar is, of course, what he is hunting, but, strange to say, he would always more gladly visit a blue flower to get nectar than one of any other color. I have seen bumblebees pass over gorgeous cannas and gladioli as if they were nowhere in sight, and hurry on to a tall, blue, mint-like plant whose flowers would never have caught my eye at half the distance at which their gay neighbors arrested my attention immediately.

The hooded violet, that grows so commonly in our fields and by our road-sides, has almost all the good qualities of the family in general and a few of its own. About the only one it lacks is the odor,

which indeed but few species have. As a family they hang their heads, though not in shame nor even in modesty. Their reason is far more practical; they do not want their pollen wetted. So they hold their faces away from the possibility of being rainwashed.

Plants that are to grow in the cropped grass must be either very small or keep their stems close to the ground, so that a browsing animal may get nothing but leaves, missing the short, hairy stalk, with its many buds from which new leaves will quickly spring.

## HOW THE VIOLET IS POLLINATED

But the brightest piece of the violet's intelligence can only be seen when you look it full and fair in the face. It has put its nectar deep in the spur that projects from the back of the flower. The whole color and structure of the violet help the bee to find his way to that nectar. The general blue color summons him, the yellow centre tells him the neighborhood of the door-way,

while on nearer approach a set of lines on the lower petals tells him just where his tongue will find the easiest entrance to the sweet store. The way down to this treasure is guarded by a fence of bristling hairs that discourages any ants that might creep up the stem. A pair of triggers, which are just on the road down to the spur, are so set that when the bee sticks his tongue into the flower the pollen drops fairly into his face and in turn is carried by him to the next violet. Here it sets the seed. It is interesting to see Bumble's method of handling this flower as he visits one of these plants. He is quite at home there, and, strange to say, instead of coming at it from the front, he alights on the top, bends over the edge, and turns his head quite upside down to get his tongue into the opening. So when the pollen falls it strikes him just under the chin, if chin a mouth like his can be said to have. Meanwhile he is so heavy that the flower bends over with his weight, often letting him rest fairly on the ground. This, however, disconcerts neither him nor the violet.

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He keeps at his work until he has drained the draught of divine drink, and then goes his way, and the violet raises its face once more into view. This aristocratic flower, in truth, has set itself out to attract bees and them alone. But this very exclusive plan is a case of that vaulting ambition that o'erleaps itself. The apparatus is too complicated, or the bees are too clumsy; for somehow, though probably adapted to each other in the past, the bees and the violets are parting company.

# SECRET FLOWERS

As a result, these lovely blue flowers commonly fail to set seed, even when freely visited by the bees. So these plants have been obliged in self-defence to take another plan. Down in the ground about the base of the plant may be found some of the most peculiar flowers imaginable. They have no colored petals, no odor, no nectar; they never blossom, are never visited by insects. But their own pollen fertilizes their own ovules and sets their own seed. Of course

this is not as good as cross-fertilization; at least so scientists seem to think. But one thing is sure, these secret flowers of the violet become fine pods full of big round seeds. Surely they are better than no seeds at all.

To find these strange cleistogamous flowers, as they are called, one must go after the first flush of blue flowers is over and hunt close to the ground, if not actually beneath it. But late in June you can scarcely fail to find them on our common violet, which, with its dark flowers and heart-shaped leaves, decorates every grassy country road-side and invades almost every lawn and pasture.

Back of the fence the wheat is growing tall and heavy and the harvest is not far off. I fear, however, the man who planted this field was not careful about his seed, for there are amongst the grain many purple flowers.

# TARES IN THE WHEAT

In one of the older translations of the Bible, the familiar passage in Matthew is rendered, "The kingdom of heaven is re-

sembled to a man that sowed good seede in his field. But when men were a sleepe his enemy came and oversowed cockle among the wheate and went his way." The King James version made the word tares instead of cockle, to our confusion. The plant named in the Greek original is not our cockle; but cockle is none the less a better translation for our purposes than tares. We have no tares; but all that in this case is true of the tares is true of the cockle as well; and if the Christ were teaching in our land to-day and wished to convey the same lesson, he would certainly say cockle and not tares.

When cockle springs up, its long tender leaves make it look much like the grain amongst which it grows, and to weed it out at that time would be quite a difficult task. But let it go to maturity, and its warm-colored flowers, lifting themselves out of their swollen, bladdery cups, are easy to see, as we look at this season over the ripening grain.

I suspect man himself has done much to



fit the cockle to its place as a weed infesting the wheat. The lychnis group, to which this plant belongs, all incline to narrowness of leaves, but I know of no other member where leaves are so very slender as are those of the cockle. I doubt not broader-leaved ones have been plucked from grain fields in the earlier times, when fields were smaller and grain was hand sown and hand gathered. Those plants whose leaves inclined slender more frequently escaped notice, and were allowed to set their seeds. Naturally their descendants had the narrower leaved habit which in time became universal. So perhaps man has unconsciously helped the cockle to hide in the wheat field.

It is interesting too to realize how he has taught the cockle to time its flowering so as to coincide with the ripening of the wheat. Whenever a flower matured too soon and set its seed earlier than the grain did, those seeds rattled out of the pod to the ground and lay there when the grain was gathered. Any flowers which were late in forming

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their pods were cut before the seeds were hard enough to join the wheat in the threshing. But whatever cockle bloomed just in time to harden its seeds by the time the grain was thoroughly ripened had its seeds mingle with those of the wheat under the flail. So man planted them with his wheat at the next sowing and again selected, all unconsciously, those seeds which coincided in their ripening with the maturing of the grain. Just as truly as man has, with set purpose, developed a cow which shall give large quantities of milk and come into milking often, he has, though quite without such intention and even in spite of his desires, cultivated a cockle that can hide in his wheat when it is young, be gathered with the wheat and scattered again with it in preparation for the new crop.

The pink-purple flowers of the plant are so narrow in the throat and deep in the tube that only the long-tongued butterflies can reach to the bottom. The nectar, however, is so abundant that bumblebees would gladly rob it by means of their familiar trick of biting a hole in the base of the flower and thus stealing the stores without carrying the pollen. The cockle, and its cousin the catchfly, have both learned the same trick of so swelling the chaffy calyx as to make of it a fence that holds the bee at a distance, and effectually removes the sugary nectar beyond the reach of his pilfering tongue.

# JULY

# THE WARMTH OF JULY



N each day now the heat is higher than before. The sun's rays are hottest in this the northern half of the world at the end of June, but our days are warmest in July and August.

## WHY JULY IS HOTTEST

This at first seems a paradox, but it is not. A man is not necessarily richest when he is earning most. Even though his receipts diminish, so long as they exceed his expenditures his wealth accumulates. We gain warmth from the sun while our part of the earth is turned toward him. But we are losing heat, throwing it back into space, all the time. During these long days we

get more than we can throw away, and consequently we get warmer day by day.

With us, of course, the sun never gets directly overhead. If it did we would be in the torrid zone. But now it is daily farther south of the overhead point at noon, and we are getting its rays more and more slantingly, and hence getting less and less heat from them. For the more inclined the sun's rays are, the greater the area a given amount of them will cover, and hence the less they will heat any given spot. By early August the income and outgo will balance, and from that time on we must constantly draw on our accumulations. daily draughts on our store continue until late December, when they are heaviest. After that they grow daily less, for our income slowly increases. But it is not until February that our call on the reserve ceases and our fortunes reach their lowest ebb. From that time we add daily to our store. But it is not the heat of July that oppresses us so much as the moisture in the air. For moisture interferes with our perspiration,

and it is this which keeps us comfortable. At first sight it seems a poor plan to cool the body by pouring warm water on it; and so it is, unless that water will evaporate. takes as large an amount of heat to make water evaporate as it does to boil it. we must distinguish between the amount and the degree of the heat. A lower degree of heat spread over a longer time will evaporate the water that a higher degree would boil in much less time. Now, the heat to evaporate the perspiration is taken chiefly from our bodies, which thus naturally become cooler. On days when the air has taken up all the water it will hold, we perspire in vain. The moisture gathers in beads when it should slowly disappear in the air. These are the days we call sultry, and they are more uncomfortable than merely hot days though the temperature be not so high.

#### BIRDS IN JULY

The birds particularly seem to feel the heat. In every little stream they are splashing and spattering the water over their warm feathers. The exuberance of their spring songs is over now, and most of them sit quiet on their perches. To be sure, their carollings have accomplished their purpose, and when the male has gained his mate and helped to build the nest, there is work enough in gathering food for his wife and children to sober any father. Even yet his joy bubbles over morning and evening; but when the sun is high, the quiet persistent note of the pewee must stand for almost the whole choir of spring.

#### HOT WEATHER SUITS THE INSECTS

But, whatever the birds and we may think of the weather, these are just the days that suit the insects. The sun cannot shine with rays hot enough to scorch their ardor, and the hum of the bumblebee, the quick flight of the wasp that is building its mud hut under the eaves, and the buzz of the hornet as he searches for flies are the pleasant accompaniments of our summer lazings. Through the warm air the butterflies wheel, almost secure from the birds who sit in the

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deep foliage with mouths open and wings held away from the body. Over the hot, dry ground of the cornfield the grasshopper hovers in crackling, quivering glee, while from the near-by grove the hum of the locust starts out musically enough, though even it gets wooden toward the end of the song.

As evening approaches the musicians change, but their numbers, if anything, increase. Denied the power of beauty, these denizens of the night must depend on their voices for winning their friends, and the night is strident with the shrill fiddling of the crickets and, later, of the katydids. Some of the insects, afraid of the birds, cautiously light their lanterns and start out on their search for a comrade by night. Even here their fear of lurking foes has taught them to flash their lights intermittently.

# THE LOCUST'S HOT SONG

THE LOCUST'S DRUMS

It sounds hot when the locust sings. He never seems quite happy with the thermometer anywhere that pleases us. When



we begin to wilt, the locust tunes up his twin drums and begins his gleeful song. For here again it is the male that sings, and if you will but catch him you will find his instruments beneath the long flaps of his vest. The wife wears no such vest, conceals no such drums, and is mute. If you will bend his body backward and forward at the waist, you can beat his drums at will. You need not hesitate to try this, for he is in truth quite harmless. It is almost impossible for him to puncture the skin, and should he by any chance do so, the result is likely to be far less hurtful than would be the case were you to prick yourself with a pin that had been lying about a city street.

#### HIS NAME

It is rarely that any name comes to have so hazy a meaning as does the word "locust." It is applied by different classes of persons to entirely different insects. When the people at large use it they mean the cicada, either the larger, greenish "harvest-



WE SHOULD CALL THIS FELLOW THE CICADA

fly" that comes every year, or the "seventeen-year locust" which is smaller and marked with reddish lines. When the man who is interested particularly in the cropdestroying insects mentions the locust, he means the grasshopper; while the strict scientist, when he names the locust family, will include neither of these, but refers to the katydid and its closer allies. Of course we should call this fellow the cicada, but I fear, in this country, popular usage has called him locust so long that reform is hopeless. We have, then, two insects popularly known by the name of locust. The one we see and hear every late July and early August is broad over the shoulders and looks as if he were made of tarnished copper. He is a motley of blacks and greens with a white blush here and there, and is better known as the "harvest-fly."

#### THE SEVENTEEN-YEAR LOCUST

The other one has long been known as the seventeen-year locust. He is smaller and redder, and only comes in any locality once

in seventeen years, arriving in June and lasting into July. The truth of the matter is, it takes seventeen years to make him. Before his exact period had been recognized, his coming, like that of the comets and all other unexpected events, was considered to presage war. This was all the more clear inasmuch as his front wings carry a very plain W, and what else could this mean? We now know that during the sixteen intervening years he lives under the ground, without wings, and thus escapes our notice.

The mother locust cuts light slits in the tender bark of the ends of the limbs of trees and in them lays her eggs. She thus-in-jures the wood, and soon the twig dies and hangs down. The next high wind breaks it off and it falls to the earth. By this time the eggs have hatched, and the young locust, not yet looking at all like his mother, creeps into the earth. Here he goes through a very slow growth and development, feeding occasionally on tender roots. By the summer of the seventeenth year he is ready

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to emerge. He creeps out and up the tree until he finds a place into which he can clinch his toes. Then his back splits open, and the adult form, tender and limp, squirms out and later hardens into the perfect insect.

Ever since 1715 (and how often before that no one knows) a brood of cicadas has been reappearing every seventeen years in the southeastern part of Pennsylvania and over much of New Jersey, Delaware, and Maryland.

In 1902 they returned in great abundance, but by this time practically all superstition was gone in the matter, and the only fear people had was that the insects might do serious damage to trees. But even this dread proved unnecessary, and practically no harm resulted from their visit. Meanwhile the increase of general knowledge on the subject was so great that probably no brood of insects has ever been so intelligently watched by so many curious eyes as greeted the last brood of this long-known series.

# THE LOCUST'S GREATEST ENEMY

Nature never seems to make a good big creature of any kind but she plants near him a deadly enemy. It seems a wasteful plan of working, but it turns out well in the end. Steadily and relentlessly every weak creature is cut off in his early prime and leaves behind him no progeny to continue his particular weaknesses, while the alert and active animal earns a lengthened life for himself and a more probable immunity for his posterity. This effective duty of removing delinquents is performed for the locust by a most savage and unrelenting foe in the shape of a long yellow and black banded wasp with reddish wings and a body fully an inch long.

# THE DIGGER WASP

Persons who live in Virginia or Maryland, or even in southern Pennsylvania and New Jersey, will find frequently in July that a large wasp of this kind is digging holes in their lawns and disfiguring the grass plots with large quantities of freshly dug earth. This the wasp has kicked



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out by means of her strongly spiked hind legs. A little watching will show what it all means. What at first appears to be a tremendous insect comes sailing heavily down to the hole. When it alights the size is explained. It is a big sphex wasp carrying, with considerable effort, a still bigger locust. You will probably want to walk about quite unobtrusively, if you care to examine this matter closely, for the wasp has altogether the finest sting it has ever been my good fortune to see thrust out. is curved like a scimitar, fully half inch long, and exquisitely pointed. I do not know how badly its sting might hurt, but from the promptness with which it paralyzes so large an insect as its prey is, I should prefer omitting that piece of practical knowledge. The insect authorities generally say that the sphex, when once she comes to earth, must laboriously climb to some high place, dragging her victim with her, before she can gain sufficient impetus to fly away with so great a weight. I have repeatedly seen this wasp, when disturbed, gather up her burden from the lawn and fly away, often to a higher point, without any apparently severe effort. More commonly, when molested it deserted its prey. I was quite surprised, however, that so formidable a fellow should show so little disposition to attack the intruding observer.

The battle between the cicada and the sphex is often a long one, but it is always certain to terminate in the same way. Strong as is the cicada, he has no means of defence. It is the constant effort of the sphex to alight on the shoulders of her victim, between the great fluttering wings. Then she curves her long sting around beneath the cicada's body and punctures it where the venom will soon soak into the nerve centres that order the motions of the animal's body and paralysis soon sets in. Now the wasp, grasping the overturned locust by its legs, flies to one of the burrows she has previously made and pushes her victim to the very bottom of the hole. This burrow has a somewhat winding course and may be as much as a yard in depth.

### WHY SHE DIGS

When once this big store of provision is safely housed, its purpose becomes apparent, for the wasp deposits against it an egg, which soon develops into a club-shaped larva. This feeds on the locust, grows big, spins a cocoon, and then lies quiet for the winter, coming out the next year just in time for the new crop of cicadas.

# SUMMER FLOWERS

People sometimes seem to forget that flowers are not over with June. Spring flowers are coquettish; summer blooms frankly bid for attention. The faint, delicate pinks and violets and whites have given place to red and purple, to deep blue, to yellow and orange. When white comes now, it is more likely to come in masses or at night, and if at night, then with a fulness and richness of perfume that is almost oppressive. I suppose each of us is most sensitive to one particular color, and I am barbaric enough to like it dark red. Of all the crops that grow in our fields none delights

me more than crimson clover. Of all the flowers that brighten our woods and swamps none seems to me more cheering from its simple glow than the cardinal lobelia.

### THE CARDINAL LOBELIA

The swamps are the places where Nature is most active in reclaiming the ground. How gracious it is that she should cover her processes of decay, that are blackening and enrichening the slime beneath, with the dainty carpet of ferns and mosses, and spot the surface here and there with such perfect patches of color as come from the graceful clusters of the yellow-fringed orchid or from the tall, glowing spikes of the cardinal flower.

The little blue lobelia of the fields, with its inflated seed-pods, has long been used in medicine. But to me the best administration of lobelia is through the eye, and its most potent effect is on the mind.

One summer day on the mountains a companion and myself had lost our bearings. There was nothing to do but follow down

a watercourse, confident that it would lead us sooner or later to human habitations. Our luncheon was eaten, we were foot-sore, and my camera was heavy. Altogether our spirits were down. The undergrowth was so thick that our quickest progress was made by wading down the bed of the stream. A sudden turn of the rivulet brought us face to face with a clump of birches. Their pure white trunks, with the paper hanging in delicate shreds, stood out clear and sharp against the dark shadows of the undergrowth behind them. About their base, on the top of the shelving bank, stood a magnificent cluster of maidenhair ferns, their dainty fronds scarcely swaying in the Through it all came the summer air. dominant note of the cardinal flower. Involuntarily we stopped and gazed; and a brighter mood and a quicker step led us on, and made it perhaps a little easier to bear when, on arriving at a house half a mile farther on, we found we had gone down the wrong side of the mountain.

#### BLACK-EYED SUSAN

But while the cardinal flower may enliven the swampy recesses with its cheering color, there is a more dashing flower, whose outspoken presence, it seems to me, must be frankly gladdening to every one who sees it and who does not own the land on which it grows. For we have gotten an artificial but most understandable bias against the sort of plants we call weeds. So I think probably the owner of the pasture is little inclined to rejoice over an intruding group of "black-eyed Susans." But when no question of ownership arises, the laughing audacity, the sturdy wholesomeness of the black-eved Susan and its unblushingly flaunted color must make it a cheering sight to every passer on the road, and a golden store of treasure-trove to him, be he child or grown man, who has crossed the bars and is wading knee-deep in the clover. They tell me this jaunty flower came to us first with seed oats from Kansas. true this is I do not know, but if it did, I am sure, to the nature lover at least, if not to the

farmer, our sister State has induced us to entertain an angel unawares, even though it be a breezy one, as becomes a western angel.

This dashing beauty belongs to a most aristocratic family, indeed to the family that scientists have come to put at the very summit of the flower world. And here the botanist and the flower lover are for once agreed, and both opposed to the farmer. For in this splendid group come the brightfaced dandelion and the white-rayed daisy, the blue-eyed chiccory and the sumptuous golden-rod, the haughty chrysanthemum of the fashionable flower show and the selfsufficing thistle of the country road-side, the stately "queen of the meadow" and the richly purple iron-weed. But which of them all gives to the landscape it adorns a more instant challenge or a cheerier note than Susannah of the dark brown eye?

# NOT A FLOWER BUT A BOUQUET

The truth of the matter is, that in this entire group what is commonly called a flower is not at all a flower but an entire bouquet. In the dandelion every narrow strap is a flower in itself, and as many as two hundred of them may unite to form the bloom that catches our eye. In the thistle each slender purple tube is the flower, and the thistle head with its prickly surroundings may contain many hundreds of flowers. In our yellow friend not only is each yellow ray a flower but the brown eye of the cluster is fairly packed with abundant florets. It is this fine spirit of co-operation amongst these flowers that has probably been the biggest factor in making of this family the successful group that it is.

But another quality has also done much to help them along in the world, and that is their wonderful adaptability. Whatever the nature of the surroundings, so long as there is warmth enough, a place will be made for itself by some "composite," for so are the members of this family named.

# THE TRUE ARISTOCRACY

But even in this group there are degrees of aristocracy, indeed examples of all shades of opinion as to what constitutes aristocracy. The chiccory, with its clear blue corollas, bids only for the bees, for they are practically the only insects that really care for blue. The purple of the iron-weed and of the thistle is a little more inclusive in its invitation. So the bees here are joined at the feast chiefly by a varied group of fluttering butterflies. But when it comes to the black-eyed Susan and the golden-rod, with their great flaring patches of yellow, every insect that cares at all for color sees the notice and heeds the call. So to these flock all sorts and conditions of bugs, beetles, flies, butterflies, and bees. It is this splendid prodigality of welcome, this genuine understanding that true aristocracy is only the call to service of the fullest and freest kind, that, more than anything else, endears to my heart this splendid, dashing, buxom, western darling.

# AUGUST

# VI

# THE CRICKET'S CHIRP



ASILY the dominant note of August is the cricket's chirp. It is the one note to vie in charm with the purling of the mountain brook. When we are overpowered by the

heat of the day, the cooling suggestion of water rippling over the stones brings such a sense of relief as makes it most pleasing; but when evening comes and we are less biased in our judgments, the musical voice of the cricket from out the grass comes with peculiar charm.

For the voice of the insect is better than that of the brook. The inanimate brook sings an accidental song, which springs from no movement of its inner nature, and is without meaning except as we find it suggest emotion in ourselves. But the voice of the cricket is a love-song. There is doubtless a very limited stock of romance in the little quadruple knot of nervous matter which serves him for a brain. But none the less, on his humble plane he feels within him the universal desire for a mate; and the outcome of that longing is the chirp.

# IT RISES WITH THE TEMPERATURE

But while his song is brightest and merriest in the love time, which is the spring-time, his cheery nature keeps bubbling over well into fall, in sheer exuberance of spirits, until cold weather dampens his ardor. His joy, so a scientist tells us, rises and falls so absolutely with the thermometer, that it is possible to calculate the temperature with a reasonable degree of precision by the pitch of the cricket's shrilling. But, however the male cricket may evince his joy, we are entirely in the dark as to the degree of response in his dusky mate. Her story is

untold, at least in any language we have learned to understand, for she is voiceless.

#### THE CRICKET A FIDDLER

Indeed, it is only by a stretch of the imagination that we may call the chirp of the cricket its voice. These strange creatures are so entirely different from us in every way that, though even the scientist uses human terms in speaking of them, these terms only apply by the roughest analogies.

Their eyes are unlike our eyes, and must present a totally different picture of the landscape. Their ears are so different from ours and so strangely placed that we were long in doubt as to what the organ meant and still in many cases are uncertain. Their jaws have positively no relation to our jaws; indeed they probably were originally legs, and they work from side to side instead of up and down as our jaws do. And so it is with the voice. Our voice, as well as the bark of the dog, the song of the bird, the hiss of the serpent, the croak of the frog, all are made in some way or other by the

air we breathe. Every one of these sounds is produced on a wind instrument. But the cricket fiddles to his mate, and so do his cousins the grasshopper and the katydid.

When the grasshopper tunes his musical instrument the fiddle is the prominent vein on his front wing, and for bow he uses his long hind leg, drawing it gleefully across the quivering wing. But the katydid and the cricket, who are nearer of kin to each other than either of them is to the grasshopper, both use one wing for fiddle and the other for bow. When they grow merry they rub both wings together, much as a character in the old-fashioned novel rubbed his hands.

#### HIS STRANGE EAR

But, strange as is his musical instrument, his ear is stranger. Its only resemblance to ours lies in the fact that it has a drum and has nerves back of it. Of the flap, which is the conspicuous but comparatively less important part of ours, there is no trace, and, such as this ear is, he wears it just below the knee of his from leg.

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It is interesting to notice how the cricket has departed from the shape of the grasshopper to fit the station of life to which he has been called. He has, perhaps to avoid his enemies, perhaps because of a fondness for roots, taken to living beneath the sod. The long legs of the grasshopper have become short, but intensely strong, and heavily beset with spikes. These become powerful instruments to push him through the earth, and make him an exceedingly uncomfortable fellow to hold tight in one's In such a life the gaudy colors with which most grasshoppers deck such portions of their bodies as they can promptly conceal would be useless, because unseen, and the cricket paints himself a dull brown. when his enemies have gone to sleep, the cricket comes to the surface and under the pale light of the stars fiddles, to the listening knees of his skipping mate, the old, old tale.

But while perhaps a genuine lover of nature will reason out within himself the charm of the cricket's song, a more widely loved songster, clad in raiment gorgeous even for so renowned a singer, takes up a central position in the scene and gives a note or two to remind us of what he could do were the concert season not already over.

# THE BALTIMORE ORIOLE

Bright colors usually make a bird shy. He cannot ordinarily afford to attract attention, except that of his mate, for it is unfortunately the case that almost any animal that really notices the bird, except his mate, is his enemy. Under such circumstances it is most natural that a bird so brilliant in his feathering and so melodious in his voice, and yet so willing to live about the homes of men, as is our Baltimore oriole, should be a universal favorite. Popular admiration has voiced itself by giving to him name after name, all distinctive of some attractive quality. Our English forefathers knew in their old home an oriole which was orange So this bird, which reminded and black. them of their old friend, got the old name. The Baltimore was added because he carried the then well-known colors of Lord Baltimore. The robin is the dearest bird to the American heart, and our present friend has often been gathered into the inner circle by calling him the golden robin; for his call is not at all unlike that of the robin, though it is far more mellow, so that in voice as well as in plumage our friend is truly golden. That he is neither an oriole nor a robin, scientifically speaking, is only another instance of the small dependence to be put on common names.

### BRIGHT-COLORED BIRDS

The fearlessness of so brilliant a bird is strange and does great credit, I am sure, to the bird world, for I think it shows that the timidity of our feathered friend is largely a matter of anxiety for the safety of his wife and childern, rather than of himself. The tanagers and the thistle finches, birds about as conspicuous as the oriole, are both more difficult of approach. But each of these has an open nest, and his mate when engaged at her domestic duties must lie in a

position quite exposed to view. So even when she herself is dull colored, as is the case of the female of both these birds, it is a matter of no little danger to be visited constantly by so gaudy a companion.

# THE ORIOLE'S NEST

But the oriole's wife and children are secure far beyond most birds. For her nest is more of a concealment to its inmates than that of any other of our common residents except the woodpeckers. Gathering slivers of grape bark, fibres of milk-weed, horse-hairs, or any such long-threaded material, the oriole weaves them into a deep round pocket, which hangs beneath some pendent limb, often so far out that no enemy save another bird could well reach it. The long pendulous boughs of the elm form a favorite resting-place, while the weeping willow, though strange to the experience of the race, has been adopted by this skilful worker as a place for her woven nest. deed, when we remember how thoroughly many students of nature and of science have



THE ORIOLE WEAVES A DEEP, ROUND POCKET

believed in the almost unvarying character of instinct, it is really remarkable to see how this bird has taken possession of every sort of string, yarn, silk, or ravelled rope that man has thrown in her way, and applied it to the purposes of her home building.

When this pocket is finished, it forms so thorough a shelter from prying eyes that Madam Oriole herself dares, as female birds in our latitude rarely do, to adorn herself with the colors of her brilliant mate. But she does so discreetly and with a modest reserve that is befitting a member of a class of animals in which beauty is distinctly a male prerogative.

# A NEW FEARLESSNESS IN BIRDS

There is a matter which I hardly dare record, since it must be largely a question of impression. But I have had my own feeling corroborated from a number of unexpected sources and I venture to set it down. The summer of nineteen hundred and two marked a turning-point in the social relations existing between man and bird in

the portions of Pennsylvania, New Jersey, and Delaware adjacent to Philadelphia. In that year there arose a generation of birds who were, as a whole, noticeably more fearless of man than was the case very shortly before. The Audubon Society and the Nature study movement in the public schools are, I think, chiefly responsible for the change. Sure it is, the new state of affairs is most gratifying to those of us who are watching with sore hearts the disappearance of the wild things we have known and loved.

But the birds have no monopoly of brilliant coloration on this splendid August afternoon.

# THE TIGER SWALLOWTAIL

With all the lazy unconcern of insects about the degree of heat, so long as there is enough of it, there comes floating along through the quivering atmosphere a butterfly, the most attractive of all our day-flying insects. Broad of wing, striking of color, it seems more than strange that so little of

the nervous fluttering which usually characterizes the butterflies should disturb this The broad yellow wings, with their black stripes and margins, and with the blue and orange buttons at the tip of their slender tails, give to this beautiful butterfly the name of the tiger swallowtail. course this formidable title refers only to the color, for a butterfly must, by his very structure, be a harmless and inoffensive animal. The beetle may sometimes pinch, the bug or the fly may occasionally pierce with his pointed tongue, the bee or the wasp may sting; but the butterfly has no safety in most cases but in avoiding notice or in immediate and precipitate flight. Our common red-brown monarch is said to be so offensive in his flavor as to be too unpleasant to eat. But as for most butterflies, birds can and do eat them with apparent relish. Even our abused English sparrow, with his bill shaped for seed-cracking, does not disdain to double and turn now and then to capture the venturesome little sulphuryellow butterfly.

#### A COLOR PROBLEM

So it is puzzling to me to see this splendid big fellow sail lazily and easily through the open air, up to the tree tops, over the houses, lighting now and then to appease what we might suppose to be a dainty yearning for the nectar in the corolla of a flower did he not disclose the catholicity of his tastes by taking the very next sip from the mud of a puddle.

Most butterflies too, when they alight, fold their wings erect, against each other, presenting thus merely a slender edge to the eye of a passing bird, and thus doubtless escaping notice. But this fellow flaunts his gaudy wings in the very eyes of his supposed enemies, lazily and insolently opening and closing them as he clings to the flower. There must be something about him which birds dislike, or he would surely be exterminated.

#### THE DOUBLE GENERATION

This butterfly's children will be longer lived than he, almost beyond a doubt. Be-

tween them they will live a year; but he will have two months of that year and they will have ten. Not that they will get that much more out of life, for they will practically sleep, many of them, eight months of their ten, and he sleeps once only, and then for about two weeks in all his two months of life. His mother probably laid her dainty egg on the leaf of a tulip-tree some time in June. There his voracious caterpillar childhood was passed. But when the eggs laid by this generation have in their turn spent their youth on the same beloved tree, they will hang themselves up by a shoulder-strap in some secure place, and there they will swing through all the rigors of winter without protection, and at any temperature known in the United States.

#### FROZEN ANIMALS

It is almost startling to think of life that can be frozen solid and not be any the worse for it. But this is really not a very uncommon event amongst many cold-blooded animals. Even the housed and pampered goldfish may be in an aquarium of water that freezes to the centre and bursts the glass; but if there has been no other calamity, the ice will melt and release the prisoners, who will resume the dull monotony of their existence, apparently unaffected by the lapse in their lives.

Next year, in June or early July, this dull chrysalis will awake. The brown, stiff case will split, and from it comes, slowly and with great effort, a limp, flabby creature, with small pads on his shoulders which within a single hour will lengthen themselves out into the splendid wings of our tiger swallowtail.

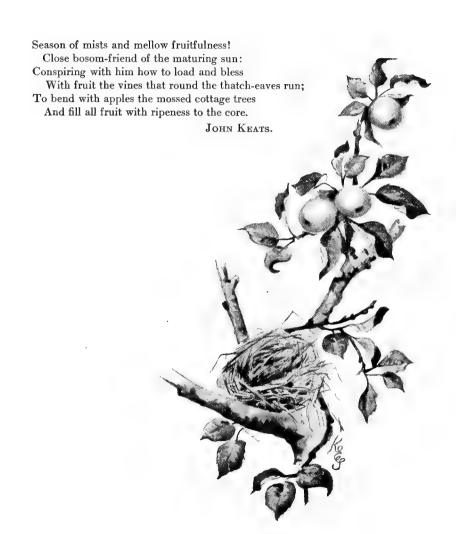
# THE LILY AND THE BUTTERFLY

And it was high time he came; for the gorgeous Canada lily is waiting. Its long slender stamens are swinging their trembling anthers in the afternoon sun and calling, with all the power of their orange petals. The call is strengthened by the brown spots. And it is particularly this butterfly for whom they are calling. He sees the

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beckoning hue, gathers the projecting stamens between his agile legs, uncoils his long tubular tongue and plunges it deep into the heart of the flower. He goes away, unmindful of the fact that his legs and his hairy body and the almost feathery underside of his hind wings are red with rich pollen. This he carries to the next inviting lily, whose green, protruding pistil, sticky now for just this purpose, picks from the butterfly the fertilizing powder so essential to the seed-bearing of our flowering plants.

# **FALL**



# **SEPTEMBER**

# VII

### THE END BEGINS



ACH year as we grow older, I think we grow fonder of fall. I like the good old name of fall,—it means so much more to us than autumn, and it shows itself so much our own

that we can at least pronounce it as we spell it, which is more than we can say for the longer word. Summer and winter do not show, on the face of them, what they mean, but spring and fall prove that the mind of our ancestors was not without its touch of poetry. The coming of the green leaves and their going again marked for them the striking events of the year.

And now the hope of spring and the struggle of summer have culminated in the fruition of fall, when all Nature rejoices in things accomplished, luxuriates in the rich colors of luscious fruits and gloats over the beautiful old age of the leaves, before she lies down, not to die, but to foster her strength for the contest of another year.

### FALL MIGRANTS

Not only are we now between seasons, but our country is a between country for many of the birds. There were a few weeks in May when our thickets and hedges were delicious with the love calls of hosts of dainty warblers. Out of the southland they came, clean coated, bright feathered, clear voiced, merry and active as they could be. Then most of them left us and went on to their summer camps in the Adirondacks and the wilds of Canada. Now they are with us once more, on their way to their winter homes in the southland—often indeed in Venezuela, Brazil, or even in the pampas back of Buenos Ayres.

But what a change has come over them! The bright clothes are worn out or cast aside, the cheery melodies are apparently forgotten, the pursuits and flirtings are all over, and a quiet and sedate band of travellers they have become.

The passage of these more extensive voyagers seems to set our own summer so-journers to longing for their winter homes, and one by one they will drop away. The martins, that were scattered in little colonies all over the countryside, will join in great flocks and make the excursion together. About the same time the Baltimore oriole will leave her pendent cradle and take her now grown children with her. The humming-birds with their glittering crests will drop out, a few at a time, and cross the gulf to join their tropical cousins.

### ALL-YEAR BIRDS

Meanwhile some of our permanent birds are beginning to get ready for winter by changing their summer clothes. In the spring-time every one so well knows and loves one of our daintiest little birds that he has received more names perhaps than any

other of our feathered friends. We call him the thistle finch, the goldfinch, the salad bird, the wild canary, or the yellow bird, as best suits our individual fancy. Bright as he was in his courting suit, he now puts away his canary coat, and for the winter is quite content to dress like his quiet wife and his sparrow cousins. So it is that few realize that this merry bird, with his toboggan-slide flight, is with us all the year round.

## POISON IVY

This is perhaps the most tempting season of all the year for a walk, and a country lane beneath the trees is never more lovely. But there is a serpent in this Eden, in the form of a creeping, enticing, but trouble-breeding vine.

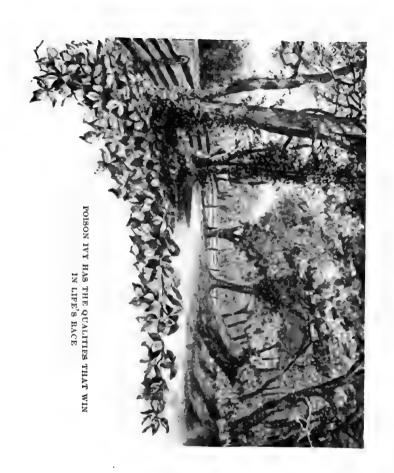
Poison ivy is a bold bad plant. It seems so subtle in its attacks, so bitter in its hatred, that we can hardly help believing it our sworn enemy. But this is only our view of the matter, and plant lovers all know there must be another side to the story. From its own stand-point the plant surely is most

ingenious. That it is successful is evident from its abundance. Unless relentlessly weeded out by man, it covers our fenceposts, climbs the trunks of our trees, and clambers about our road-sides.

### ITS GOOD POINTS

The truth is, poison ivy has the qualities that win in life's race. For one thing, it knows how to take advantage of the labors of others. The vital, active work of the plants is done by their foliage. Their stems exist almost for the sole purpose of holding the leaves up into the air and sunlight. poison ivy has learned to put the least possible amount of material into its stem. uses the trunks of other trees or posts or even walls to support itself, and thus saves for making leaves the material that would otherwise go to the stem. There is in this a temptation and a danger to the plant that it will learn to rob its involuntary assistant of nourishment as well as of support by sinking its roots into the tissues and stealing sap. When once this process begins, degeneration is sure. But to this temptation the poison ivy has not succumbed. It still works up its own sap, and so long as it does this it is probably safe from the degrading fate that has overtaken the lowly dodder as a result of yielding absolutely to the same tempting habit. To give it this power to cling to a support, the poison ivy has developed a faculty of sending out abundant roots all along its stem, and then clinging to anything they touch. When the plant lies prostrate on the earth, these roots serve as additional feeders and help it to draw nourishment from the ground, even should an animal, in trampling about, break off the twigs from the parent stem. But when a suitable opportunity comes these roots help the plant to rise by serving as holdfasts.

Then too the plant has learned to cater to our blackbirds in the matter of fruit. These birds are particularly fond of the whitish berries which hang so tightly to the stem that they may be found late in the winter when fruits are scarce. Within this toothsome pulp are seeds so small and hard



that even the gizzard of a blackbird fails to crush them. So these vagrants serve as the active disseminators of the canny plant, which thus gains a foothold in every fence corner.

### NEVER TOUCH IT

But, after all, the poison itself is probably the strongest element in the plant's success. Every part of the plant contains it; every season of the year finds it present and active. Even dry and dead plants will still poison if handled roughly by sensitive fingers. But one count brought against the plant is false. It wounds no one except in self-defence. The idea, very prevalent, that sensitive persons need only pass to leeward of it when it is wet with dew, in order to be poisoned by it is a mistaken one.

I know this is a statement that will be seriously doubted by many careful observers, but thorough research by a worker in one of the great physiological laboratories of the country has put this beyond doubt.

The poisonous substance in the plant is

an oil that is not volatile. It is, however, most persistent, and can be easily transferred from one object to the other. One person getting it on his hands and then washing and wiping his hands on a towel can later give it to any person who is unfortunate enough to use the same towel. Furthermore, a person treading on the plant can later transfer it to his skin on removing his shoes. If a person who has unwittingly brushed against it will promptly scrub his hands well with warm water and soap, he can often remove all trace of the oil before the eruption appears. The same treatment early in the attack will sometimes be enough to prevent its spread. Once well established on the skin, no remedy seems to even allay its violence until it has run its course. Each person has his own pet treatment, but none commands the general regard of physicians. One thing the oily nature of the original poison makes evident, and that is, that oily remedies run great risk of simply dissolving the poison and thus spreading the disease over a larger surface.

The only plant likely to be confused with our strenuous foe is the Virginia creeper. This can be distinguished from the poison ivy by the fact that its leaves have five leaflets each, while its venomous double is content with three. It seems strange that so successful a device for the protection of the plant as the formation of a poison should have been so rarely seized upon by others of our thousands of plants. The truth is that while a few, like the tomato for instance, are somewhat irritant to an occasional sensitive skin, only one other plant native to the eastern United States is seriously poisonous to the touch and that is the swamp sumac.

# THE DRAGON-FLY

Over the neighboring pond darts that fascinating insect, about which cling so many strange notions. It would seem as if the dragon-fly is the victim of a curse. Many are the names under which he goes, but every one is a reflection on his character.

Literary people call him the dragon-fly. The small boy very commonly speaks of him as the snake feeder or snake doctor, or possibly the snake servant. His disciplinary parent, bent on using the fly as a bogie to ward off evil-doing, calls him the devil's darning-needle, and solemnly and impressively tells the refractory child that the insect's chief duty is to sew up forever the mouths of all those wicked little children who tell lies.

The mean side of these awful names is that they are all libels. The dragon-fly is as harmless an insect as haunts the riverside. I have caught them by the hundred and handled them freely, and there is no mistake whatever about it.

An insect's power to harm lies at one end or the other. A few have a small amount of venom in their bite; these are chiefly flies or bugs. A few have their egg-laying tube sharpened to a fine point and have connected with it a set of poison glands; these are almost confined to the bees and wasps. But this fellow can neither bite nor sting.

His jaws are usually so small as to be unable to gather up a fold of skin; or, if large enough, can barely give a light pinch. Sting, the dragon-fly has none.

If any one will overcome his prejudice against this slandered insect and catch him, he will find him extremely beautiful. We often hear of the "thousand eyes" of the fly, but few people ever see this compound eye. If one of the big fellows, so common in September, be examined, the facets will show even to the naked eye, while a magnifying-glass brings them out very plainly.

## BEAUTIFUL COLORS OF THESE INSECTS

Then too the coloring of these insects is exquisite. Most colors are due to pigments, but these belong to that wonderful set whose surface structure determines their beauty. They are the varying colors that change with every angle at which the light strikes them. They are the colors that gleam in the pearl and glow in the opal, that give to ancient glass its exquisite beauty. They are colors that, in an animal, are apt

to be very fugitive and to dim soon after his death.

This fellow haunts the water because there he best finds his food. It has been seriously proposed to cultivate him for his great fondness for mosquitoes. In connection with this his one good name was suggested. It was proposed to call him a "mosquito hawk," but the name never "took."

Then too the dragon-fly lays her eggs in the water and this brings her to our ponds. Here she hovers over the surface, her long tail bent down. Every few seconds at such a time, she dips the tip of the tail under the surface and deposits an egg, which sinks to the bottom and adheres to the stones. Here it develops into its baby stage. Often when you have lifted a stone from the bed of a stream a black, flat animal has scurried to the underside of the stone. This was probably a young dragon-fly. This water-inhabiting and quite unlovely-looking animal will stay here until next summer. Then it will climb up the stem of a cat-tail or sedge, clinch its toes so as to hook firmly to the



plant, and split down the back. From this split skin will emerge a dragon-fly, limp and flaccid at first, but soon stiffening up and flitting away to enjoy his sunny time of life.

## TURTLES ARE DIGNIFIED REPTILES

"Mind your own business and keep your own secrets" is the turtle's motto. Of all our reptiles he is the most inoffensive. Snakes almost every one fears or hates; lizards give most people a decidedly creepy feeling; but no one fears the turtle. goes quietly on at his own slow gait, harming no one and harmed of none. lizard scurries for his life at the first strange noise. The snake slinks quietly from the pathway of the traveller, or perhaps, if venomous, lies in intense quiet waiting the need for a stroke. But the turtle does not even interrupt the tenor of his way, but continues walking or feeding until you fairly kick up against him, and then he simply pulls in his head and legs, curls his tail about himself, and lies by until the danger, if any there be, has passed. Then, as leisurely and dignifiedly as he withdrew from impending harm, he returns to his previous occupation.

The truth of the matter is the turtle has nothing to fear. Nature has provided him with so excellent a coat of armor that he needs no weapons. The bones of his back and ribs have grown wider and smoother and have united to plates formed in his skin. These the animal has knit together so firmly as to make a stronghold into which he can most securely retreat. This box, being made of bone, is of course white. It is covered with a series of thin sheets of substance not unlike our finger-nails. It is this material from certain large marine turtles that forms what is known as tortoise-shell, from which so many beautiful and useful articles are made.

## HOW THE TORTOISE PROTECTS HIMSELF

Our common land-living box-tortoise is the best-protected member of his tribe. Not only can he, like all the rest of his friends, draw his head into the box, but the underside of the box is hinged and he can completely close the flaps. This arrangement is the more necessary because he cannot commonly hide in the mud and water, like his pond cousins, the snapper and the spotted turtle. These latter are the turtles we often see as we approach a body of quiet water. An old projecting log holds perhaps a dozen of them, lying with outstretched necks, enjoying to the full the warm rays of the summer sun. For they are in truth children of the tropics, and ours are wanderers into a clime too cool for them during a considerable part of the year. they use every opportunity to enjoy the luxury of a sun bath. But in such situations they are very much exposed. So on the first sight of our approach, and their sight is very keen, they drop most unceremoniously into the water.

The food of the box-tortoise is as humble as himself. He has quite a taste for mushrooms, and it is astonishing how well versed he is in the matter of their edibility. I have



seen him pass fine, firm amanitas as surely as if he knew that death lurked in their hidden cup and beneath their gauzy veil. Three feet farther on he ate of russulas that were certainly not nearly in as fine condition, but which lacked the protecting poison of their more sophisticated relatives.

The wood-turtle, with his orange legs and the yellow patches on the underside of the shield, neither confines himself so sedulously to the water as the spotted tortoise, nor is he so well adapted to land living as the box-tortoise. He has one trick too which often betrays him to his enemies. When the box-tortoise is startled and draws in his head, he usually does so quite quietly, but the wood-turtle cannot refrain from showing his reptilian blood by emitting at times a low but penetrating hiss. This is quite sure to attract attention when, if he had but been silent, he might easily have escaped unnoticed.

# OCTOBER

# VIII

### THE COLOR MONTH



ARVELOUS indeed are the woods in October. People who have almost lost their liking for the outside world during the rest of the year, often keep longest a fondness for the au-

tumnal landscape. Men who rarely look from a car window seem at this season to be drawn to the glories with which kindly Nature fills our senses as she begins her preparation for the winter's sleep. Many a man under the genial influence of an October afternoon has taken down his forgotten gun and cleaned it up and planned for the gunning trip which he intends shall come when the "season opens," but which as a matter of fact rarely arrives. It is all the subtle

effect of the gloriously restful tinge which the great artist is giving to her greatest work.

### NATURE THE GREAT PAINTER

For Nature is surely our greatest landscape painter, and the best that any other artist can do is feebly to imitate her beauty. There is but one Corot, and few of us can see many of his pictures. But how often does Nature show, to those of us who will but open our eyes to see, the beauties of the early morning when the thin mist still overhangs the valley and everything is covered with a purple haze. There is but one Fortuny; but every clear sunny afternoon in early summer gives, to each of us who cares enough for it to look, as bright a scene and as gorgeous a contrast of colors as any ever painted, and gives them with ever-varying effects. At no time of the year is it more delightful to watch Nature at her work than during these crisp October days. She guards none of her secrets: she does all her work openly. But we are too dimsighted to see into her methods.

To those of us who have followed her progress year by year and all the year through, she has shown many moods, many caprices. Her pictures are never finished. Always she retouches them, adding a little here, painting out a little there. But this month we catch her in one of her most exalted moments. The exuberance of her summer mood is over. She paints more slowly; the colors are more mellow, more mature: the vellows are less frankly yellow, the reds more orange or more purple; the blues are almost all left to the sky. But oh, the richness of the scene! That rock in the foreground is flecked with the brownishgreen of the mosses, while from the little rift the fern stretches out its emerald fronds. The willows, fading backward through their color scheme, have become yellowishgreen, and at last a faded, wearied yellow.

# THE TREES IN FALL

#### TULIP POPLAR

For a tree that boldly glories in the autumnal yellow give me the tulip poplar. Here is no uncertain note. It is not a washed-out green, it is not a yellow patch nor a yellow line, but a clear, vivid chrome yellow, with a lustre and a glow that make it no apology, but a glory. It does not pretend to anything beyond, and the richness of its tone is its own justification.

#### THE MAPLES

The maples aim at a more æsthetic taste, and they try their hands at the reds. They practised a little, quietly, in the spring, and now boldly attempt the work in the fall. The sugar-maples are a little too staid to accept the modern notions, and they paint their autumn leaves a conventional yellow. The silver maples put the red on in patches and blotches. But the red maples, whose 'prentice work in the spring had been so effective, now paint their leaves with masterly skill. Beginning with the outer edge, slowly they enrich the yellow, first with golden, then with orange, and lastly with red. And so the rainbow creeps in toward the midrib of the leaf, which often is golden to the last.

### THE OAKS

The oaks are more staid in their coloration. They paint with the sombreness of an old master. The richest colors only will do for them.

### THE SWEET-GUM

The starred leaves of the sweet-gum tree are in themselves so beautiful that they form a tempting ground to which the tree responds with the utmost abandon. First of all, on the side toward the sun, she tints herself a liquid yellow. As this yellow slowly passes around the tree to the shaded side, a wave of orange follows it. Creeping after this comes a crimson, which in turn gives way to mahogany, to be followed in the best of seasons by a glorious purple. When one has watched such a tree day by day, as the sweet richness of the changes in color sink into him he feels filled with a reverence so intense that he knows it is well the radiance should cease while he still has power to appreciate the beauty which lies before him.

### "WE ALL DO FADE AS A LEAF"

### FADING AS A LEAF

When the grand old prophet of the exile told his people how they faded as a leaf, he joined to it the further complaint that their righteousness was as filthy rags. I fear he had no thought of flattering them. But the truth of the matter is, the most beautiful termination life can have is to fade as does the leaf. It is not the frost that makes the leaf fall. Trees in hot countries shed their leaves. But they do not cast them all at one time. the tropics a tree drops its leaves as a bird moults its feathers, one by one, and you never miss them. With us, winter has taught the leaves to fall all at one time, when they are of least use to the tree and are most likely to prove a source of danger.

It is the green portion of the tree that does most of its work. In young, tender plants this may mean the whole outside. In older trees it means practically only the leaves and the young twigs. In these the food is prepared that builds up all the rest of the plant. This work can be done well only where the sunlight is fairly strong.

As the days get shorter and the sun shines more slantwise, there is not heat enough for good growth, so our trees prepare to "close up shop" for the winter. When they come to do this, they find themselves with two sorts of material in their leaves. the live material, that did the work and is still good, -protoplasm the scientist calls it,-and a lot of by-product in the shape of mineral matter brought up from the soil. protoplasm can be taken apart, carried back into the trunk, and stored away for use next year. It is getting too cold for the plant to do this well, so it puts "warming up" curtains at the windows,—that is, it colors its leaves yellow or red, and thus absorbs the sun's rays and furnishes warmth enough to permit the plant to carry the living substance out of the leaves into the trunk or the roots.

Of the mineral matter in the leaves the

plant has quite enough for its present purposes, so it is not carried away. Now the leaves, thin and dry, as compared with their summer condition, are cast aside, thus returning to the soil the minerals that had been taken up, and which now are in good shape to be used over again. This is the reason why woods earth is so good a soil for potted plants: it is full of concentrated nourishment from the decayed leaves. As before hinted, the leaves may become a source of positive danger to the tree. They have such broad surfaces that the heavy winter winds could catch firm hold of them and thus break off branches, or even uproot the trees. These same leaves would be likely to catch and hold the snow, and thus would be again more than the tree could possibly bear.

So after all its lifework has been completed, with a gentle consideration for the tree that bore it, the leaf gently draws through the base of its own stem a sheet of cork, dressing the wound, so as to prevent infection even before the wound is made. Then only does it drop away, giving back to the earth the precious materials it has borrowed and used during its lifetime. Who would not be proud to have it said of him, in full truth, that he had faded as a leaf?

### A PAIR OF FALL FRUITS

But while we have been philosophizing we have walked fairly through a patch of dried-up weeds, and now see the result. Covered—yes, fairly covered—with beggar-We did not see them? Of course ticks. It will be a long time before we really do see them unless they fasten themselves upon our clothing. For that is just exactly what they were made for. A month ago we would easily have seen them, for they then carried yellow flowers that were bidding for attention. But now they hide themselves Do you see those low brownish carefully. plants, growing on both sides of the path? That is where we got them. There are lots there still for the next person who comes along.

#### BEGGAR-TICK

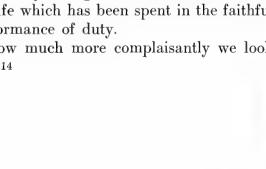
Innate depravity makes them grow along the path, you say. You forget. That is looking at it from the wrong side again. Look at it from their stand-point. You see they want their children to grow up in better surroundings than they did,—where there is less crowding and a likelier chance to make a living. So they send them off hanging to each passer-by, hoping better things for them. We are only doing our part in the play, first when we carried them along, and now as we sit here on this fence and pick them off. Look at one of them. How splendidly it is fitted for its work. The seed part is ordinary enough, but these two prongs, with their back-pointing barbs, do Now let us go ahead. the work. you go, jumping into another patch. that is the patch some one planted last year, in just the way we have set out another crop for some one to jump into next fall. course the beggar-ticks did not give their seed that shape for the purpose of catching you. They were meant to catch into the

fur of humbler animals. But if you insist on going about as a wolf in sheep's clothing, you must expect to do a sheep's duty.

#### INDIAN CORN

But we are safely over the fence and out of the weeds, and now for a walk along the edge of this cornfield. Was there ever another crop so beautiful, so impressive as Indian corn? It is the richest legacy, beside the land itself, the Indians have left us. Old age, a ripe old age, has overtaken these The hair lacks the lustre, the silkiness of youth. The garments hang limp about a form that has lost most of its curves. The skin is getting brown and wrinkled and spotted. Above all, the garrulousness of old age has come on, and these stalks whisper constantly to each other, even to them-It is not a complaining whisper: it is the quiet whisper of old age to old age that lovely old age that comes after a fruitful life which has been spent in the faithful performance of duty.

How much more complaisantly we look



upon the corn than upon the beggar-tick! With our one-sided view-point the one is our friend, the other our enemy. Of course they have no such notion. Each is anxious to provide well for its children; each takes a different plan. One is unobtrusive, clings to us, unconsciously to ourselves, and makes us serve its purpose, not only without our intending to do so, but clearly and distinctly against our will.

The other has taken a less subtle plan. Instead of arranging that each child shall be dropped into a new region far from the home competition, the corn provides each baby plant with inheritance enough to live on vigorously until it is quite able to take care of itself. For that, of course, is the meaning of all the starch and oil lying up against the sprout in this big seed. Then we come along, persuade ourselves that the corn is doing all this for us, eat the baby, inheritance and all, and go on our way rejoicing that we have so good a friend as Indian corn. And all this as a result of our view-point!

#### THE NUTS

What would October be without the nuts? Those of you who get them from the grocer have no suspicion of how delicious they are. It seems to me the big Spanish and Japanese chestnuts do not compare with our native product. As for the English walnut, it may be easy to crack, but it is a tasteless thing beside our black walnut, and not to be named in the same breath with the white walnut, or butternut, as many of us were taught to call it. The boy who has never come home with his fingers blackened with walnut stain that will not leave him for a week—well, he deserves to be put with the boy that cannot swim, that needs a cup to drink from a running stream, and thinks milk "comes" in a bottle.

#### WILD FRUITS ARE BEST

Indeed, these wild fruits are good almost in proportion to the difficulty we experience in gathering them. The wintergreen berries and partridge berries are easy to gather, but rather insipid. The May-apple, readily found and simple to pick, is a tasteless affair as you pluck it from the stalk. But when fall comes it takes the practised eye to discover nuts. You see, a nut-tree tries every means to save its fruits from being eaten; for are they not the seeds themselves? And these seeds, ever so much bigger than even those of Indian corn, must do all that in their power lies to elude the eyes of hungry animals. The simple corn falls too easy a prey; they must do better if they are to escape and perpetuate their kind. Here again two plans are evident. The chestnut is more subtle; the walnut relies on its main strength.

#### THE KEEN CHESTNUT

The chestnut, so primitive in the matter of its yellow fall color, in the simple character of its leaves, in its quick growth for a tree, is quite sophisticated in the matter of its nuts. During the long growing season the nut is covered by a hull which is green in color. This means that against the background of the leaves it will, for the most

part, escape observation. The coat, too, is so prickly that few things except man, with his skilful fingers, can open it. As the leaves turn in the fall the burr turns too, and to just the same shade. Then comes a frost, and brown leaves cover the ground. Now the burrs crack open, and the chestnuts fall and nestle closely in stray crevices, there springing up, the next year, as chestnut seedlings.

#### THE WALNUT

The walnut is even more successful in this effort. But in addition the coat is so intensely bitter that no animal cares to bite into it, while the shell is so rough and hard that nothing but a squirrel can get through it, until man, with his tool-handling ability, comes and crushes the firm covering. The kernel is never sweeter than when it is taken from the walnut-shell crushed under its own tree by means of a handy stone.

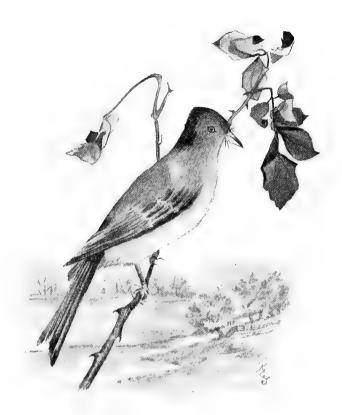
#### THE WHITE WALNUT

Some people think the white walnut is not good to eat, that it is too oily. They simply do not know how to take it. It is our one summer nut. It should lie out under its own tree over winter, and next summer, for some strange reason, it will not have sprouted. Then is the time to eat it. It is the very ambrosia of wild foods.

#### A LITTLE SOJOURNER

#### THE WOOD PEWEE

Already we have missed the great majority of our bird friends, and soon we must part from most of the rest. There, sitting on that projecting dead twig, is one of the daintiest of them. He should have been away before this-probably will be by tomorrow. Hear his "pee-ee-wee-e" down and up, as if to say "I'm he-re." Most birds neglect their music as soon as they are married. Many others will not consent to sing during the heat of the day. But the wood pewee keeps up his modest, reassuring note all day and all summer. His aspect is that of a courtly old gentleman who is striving on slender means to keep up appearances. His suit, apparently black,



A COURTLY OLD GIV

is rather rusty, and just a little white at the edge of the pockets. His waistcoat, too, has seen better days, and is sadly in want of bleaching. But he keeps it all so neat, and is so almost plaintively anxious to do nothing which is not entirely dainty and proper, that he is a most lovable bird. See that fluttering sally after a fly. Now he is back on his perch. Oh, if all of us could only go as patiently about our work, doing our part cheerfully and contentedly, and helping meanwhile to brighten the lives of those about us!

## NOVEMBER

## IX

#### THE SPORTSMAN'S MONTH

PORTSMEN have almost had November for their own. This is the open season for more kinds of game than may be shot in any other month. So it has come to pass that many people

scarcely think of walking into the woods unless they have with them gun and dog. As a matter of fact, these have become with very many American sportsmen simply the excuse. It is a better spirit that really animates them. Over every one there comes, now and then, a swelling longing to escape from the trammels and conventions of civilization and to live the simple and unconstrained life of the woods. But most men would feel foolish if they were to

leave their business and put on old clothes and simply tramp in the woods. So the gun offers the excuse. It really often does not matter whether much game is found.

#### THE NEW SPORTSMAN

Indeed our finer-fibred sportsmen have learned voluntarily to limit the size of their game-bags. Standing and shooting tame pheasants by the hundred would hardly be called sport in America, as it is in England and Germany. Better still, there has come over a small and select body of our sportsmen a new spirit. The game is nearly gone, say they; why shoot the rest? Why not leave these lingering remnants to tell us what our woods once were? If you shoot the deer with a gun, he is only that much meat, that will last at best but for a short time, and a head which though it may bear witness to your prowess is at the same time equal evidence of your butchery. But a deer shot with a camera remains to enjoy life. Indeed to take a successful snap-shot of an animal requires a far higher degree of wood skill than to fell him with a rifle-ball. So it is, that the modern nature lover's zeal has grown out of the old sportsmanlike instinct, influenced partly by the waning game and partly by the newer sensitiveness to the meanness of cruelty.

#### WHAT IS SPORT?

Not that the gunner is to be either despised or pitied. We are better, so the Great Teacher has told us, than many spar-And if man, worn by the routine of life, finds himself refreshed and strengthened in the fall by his trip through the woods, with gun and dog, surely we, who slaughter sheep and oxen by the thousands for our daily nourishment, have little right to complain, when the sportsman comes home with a few grouse or rabbits, or even with a deer, a bear, or an elk. But he must go at a sportsman's season, must use a sportsman's weapon, must shoot at a sportsman's animal, must give the creature a fighting chance, and must limit himself to a sportsman's share. Meanwhile, those of

us who think that all that is best in an animal goes with his life, and who love animals too much to shoot them ourselves, cannot help but wish that more men were of our way of thinking, and could enjoy the wood, without the gun. For a walk in November, like virtue, is its own reward.

How quiet the woods are just now! The brown leaves lie in some places almost kneedeep, and there is a childlike joy in wading through them, breaking thus, as they crackle beneath our feet, a stillness that is sometimes almost oppressive. For about all of our summer birds are gone now. It is true a few others have taken their places, but songs are practically unheard. The light hammer of an occasional downy woodpecker, the gentler tapping of the nuthatch hunting for larvæ in the crevices of the bark and chattering to himself in a wirv undertone as he runs up and down the branches of the trees, the inquisitive pertness of the golden-crowned kinglet, who in spring commonly keeps to the top of the trees but now becomes sociable: these are the unobtrusive delights that reach the ear of the nature lover, but which may all easily be missed by the casual walker. But as we near the creek a shrill, harsh clatter tells us that one of our feathered friends has not yet gone, and that, while man has taken to the gun, the ancient fisherman is still plying his vocation.

#### THE KING OF FISHERMEN

#### A LONE FISHERMAN

Fishing is a selfish business. When you have once found a hole in which the fish really bite, you look with small affection on the new-comer who tries to drop his hook into the same pool. The birds are no better than we are in this matter. The kingfisher, for example, has this human fishing trait developed to an amazing degree. There is one of these birds that haunts a few spots on a creek I often visit. When I come too near to one of his stations he leaves it for the next, and as I go up the stream he keeps ahead of me until I have chased him out three or four times. Then he flies around me and begins at the bottom again. He is

afraid of me; but let another kingfisher try to fish in his waters and he drives him out in short order. He allows no trespassing on his domain. Even his wife receives scant courtesy except during the nesting season. Then he makes her a dugout for her home. In this, with a mattress of fishbones to sleep on, she must be content.

Commonly he sits on a dead limb that overhangs the water. His dishevelled hair shows how distracting a business fishing is for him. His neck-tie, too, is awry, and his blue-gray coat is flecked with patches of dusty white. From his perch he peers down into the water. If fish are scarce, a frog or a crayfish answers, or even some poor drowning bug that comes floating by. When he sees the glitter of a fin below him, he pounces head foremost into the water and comes out with his prey sticking crosswise in his bill. Away he flies chattering, to light at his next station, devour his catch, and then watch for another. His voice, as he clatters along, sounds as if fishing during the cold weather had got into his windpipe,



A LONE FISHERMAN

for he is as hoarse as a wooden rattle. He may leave us any day now for his long, lonely flight into warmer regions. Most of our birds are sociable, but this fellow has been so unneighborly all through the fishing season that he cannot bring himself to travel with any one now.

There is, I believe, a record of kingfishers living in a colony out in Illinois, but there everybody is sociable.

#### HALCYON DAYS

In the countries north of the Mediterranean there are a few weeks in midwinter when the weather grows particularly balmy and pleasant, somewhat in the manner of our own Indian summer. It is at this time, so the fable runs, that the kingfishers build their nests, floating them upon the sea, and in them hatching out their young. Meanwhile Æolus, the god of the winds, tempers and restrains the breezes lest they disturb these mating birds. For was not his own daughter, Halcyon, changed into a kingfisher when she joined her ship-

wrecked and drowned husband, and are not all kingfishers dear to him for her sake? So these lovely sunny days are called kingfisher days—halcyon days, for halcyon is the name of the kingfisher.

But belated as a kingfisher is at this time of the year, surely he seems less out of place than does a live butterfly, however dull and sleepy it may be.

#### A WINTER BUTTERFLY

#### THE MOURNING CLOAK

Butterflies and winter do not seem to fit together. A well-conducted butterfly ought to die in the fall at least, if not in the summer. And indeed the life of this airy creature, after he has once gained his wings and become truly a butterfly, is usually very short. We have one family of them, however, of which several members have the very unusual habit of overwintering. I found one of them the other day underneath a sheltering stone on a neighboring hill-side. She was probably born sometime in September. That she is living now

is due largely to the fact that she is one of the most jerky fliers imaginable. All the butterflies take a more or less zigzag course. Many birds like to eat them, and this motion helps the butterflies to dodge their enemies. The mourning cloak and her relatives are the best dodgers, and it helps them to a long life. While other butterflies die off in the fall, this one hunts out a sheltered spot in which to pass the winter. Thus she has an early start in the spring, and her children can be well on in life before the first generation of other butterflies are much more than under way.

There is another feature about this butterfly that helps to prolong her life. When she settles down she folds the upper sides of her wings together, and the under surface is so dull, and harmonizes so thoroughly with the background against which she rests, that she is exceedingly hard to detect. So it is that she eludes the beak of the predatory bird, that might otherwise bring her to an untimely end. But to have only dull hues on her delicate wings would be alto-



gether too hard on so ethereal a creature as a butterfly. Painted as sombrely as this, life would be too apt to be loveless. So, if one side of her wings is colored for her enemies, the other is painted to attract her color-loving mate. While the under surface looks gray and dull and lined like rotting wood, the upper side is decorated with a coating of rich satiny brown, and its beauty is enhanced by a wide edge of warm buff.

#### BUTTERFLY COLORS

It is wonderful how delicate and frail are these butterfly colors. Most insects have thoroughly transparent wings, and so are those of the butterfly if we will but rub them between our fingers. Then the color shows itself as a powdery deposit. Examined closely, this powder proves to be made up of exceedingly small scales, put on like shingles. Each scale is hollow, and into it the blood of the butterfly easily penetrates. This becomes cut off, and just as our blood in a bruise goes through a series

of degenerative changes from blue to black and then olive and green and yellow before the color disappears, so here color changes come on, but are arrested in each scale at a definite point that determines the color. If it seems a cold business to analyze the hue of a butterfly's wing and bring it down to a physiological process, forget it all and remember only the beauty.

Few insects have the hardihood to brave the winter. The race is carried over from year to year either in the egg or in a resting stage as unlike the parent as an insect can well be, and the parents often drag out a useless existence until life comes to a tedious end.

## THE GRASSHOPPER'S DEATH

#### A LOVELESS OLD AGE

Hard luck is the life portion of the grasshopper. The happy member of this tribe, it seems to me, is the one the turkey picks up, for his troubles are soon over. Missing this fate, a lingering death usually awaits him. Sometimes his reckless leap

into the air, in search of fresh pastures, proves his end. When he jumps he has not the slightest idea of where he will come down. Often he alights in the angle between a grass leaf and its stem. Caught there he cannot release himself, and death through starvation awaits him. If he escape this imprisonment, later in the season a little red spider is apt to attach itself to him just below the base of the wing. This greedy villain slowly sucks away his lifeblood until gradually the wretched host succumbs. Should the grasshopper escape earlier accidents and live to old age, he is still more to be pitied. The cold days of fall stiffen the poor thing, and he lies apparently dead in some crevice between the stones. A warmer sun thaws him out again, and he gives a few short jumps in the early afternoon. With the cool of evening he stiffens up once more, probably to remain so for days, even for weeks. Finally the cold becomes too great for him to bear, and from torpor he passes into death. In the latitude of Pennsylvania his wife sometimes lives over the winter. Should she do so, it is only as a battered, dilapidated relic, with no aim or purpose in her unnaturally lengthened existence.

The truth of the matter is, that down South grasshoppers live over the winter; in the extreme North they never do. On the border line—that is, the middle belt of the country—they sometimes do, though not as a usual thing. But insects, however much they may seem out of place in winter, are surely no more so than are flowers, and yet we have a not uncommon November bloom.

### THE WITCH-HAZEL

The witch-hazel waits until all other flowers are over; then, just as likely as not, after it has thrown away all of its leaves and is quite bare, in October or November, it puts out its yellow flowers. I suspect it does it to attract some of the little flies that hover about at this time. The warm days still bring out those insects, and now the witch-hazel blossoms have no competition. So they get their insect visitors, and thus set

their seeds, which is, after all, what they want to do with their flowers. There is another odd thing about this plant. While it is just preparing to set its seed, it is still carrying the fruits that matured from last year's flowers. They are the urn-like objects scattered over the branches. Some bright morning, after a frosty night, each fruit will split sharply into two, and partly into four. The sections will bend away from each other, and under the strain of the curving pod four oblong, hard seeds will shoot away for eight or ten feet. This is the witch-hazel's way of giving her children a start in the race for life.

#### THE DIVINING ROD

Anything we do not understand we are apt to attribute to the Deity or to the evil one, and it seems then to need no further explanation. Which of these is considered the agent in the peculiar use sometimes made of the witch-hazel, the name "divining rod" would seem to indicate. A twig of this plant, rightly balanced, is supposed



to point out a good place in which to dig for water. Of course this is all nonsense, but the divining rod is often used in spite of that.

But here are the evidences of a citizen of the woods who seems better prepared to withstand the winter, for he has learned to rifle nature's storehouse.

## THE SQUIRREL

#### A GOOD BURGLAR

A good burglar does a clean job. He does not crack the windows and break the furniture. He makes a neat entrance that will answer his purpose and not do violence to his professional pride. These empty walnut-shells lying under an oak tree have caught my eye. Now walnuts would seem to have no business under an oak tree, and doubtless some animal that ate the kernels brought the nuts here. It was not a boy, for he is an unskilful burglar and would have cracked the shell with a stone. The clean-cut hole in each side of each shell tells that the tool of a professional burglar has been at work here. A little red squirrel is



doubtless the culprit. Burglary is hereditary in his family, and he has inherited not only the splendid kit of tools, but also the furtive habits necessary for the business. As I watch one, he flies up the trunk of the tree, out on its spreading limb, gives a quick jump to the extended branch of the neighboring tree, and runs down its trunk. had only run across the ground he could have got there in half the time. But time is not such an object with him. His whole life is a series of dangers, and on the tree he is fairly safe. So he spends as little time as possible on the ground. His curving nails, even sometimes his sharp teeth, help him to hold securely to the bark. know it is the fashion to decry the red squirrel. He is the Ishmael of the furbearers, as the English sparrow is amongst the birds. But, for the life of me, I cannot help loving him. He has a reprehensible habit of taking young birds from their nests. but I have a predilection for spring chicken myself which warns me not to be too hard on a fellow sinner. Of all the wood creatures he seems to me the most riotously mirthful and good-natured. It is true he is a teasing, harrying sprite, but he does not seem at all ill-natured. And when he takes to playing he does it with the utmost Tag is his game, by preference, abandon. and surely when two red squirrels get well interested in their sport, they are more engrossed in it than anything else but college boys engaged in foot-ball—and the squirrels need neither referee nor surgeon. it comes to leaping from one tree to the next, or, if hard pressed, from the top of the tree to the ground, the red squirrel spreads his legs out wide. The loose flaps of skin running from front to hind legs, and the broad vibrant tail, give him a big surface to resist the wind, and he fairly sails down. Of course he cannot rival his cousin, the flying squirrel, in this feat, but he compensates for this by being a far more active runner.

A wonderfully effective tool is that pair of upper front teeth of the squirrel. They are long and curved, and his split upper lip allows him to expose them fully for their work. The hard enamel covers only the front, while the more yielding ivory forms the rear of the tooth. This softer back keeps wearing away rapidly, leaving the sharp edge of the enamel to do the cutting. If you cage a squirrel and keep him on soft food, it will be but a comparatively short time before his front teeth are far too long for his comfort.

But while all these delights are engaging our attention we have forgotten that the days are not now so long as they were and that the sun is low down in the southwest.

#### SUNSET

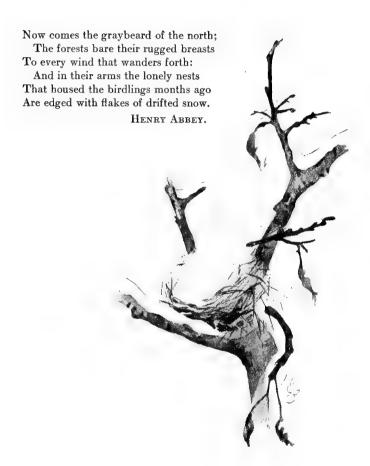
There is a popular notion that the sun rises in the east and sets in the west. That we think so only shows how willing we are to believe what we are told in spite of our eyes. The truth is, there are only two days in the whole year when the sun does any such thing. These two days are March twentieth and September twenty-second, when the days and the nights are each twelve hours long.

When the sun really means business in our part of the country, it makes its appearance at half past four in the morning and it gets up in the northeast. It works hard all day, and by the time it leaves for the night at half past seven it has moved around to the northwest. But now in this section of the country the sun is deserting us. It keeps out of sight in the morning until a quarter before seven; then it comes up far south of east, hurries across the sky in a halfhearted kind of a way, keeping low down, and dives under again, far south of the west point, by a quarter before five in the evening. Every day the sun gets up later and farther south of east, until just before Christmas, when it will come up in the southeast, will stay out only about nine hours, and slink away again by the time it has crossed over to the southwest.

## . WHEN OUR NIGHTS ARE LONG

It seems as if the sun were treating us badly, but there are other people in the world, and it is their turn now. Ours will come again in good time. Meanwhile our part of the world will have to prepare to be content with but little of the sun's society for a time. We can console ourselves with the thought that we are better off than the poor creatures that live far north. again we sometimes have a curious notion. We often talk as if they had six months of continuous day and six months of night. The explorer who reaches the pole and stays there for a year will perhaps be the first man who ever experienced that state of affairs. At the Arctic Circle there is one night only when for twenty-four hours the sun is gone, and the next night is a few minutes shorter. The nearer the pole the longer the nights, but it is only at the very pole that the night is six months long, and this we know only because "it must be so," and not because any one has ever experienced it.

# WINTER



# **DECEMBER**

#### SNOW

ECEMBER brings out all of Nature's resources. The old mother has fed her children with water in the summer of their growth, and now, when they lie down

for their long winter sleep, she turns the water into a blanket which she carefully tucks about them. And wonderful water it is of which this covering is made. Clean, soft, white, porous, it is an ideal protection. When she turns her liquids into solids Nature makes crystals of them. She has only a few general plans for her crystals, but her variations of these plans are infinite. The one she uses when she builds up the snow crystals is, of all others, the one that makes them pack most loosely.

# ONE INCH OF RAIN MAKES TEN OF SNOW

#### SNOW CRYSTALS

Let the fine flakes of snow that fall on a crisp, cold day drop on the surface of your sleeve or hat, and you will see many patterns in many storms, but they are all variations of the six-pointed star. The points themselves have points, and these again may branch, and all are put together into such a delicate filigree as to take up a great deal of room and weigh very little indeed. An inch of rainfall, the drops frozen as they form into delicate crystals, will make ten inches of snow. As a result these crystals cannot pack tightly and smother the life that lies buried but not dead beneath them. But, on the other hand, they keep it warm and comfortable until the return of the spring sun.

We are told that "God tempers the wind to the shorn lamb," and it is equally true that He tempers the winter winds to all His creatures. Cold of itself does little harm so long as the air is dry. I have heard Kennan, the Siberian traveller, say that he had worked comfortably on a calm, dry day when the temperature was sixty degrees below zero. The very first thing that happens as the air begins to get cold is that the moisture settles out of it in the graceful, delicate form of snow, leaving the air dry, pure, and exhilarating. And, with all its other blessings, snow is white. Fluffy and transparent as each crystal is, it could be nothing else. For the light that enters it is reflected from so many surfaces that it is sure to come back whole, as it went in, and whole light means white light.

#### THE WHITENESS OF SNOW

Black snow would be dangerous; so would red or yellow. These are "warming-up colors," and they change the sun's rays to heat. Such snow would soon melt again and prove a very poor protection. But white snow throws back the sunlight in just the form in which it receives it, converting none of it into heat, and thus the

snow can lie long on the ground. Throw dirt on the snow, and its dark color quickly makes it eat its way in whenever the sun shines on it. After a snow-storm, once let the horses' feet mingle the dirt of the road with the snow and sleighing will soon be over.

### NATURE'S IRRIGATION PLANS

Nature secures another advantage by changing the water into snow. All through the winter, while the plant world has not sufficient sunlight and warmth to grow, she collects on the high regions the water not now needed by the plants, and holds it back; not in dams and lakes that might break and flood the valleys, and which in any event could only water the lowlands; but on every height she gathers a store of water that will not flow away and needs no damming, but which is ready, when the first warm, sunshiny days of spring come, to allow its lifegiving streams to find their way gently down the hills to the valleys below, and to ooze slowly through the ground to the plants that are all preparing at that time for their grand onward rush into beauty and bloom.

I fear it needs such philosophizing on the snow to console me for the fact that walking at this time of the year is rather tiring, if one cares to leave the broken track and plunge through the woods and along the stream, beneath the snow-laden hemlocks and the cold, naked oaks and elms and maples. But if one does not go so far afield, he appreciates all the better whatever sight may be silhouetted against the sharp background, or whatever sound breaks out of the crisp stillness, unbroken by the rustle of leaves, the carol of birds, or the chirp of insects. When we add to this the glorious sense of exhilaration with which one is filled after the battle with the wind and the cold. a winter walk is not without its allurements to the nature lover sufficiently hearty to withstand its rigors.

#### WINTER MUSIC

This is winter. This morning the wagons creaked as their wheels went over the snow

The frost crystals scream a brisk accompaniment to each step, and that means crisp cold. The wheels of the train ring on the steel rails. You never catch such a clang as that in the summer time. Watch the long line of white cloud as the steam from the locomotive stack trails back. It does not build the piled cottony white masses that follow the locomotive on a summer afternoon, especially before a thunder-shower. Instead, the white stream soon melts into a whispy, curly, diaphanous cloud, that floats away in flecks. And then too how the telegraph wires sing this morning! This is the time for these Æolian harps. these cold days the wires run in almost straight lines from pole to pole. The cold makes them shorter, and so tightens them up. In summer they sag, and are not tense enough to sing. But now every crisp breeze sets them humming and ringing with a most cheerful tune. If you have never heard it before, lay your ear against the telegraph pole, and you will catch music weird and strange, with its absence of measured cadence, and yet full of captivating swellings and of surgings from the gentlest, tenderest pianissimos to the boldest, most stirring of It obeys none of our laws of musical composition, and yet it is undoubtedly supremely musical. To me it seems rarely strange that an instrument so planned by man for a different and far more practical purpose, should lend itself so readily to the gentle touches of the invisible musician who never seems to strike a discordant note. And so, I say, this is winter: clear, typical winter weather. But out-door life in winter is, after all, by no means barren of attractions, and one of the most delightful of them announces itself with a tap-tap-tapping that is insistent enough to demand attention.

#### A BIRD INSIDE A TREE

#### THE DOWNY WOODPECKER

Rarely do two things fit each other better than do the tree trunk and the woodpecker. He is born in the trunk of a tree; he lives on the trunk, and when he leaves it, it is but to go to another. His toes are built to cling to it, while most birds have feet fashioned to cling to the limbs or to walk on the ground. His tail is made to brace him against the trunk; most birds would hopelessly spoil their tails by such use. He feeds on the insects that infest the bark, and when he wants to woo his downy mate, he uses some dry old dead trunk as a drum and on it beats what is to her a most fascinating tattoo. Almost any other of our common birds has a foot fashioned so as to allow him to put three toes on the front of his perch and one behind, and after he has settled himself down he can hold tight enough to sleep there. The woodpecker is somewhat awkward when he tries to sit across a twig, because he parts his toes in the middle and puts two in front and two behind. But this gives him a grip on the erect portions of the tree that almost no bird not of his family can equal. Then his tail feathers are firm and pointed, and when he has fastened his toes in the bark he spreads his stiff tail, presses the points into the crevices of the tree, and is ready for his work,—that of clearing the bark of insects and of those "white worms" that will become full-fledged insects later on.

The woodpecker is a most industrious fellow, beginning near the bottom of a tree and working his way up to the top. Even in the very dead of winter he finds here a hearty meal, and the poor insects that had crept under the edges of the dried bark in the autumn fall victims to his searching eye and his strong, prying bill. Having worked one trunk over thoroughly, from bottom to top, he sweeps with undulating flight to the bottom of another tree, and works his way up it.



## DOWNY'S NESTING

When the snow has gone and spring has come, he will take to the dry, hollow, light-ning-blasted top of a tree. On this far-sounding drum he will rattle away cheerily and industriously until some downy maiden who loves a drummer responds. Then he turns to and digs her a home out of the same

dry trunk, and there they raise their downy family.

He is one of the few birds we have that stay with us all the year round. In the quiet of the winter woods, the heart of the walker is cheered when he hears the gentle "rattat-tat-tat" of the pecker's work, and the subdued "twit, twit-chee, chee, chee" of his gentle voice. If it were not for these little noises you would be very apt to miss seeing him, for he is a speckled dweller on a speckled trunk. His only touch of color is the splash of red across the back of the neck, and even this scanty adornment is denied his wife. It is the old common trick in the males of birds to monopolize the colored clothing and to leave the plainer garb to their mates.

But not all the interest in this tree centres around its feathered visitor. About its base, peering through the snow, are the long, hearty-looking fronds of the Christmas fern.

#### FERNS IN WINTER

The Creator has fashions in plants, and the ferns are quite old-fashioned. There was a time when they were the vogue. Then they grew rankly in every swamp from the equator to the pole. But that time is over now, and the ferns are quite out. Then they grew of all sizes: tree-ferns were common everywhere. Now tree-ferns are practically unknown outside of the tropics. The only reason why ferns have survived at all is because they have sought safety in their insignificance.

#### THE FERN FASHION

Plants grown from seeds are the fashion now, but they are quite a modern introduction. The days when the coal was made were the time of the fern fashion, and such a thing as a seed plant, except in the primitive form of the pines, had not yet been invented. Now the seed plants are dominating everything, and slowly driving the rest into the cold regions and into the swamps and up the hill-sides. Most of the ferns take kindly to the swamps, and that means death to all their exposed parts in the winter when the water freezes. A few,

chiefly plain, tough specimens whose fronds (as fern leaves are called) hug the ground rather closely, have learned to stand the cold of winter. It is a patch of this kind, called the Christmas fern, that I have just found. Some of the fronds are brown and dead, but many, in the sheltered places, are almost as green as in the summer.

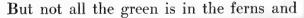
To many people the idea of a plant without seeds is a strange one, but this is only half of the strangeness. No fern in the ordinary course of events has a fern for a parent, and equally strangely no fern, as events ordinarily happen, has a fern for its child. But each fern has had a fern for its grandfather and will in turn have a fern for its grandchild.

## THE FERN'S PATERNITY

When a fern has come to maturity, as will be readily remembered by any one who ever picks these exquisitely graceful plants, brown spots appear somewhere about it, commonly on the under side of the fronds. From these spots, at full ripeness, a brown

dust is dropped, indeed sometimes thrown to a little distance. This brown powder consists of little grains each of which is a spore, and these serve the plant for the purpose that seeds answer in the higher plants. But they differ in this, that, while a seed is really a child of two parents, the spore is but a piece of one. A seed, springing up, will produce a plant with qualities between those of its parents, with all the possibilities of improvement on either that this fact implies. A spore transmits practically unchanged the qualities of its single parent.

But the strange part of the process is that when the spore grows it does not produce a fern at all; sprouting it grows into a small heart-shaped shield. This is so inconspicuous as to escape attention on the part of all but students and gardeners. And it is this shield that comes nearest to flowering in the sense of the crossing of individuals to produce the new plant. For it is from the crossing of two such shields that a new fern arises.



on the hemlocks. Perhaps, if we are wandering through New Jersey, Delaware, or southward, a strange green tuft on an otherwise brown tree will catch our eye.

#### THE MISTLETOE

Why will we set our hearts on the degenerates of life and despise those that are wholesome and hearty? When a plant is really robust and thoroughly able to take care of itself, we turn up our noses at it and call it a weed. Here at Christmas time we hang from our chandeliers sprays of mistletoe, not only a degenerate, but, what is worse, a parasite, and make it the accompaniment of our most festive season.

A strange plant it is, almost an uncanny one. Other green plants work for themselves, but here is a plant that is just green enough to help itself when it must, and firmly enough rooted in the bark of its host to draw from it a large share of its nourishment. For the mistletoe never grows on the ground. Its seeds, when they fall there, come to nothing. Instead, we find

it perched up in the tops of oaks and of the sour-gum trees.

#### HOW MISTLETOE IS PLANTED

The story of how the mistletoe gets on the trees is to me a most interesting one. ering the mistletoe twigs are pearly white berries. These hang on to the plant until the arrival of winter, when food is comparatively scarce, and hence some of our birds eat them freely. Now, when a bird eats a cherry he swallows simply the meat and flips the stone away. The seed of the mistletoe the bird cannot flip. It is sticky and clings to his bill. His only resource is to wipe it off, and he does so, leaving it sticking to the branches of the tree on which he is sitting. This seed sprouts after a time, and, not finding earth,—which indeed its ancestral habit has made it cease wanting, it sinks its roots into the bark of the tree and hunts there for the pipes that carry the sap. Now, the sap in the bark is the very richest in the tree, far richer than that in the wood, and the mistletoe gets from its

host the choicest of food. In the case of many parasites, this stealing of nourishment leads to the entire loss of the leaves it now no longer needs; but the mistletoe keeps them, in at least partial support of itself. With an apparent shrewdness most astonishing, it holds to them all the year round, while its host has thrown away its own leaves and stopped working for the winter.

#### THE CHRISTMAS CUSTOM

The mistletoe, like the Easter egg, is one of the evidences of the fact, that a new religion becomes superposed upon an old one, rather than completely displaces it. In the primitive worship of our Saxon ancestors, the priests assembled their people beneath the ancient oak, where often the horse served for the bloody sacrifice. Reverencing the oak as they did, what is more natural than that an especial sacredness should attach to the mysterious plant, the only one in their experience, that flourished, green all the year round, upon the branches of their

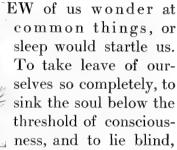
holy tree? So, when the yule-tide came, the mistletoe was taken into the house, and there Christianity found it on the conversion of the northern tribes. With the celebration of the birth of "Christ the White," concurring as it did with the yule-tide, came the strange combination of the Mass in the church as the official ceremony, and the mistletoe in England and the Christmas tree in Germany as the celebration in the home, in memory of the good old times. Of course there is no longer any religious meaning attached in our minds to the hanging up of the mistletoe, but the sweet accident which tradition makes liable to occur beneath its overshadowing boughs tells us that its original significance was certainly not baleful.

# **JANUARY**

### XI

#### THE RESTING MONTH

SLEEP



deaf, speechless, helpless for hours, is surely marvel enough to make us pause. And then to rise, with the ashes and the smoke of yesterday's fires cleared out of our tissues, with brains alert to think, muscles tense to act, digestive organs calling for more fuel, lungs tingling for more of the draught to feed the fires; this is what sleep means to us. But glorious as is this rest and refreshment, there are members of

the insect world to whom sleep is not only renewal, but, at the same time, glorification.

#### THE HAWK-MOTH

To go to sleep ugly and wake up beautiful—how charming it must be. It is still more delightful to have no recollection of your old estate. But it is best of all to lie down in the fall, after a hearty feast, sleep over the winter, and wake up in the spring a lovely creature with a finer nature and a daintier appetite. Such are the changes now going on beneath the snow.

# THE "TOMATO WORM"

A foot or so below the surface of the ground, wherever, last summer, tomatoes or potatoes were growing, Nature is at this wonderful work. These plants were "infested" (as the farmer naturally says, looking at it from his stand-point) by what most people would call an ugly green worm. The farmer calls it a "tomato worm." Of course it is not a worm, for a real worm has

no legs, and a worm always remains just a Properly this thing is called a larva, though this is quite by the way. It is as long as your finger and nearly as heavy, and has a most dangerous-looking horn on its tail. The sight of it fills most people with disgust, if not with fear. This, however, is purely the result of our unconscious and absurd horror of all creeping things. very strange how many animals, at first repugnant, lose their repulsiveness become even beautiful when we interested in them. The green color so common to the different species of these larvæ is just a part of Nature's old trick of protection. Living as they do upon the green background of the leaves, they would be sure, were they not colored as they are, to attract the notice of hungry birds which have none of our repugnance for these busy creatures.

The only apparent mission in life for such a larva is to eat, and at this vocation it busies itself so absorbingly that soon it has filled itself completely and any further

feeding is out of the question. When it has reached this condition, Nature teaches it to clinch its toes firmly into the stem of the plant on which it lives and await develop-These arrive in the shape of a splitting of the skin across the neck and down the back. The creature, thus released from the cramping pressure, wriggles out of its own old skin and comes out with a new and larger covering. It now grows rapidly for a few hours. Once more it has room inside to fatten. This process repeats itself until the larva has attained its full size. Then it creeps down into the ground and prepares for sleep. Here its last conscious act (if I am not too bold in imagining its psychology) is to split its old larval skin about the neck and shove it back. Then the larva sheds the skin and leaves it to lie as a pellet just back of it. Now the creature looks like a long brown pitcher with a slender handle. This is the final external change for the season. All through the winter it lies apparently unaltered.

#### AN UNDERGROUND TRANSFORMATION

But internally a most profound change The little, nearly blind eyes are is at work. developing into a magnificent set, adapted for near and distant vision. The leaf-eating jaws are changing into a long, slender tongue and a digestive apparatus for handling nothing less ethereal than the nectar of flowers. The short, clumsy legs are becoming long, slender and delicate, and, best of all, four splendid wings are growing out from the shoulders. But all of this wonderful change is still concealed inside the dull, brown skin. By the time spring comes the animal that had gone into the earth a long, ugly, half-blind, wholly gross larva, once more, and now for the last time, splits its skin and emerges from the brown case a beautiful creature.

#### THE FINAL PRODUCT

Have you ever noticed what seemed to you a humming-bird hovering in the twilight before your moon-flowers and trumpet-vines or petunias? Humming-birds like



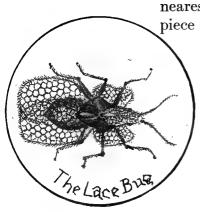
to fly in the sunlight; so it could not be one of them. Perhaps you called it a lady-bird, though bird it was not. It was a hawk-moth. Active, lithe, graceful, covered with the most delicate of powdery clothing, and with a rare beauty of sedate coloration, it is hard to realize that this was once a "tomato worm." Indeed I strongly doubt whether the hawk-moth herself even for a moment has recognized the relationship.

Is it not natural that men's minds should have seen in such marvellous changes as these something that seemed to make them understand, at least a little less dimly, how we may be sown a natural body and raised a spiritual body?

But not all of our insects are so securely packed away for the winter as is the hawk-moth.

## THE LACE-BUG

Do you want to see a beautiful bug tucked away against the cold? Go to the nearest sycamore tree and lift up a small piece of its bark from the trunk at about



the height of your head from the ground. There lives the lace-bug; active in summer, asleep in winter.

This tiny creature is only about an eighth of an inch long, and to the naked eye seems simply white. But any ordinary magnifying-glass will disclose its beauty. Two long sheets of lace down the back form its wings. Its neck is surrounded by an Elizabethan ruff of lace. It wears a lace cap on its head. If you admire lace gowns, here is a real one, fresh from the hand of the great Weaver.

One is at first inclined to wonder why so small an insect should be so exquisitely beautiful. Then we realize that unconsciously we have measured by ourselves. The lace-bug's mate doubtless finds him just the size to suit her taste and has no doubt as to the value of all this charm.

To me it is a source of great satisfaction to be able to turn up for my own delight so beautiful an object to put under my pocket lens. More than one winter day has shone brighter for me because I lifted a fragment of the bark of a sycamore tree.



#### AN AMERICAN TREE

For true American character give me the sycamore. Not the European member of the family, that comes from the nurseries and that we are apt to plant on our lawns; but our own sycamore, the buttonwood of our meadows. Summer or winter alike, it is always charming; but it seems to me particularly beautiful in winter. Look at the difference between the nurseryman's tree and our own sycamore. The general lines are just the same. There is the same ruggedness and sturdiness. But in all the details of the smaller branches there is a yielding ease of curve in the European tree, las becomes the more cosmopolitan experience of our travelled friend, while our own sets its twigs with uncompromising assertion.

#### THE PEELING TRUNK

I wish I could catch the reason for the difference in color of the sycamores in different winters. The smaller boughs always shed their outer bark in winter and look almost as white as if washed with lime.

The trunk at the base, if large enough, always retains a covering of dark brown, old bark. During some winters the white creeps ever so much farther down the trees than it does during others. The winter of ninety-nine and nineteen hundred was the "whitest" winter for sycamore trees in my recollection, and many good-sized trees were clean almost to the ground. By the next year the color had crept up much farther, and kept going up for several years.

There is one quality in the sycamore tree from which we must withhold our admiration: it is unusually apt to be decayed at the heart. Whole trees are often mere shells, the hollow centre having served perhaps as the chimney to the fireplace used by careless hunters or thoughtless boys. One scarcely sees how the tree can suffer it and live. In one of the New Jersey towns there is an old buttonwood that showed considerable internal decay. The owners, anxious to preserve a tree that had become historic, put a man inside the trunk, who cut out all the decayed wood and filled the cavity

with bricks and mortar. The sycamore has completely healed over the wound and now shows no trace of the disease, although the tree is probably more than a century old.

#### THE WINTER SHAPE OF TREES

It takes winter to bring out the character Almost any tree can look well in of trees. Its leaves will pad out its desummer. fects, round its angles, and cover its deformities. But in winter the tree itself stands out in all its nakedness. Then the oak shows its rugged grandeur, the elm its courtly grace, the birch its gentle delicacy. It is then the Carolina poplar, planted by an evanescent land improvement company and decapitated to make it "shapely," shows out all its hideous deformity. When will men who want "bushy" trees learn to plant such as have of themselves the bushy habit, instead of taking such as the Creator has taught to grow spindly, and cutting the heads from them? In summer the deception is fairly good, but in winter the poor things look like dilapidated feather dusters. Carolina

poplars begin to undress early in the fall, the first leaves falling before August is over. This being the case, they are the very last trees we should undertake to deform.

This bareness of trees in winter, with its putting away of tender parts and leaving the hardier portions of the plant to withstand the inclemency of the season, is by no means the only plan plants employ.

#### HOW PLANTS ESCAPE THE COLD

#### ANNUAL PLANTS

Plants cannot get out of the cold. The robin may fly south to a warmer climate, the groundhog may creep into his burrow, deep in the earth, and go to sleep, the rabbit may grow a thicker coat and brave it out. But the plants are fixed and must stand it as best they may. By all odds the greatest number solve it in the very simplest way: they die. Of course such kinds have learned to flower and seed within one year, or there would be an end of their race.

The lilies and the tulips take a different plan. They are not content with one year's

growth, and yet are not ambitious enough to put up a structure that will resist the cold as the trees do. So they grow fresh tender leaves and flowers, but as winter comes on they remove all their live material from the parts above ground and run it down into the earth. There they store it up as a rich deposit of starch. This is what makes the fleshy portion of plants of which we use the underground parts for food, such as the turnip and the potato. It is this portion that we plant year after year in the case of our tulips, crocuses, and caladiums. When the supplies have been carried beneath ground, these plants desert the old leaves and stem and let the elements destroy them. Next year they build all of them afresh. Of course such plants never grow very large. But, after all, it is a fairly successful plan and one in very common use.

#### THE DANGER OF BURGLARS

The great drawback to the method is its temptation to thieves. Many animals like the starch that has been stored away; so they dig it up and eat it. I suppose most of them do it with the same philosophical conceit that man has: they think that is what it was made for. So the stupid, lumpish potato usually comes to an untimely end. It has put away a great store of food, as useful to any animal as to itself, and left it quite unprotected.

#### THE INDIAN TURNIP

Jack-in-the-pulpit has better sense. For all the religious profession implied in his name, he is at bottom a very hot-tempered gentleman. The country boy is apt to learn very early, through the solicitous efforts of some companion, the taste of the "Indian turnip," which is only the underground portion of Jack-in-the-pulpit. The sad lesson is in active process of learning for just about half an hour, for it takes fully that long to get the hot sensation out of the mouth. This is because Jack is shrewder than the potato. When he puts his starch away under the ground, he packs it as full as it can stick with wonderfully minute but

intensely sharp needle-like crystals of oxalate of lime. These get into the tongue and lining of the mouth, and irritate it so intensely that I imagine few animals ever need more than one taste.

#### POISONOUS ROOTS

Some plants, like the wild parsnip, are vindictive enough to kill the burglar who steals their stores. They mingle poison with the starch. But the religious training of Jackin-the-pulpit has at least gone far enough to keep him from such extremes, and he simply preaches the robber a most pungent homily and one not likely to be soon forgotten.

The bareness of the woods in January puts many of Nature's small creatures under the necessity of keeping as thoroughly out of sight as is possible.

# NATURE'S LESSON TO HELPLESS ANIMALS

If you look like the ground, sit still and you are safe. This is Nature's first lesson to a helpless animal. It is the hopping toad that startles you, and the gliding snake. Let either lie quiet and you miss seeing him. For every toad you see you probably pass ten unnoticed. Even after a grasshopper has caught your eye by flying, you usually lose sight of him when he lights.

#### THE RUFFED GROUSE

During my walks through the winter woods I occasionally meet a bird that has learned this lesson well, and that is the ruffed grouse. He is now, alas, too rare, although even in eastern Pennsylvania he was quite common within my memory. The rich brown plumage, with its flecks of black, corresponds so closely with the fallen leaves and occasional patches of bare brown earth that if he will but lie still you are almost sure to miss him. Should your path run near his resting-place, almost from beneath your feet he rises to the level of your head; then, with a speed that is at the same time the admiration and the despair of the gunner, he is away through the woods. The low, firm hum of the wings tells of the

rapidity of the stroke. Few birds can keep up long at that rate, and the grouse usually drops before he has gone more than a few hundred yards. So accurate is his flight that in spite of his speed he never strikes against the trees, even in the closest forest. To accomplish this his tail is broad, fan-like, and strong; for the tail is the rudder of the bird, and on all birds that fly accurately it must be well developed.

#### WHITE MEAT

Our common chicken, degenerate though she is through captivity, flies for a short distance with just the same motion of the wings as the ruffed grouse. This is one of the outward evidences of her not very distant kinship with this, the finest game-bird in the eastern United States, the wild turkey alone excepted. Many birds in this family, including our own domestic chicken and turkey, and the grouse and bob-white amongst our wild birds, have taken so much to running and are so little given to sustained flight that the muscles of the breast



and wings have become distinctly degenerate. We may like the taste of white meat, but it is not as useful to the chicken, and not as nourishing to us, as the dark meat of her legs, or as that on the breast of such birds as use their wings frequently in flight.

### HOW NATURE MAKES NEW SOIL

Now it is that we may see Nature getting ready for the spring distribution of fertility to her beloved meadows. The soil which she is going to scatter so lavishly in the spring in the shape of mud she is now most assiduously preparing. All through the rocks run lines of weakness. These may be there because they mark the layers in which the rock was originally formed. Sometimes they are sheets of crystals that corrode on exposure to the air more rapidly than the other rock ingredients. Still again they may be cracks formed when the rocks contracted on cooling. But whatever may be the origin of these crevices, into them the water When water freezes it swells with a power well-nigh irresistible. That a very little of it can crack an iron pipe most of us have found to our cost. And so the water which has percolated through the soil into the rocks freezes there and tears them apart, slowly but completely.

Thus the rock is split, and the pieces made in this way are again broken into finer and finer fragments until new soil is made to take the place of that which each year moves down to the lowlands. But this new soil lacks fertility. It needs organic matter. So the bacteria act on the old fallen leaves and withered grasses and in the tangle of roots of dead plants, and work them up into the very best of compost for enriching the soil.

#### THE SOIL BECOMES POROUS

These bacteria are as helpless as we are unless they are well supplied with air. On these winter days, as you walk along a country road after a frosty night, you can see how Nature's plowman is at work. Jack Frost is loosening the top layers of the soil and making them porous and airy. Nature

plows when the plants are asleep and will not be hurt by the process. The sod on the top of the bank is lifted up on tall needles of ice. If you walk on the turf your foot sinks an inch or so at every step, and the crackling of the crystals tells what has given way. In the soil, thus opened up during the winter by the frost, this work of the bacteria is ready to go on with vigor as soon as warm weather comes. Earlier than this the plant could not use the material. Nature makes her fertilizers just when she needs them.

It is the moisture that is deep in the ground that really serves the needs of the plants. Rain for the leaves is not of nearly so much moment. So it behooves Nature to see that this water does not needlessly evaporate. Any housewife who has left uncapped the lamp beneath her chafing-dish knows how soon the alcohol will have evaporated. If the top of the wick were more loosely braided and had larger air spaces in it, this work would be slower. But a lamp is intended to evaporate its burning fluid rapidly. When not in use such a

lamp must have a cap. In the same way the moisture of the earth would dry up into the atmosphere were it not for the covering of fallen leaves and for the porous nature of the top layer. These remove the level of quick drying farther down. They serve as the cap on the lamp.

# **FEBRUARY**



THE FLOCK TAKES TO THE BLOCKS OF ICE

## XII

### NATURE'S LAST NAP



LD Nature's sleep is nearly over. Already she is beginning to turn and stretch. She may draw up the blanket of snow again and take, another nap, but it will not be a long one, nor

will it be deep. So, if we are to get our last look at real winter, we must take it now. And it is delightful, to one whose eyes are open to the premonitory symptoms of the awakening, to see how the plants that grow in the beds of the little streams will begin to show green before the month is out. The twigs of the willows too will redden, and the skunk-cabbage will push out. But these are only symptoms of the awakening and not the awakening

itself. February is true winter still, and every trace of active animal life is striking enough to be interesting.

### THE CROW

There are a few of our animals for whom winter with all its privations has no terrors; and amongst these none maintains his equanimity more entirely than the crow, who now is holding his winter conclaves. I think the convention assembled near my home this winter must number a thousand members.

# EVERYBODY'S JIM

Every one seems on easy terms with the crow. No one hesitates to call him Jim, nor does he ever seem to resent it. He is the easy-going fellow of whom no one knows any definite harm, yet for whom certainly no one is willing to say anything distinctly good. He is semi-disreputable without being thoroughly bad. So his name becomes a byword. When you have a friendly quarrel with a neighbor, you "pick a crow" with him. When you wish to point the

finger of scorn at a neglected horse, you call him a "crow-bait." You could hardly make a more unflattering remark concerning any one's personal appearance than to call him a "scarecrow."

Amongst his fellow birds his reputation is even more doubtful. He has a fashion of slinking about the backdoors of their homes, and, when he finds the mother has gone out for a minute, to get a bite of something or other or to look up a recreant husband, Jim is not at all above snatching an egg or even one of the children. So the rest of the birds become anxious when he gets to their end of the settlement, and they are quite apt to gather together and say very unflattering things about him as he approaches and are not above saying them to his face when he arrives.

His tribe shares his bad reputation; and, while in the sad tale of Cock Robin his cousin the rook may take the part of the parson, I much doubt whether there is in it any compliment to the sacred office. The most serious attempt to give the family an

air of respectability was when the raven "perched upon the bust of Pallas" just above Poe's chamber door, from which point of vantage he interjected his depressing remarks into the poet's musings. I know Poe calls him a raven, but if he met him near his Baltimore home his raven certainly was a crow.

Jim takes on the manners of a respectable bird for a time in the spring. During his courtship and his early married life he is really well-behaved. He forsakes his cronies and pays faithful and devoted attention to the "crowess" of his choice. Together they build a rather shiftless-looking sort of a home on some high tree. Here they have their little romance, which is probably as sweet to them as if they had a more pretentious nest of grasses and horse-hair and were in better odor with their neighbors.

At this time their fare is quite a varied one. I suggested eggs and young birds, but these are only tid-bits as an occasional treat. Their steady diet is more commonplace.

Bugs and locusts, cutworms and beetles, form no small part of their food. For this the farmer would be devoutly grateful did they not demand such heavy pay in the shape of corn and wheat and rye. Jim is probably not learned in the matter of diastase and its power to turn starch to sugar, but he has the practical side of that information, for he knows that a few days after corn has been planted it is delightfully tender and sweet. This taste, more than anything else, has been his ruin, and the farmer is his uncompromising enemy.

### THE WINTER ASSEMBLY

When fall comes, the charm of married life wanes and he drifts back into disreputable ways again. Joining himself with other fellows of the baser sort, they form crowds of hundreds or even thousands. Seizing on some isolated grove on the mountains for their refuge, they sally forth in great flocks early each morning.

Many a dweller in the towns, as he begins the slow process of waking in a winter morning, hears the strident "caw-caw-caw" of the marauding band. Their destination is usually the banks of a river, perhaps even twenty miles away "as the crow flies," and there they pass the day. Feeding along the edge of the water, they pick up river snails and garbage, carrion, or indeed anything approaching edibility that happens to turn up. Sometimes one will hover like a gull and pick up scraps, or even a fish from the water. When the stream is covered with loose blocks of ice, the flock takes to these and gathers from the river all sorts of float-But when nightfall comes, they ing food. return in noisy procession to their distant mountain home.

Meanwhile amongst the limbs of the trees in which the crows have had their winter lodging I find the evidences of a less successful battle against the biting frost.

# THE PAPER WASP'S NEST

A wasp queen, like the queen of the bumblebees, is queen by divine right. She is not elected to the throne, she does not in-

herit it, she has not usurped it. But the place is hers, and her sway there is none to dispute. For her subjects are all her own children, even to the number of several thousands. Late in the year she may share the responsibility with her favored daughters, but in her early career she reigns supreme and alone. The year has a lonely beginning for her. At this season she hangs, cold and stiff, behind some strip of bark, or in some protecting stump. Perhaps, fortunately for her, the cold has benumbed her feelings, for her husband, prince consort but never king, died last fall after a very short married life, and his posthumous children have not yet come to comfort her.

### A PAPER PALACE

With the first days of spring she sets industriously to work to establish her kingdom. Her palace is a most unsubstantial affair, for she builds it of paper. Very modest indeed are her plans at first. She flies to an old dry limb or to a fence-rail,



and gnaws loose little fragments of wood and grinds them by means of her jaws, adding saliva until she has a genuine paper pulp, of which indeed her ancestors were the inventors. Of this material she makes a comb like that in which a bee stores honey. But whereas a bee makes level rooms in an upright comb, the wasp makes a level comb with upright rooms. Perhaps we had better call them downright, for the entrance to each room is on the under side, and the suite of apartments hangs by a strand of paper from the limb of a tree. In each room she puts an egg and enough food for the baby wasp to eat when the egg hatches. When she has done this, she builds a paper roof which at first only shelters, but later is brought down over the sides until it completely surrounds, the comb. By this time her first batch, of perhaps fifty children, makes its appearance. them immediately to work. Most of them are ill-developed daughters who devote themselves to the more menial household duties. Indeed, they are maiden ladies

with neither the capacity nor the inclination for raising families of their own. So they build a new and larger comb, hanging it beneath the old one. For in this community the top story is built first, and each additional one is put under the last, until the cold weather of fall brings the process to an end, though often not before four or five stories have been added. Of course. the old enveloping walls are not able to hold So with each extension the wasps tear pieces from the inside of the wall, chew them into pulp, and add them again to the outer side. In this way the walls keep moving outward to accommodate the growing family. As the season advances the colony increases in numbers until by fall there may be a thousand inhabitants of the one great nest.

#### THE RESULT OF WINTER

Cold weather coming on finds the old queen now well provided with subjects, all her own children. The very great majority of them are the undeveloped females, who

do all the work of the colony. Some few are males, useless gentlemen who toil not neither do they spin. To marry well, into a neighboring royal family, and then to die, is the full span of their duty. They even lack the common weapon of defence in the tribe, the sting. In addition to these are the small number of fully developed females. Genuine winter weather is too much for most wasps. It usually surprises a good many young who are only half developed and who are killed by the frost. The males and workers all die. The queens, old and young, forsake the nest, and each hunts a quiet place where she will be protected from the winter's cold, and goes to sleep. When she wakes, it is to enter into the round of life pursued by her mother before her. To the best of my knowledge, the old homes are never used a second year.

As my walks lead me by the old neglected mill-pond, I see the home of a colony whose winter fight is a compromise. The members will not brave it out as the crow does, nor yet will they succumb as does the wasp.

Here a semi-activity on milder days alternates with entire seclusion in the coldest weather.

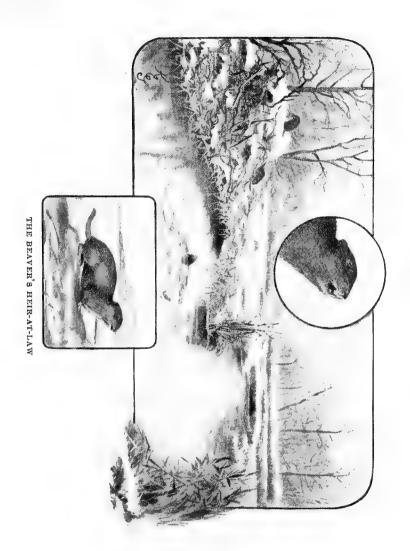
### THE MUSKRAT'S MOUND

The ghost of the beaver is still in the land and his name is muskrat. In practically everything but size they are the same. Take a muskrat, flatten his tail up and down instead of sidewise, and magnify him, and you have a beaver. Thoreau once said he had found in the Walden woods everything but the Bengal tiger and the Victoria lily, and that he confidently expected to find them sometime. Nothing has better helped me to understand his meaning than to study the muskrat and call him beaver.

# THE BEAVER'S HEIR-AT-LAW

I recently came across a mound that reminded me of this afresh. A stream makes its way into an abandoned mill-dam. This has been allowed to fill up, and, for several hundred yards all about it, earth has silted in and formed a swamp. In Pennsylvania

our muskrats usually make burrows in the banks of streams, leaving to their more northerly brothers the mound-building trick. But these fellows had built a genuine mound. Not far away was a cornfield, and cornstalks, cut into lengths of about a foot, had served to furnish the main stiffening for the structure. With this they had mixed mud, carried up from the bed of the stream, which they patted down amongst the rather irregularly laid stalks. In this way the side towards the stream had gotten a gentle slope and showed chiefly the mud, while the opposite side was steep and full of projecting stalks. They take the material they find easiest to hand. I have recently seen two others. One of them was made almost entirely of mud, with a few old leaves; the other was built of coarse grasses daubed The entrance into the mound with mud. has its mouth under water. The muskrats have hollowed out the inside of the pile and entering the tunnel they come up through a hole in the floor. This is only a few inches above the level of the water. Here they



spend the winter, only sallying out in search of food on bright days, unless pressed by hunger. But even when it is quite cold, a blow on the top of the mound will startle them, and away they scurry, perhaps under clear ice which may cover the stream. In this pond the main food of the muskrat seems to be the roots of the coarse water plants that grow in the swamp. In a larger stream some miles away, the habits of the animal are quite different. Here he builds no mound, which indeed would be too easily swept away by the high floods. Instead, he makes a tunnel, below the level of the water, into the bank of the stream. This passage-way rises and opens into a chamber as big as a peck measure. Here he chiefly spends his days and winters. His journeys made in search of food are commonly made at night. His food, as well as his house, differs from that of his pond-loving brother. He has given up, to some extent, his vegetable diet, and has taken to bivalves fresh from the shell. Mussels, or fresh-water clams, seem to his taste, and piles of the shells of these litter the bottom of the stream or the bank near his home.

### THE HAND AND THE BRAIN

The muskrat is not only cousin to the beaver, but is not much more distantly related to the squirrel and the rabbit. sequently, besides having the family traits of the hare-lip and sharp front teeth, he also has the habit of sitting up on his hind legs and holding his food in his front feet. This posture is almost unknown in any other group not provided with distinct hands. Modern students of mind say that much of the clearness of our thinking depends on our facility in handling. They tell us our ideas of size and form come primarily from the sense of touch rather than from sight. Perhaps much of the intelligence of squirrels is due to their constant practice in handling things. It would seem that in this family the kind that sit up and handle their food most are the brightest. But perhaps this is putting it wrong end foremost. It may be that the brighter they are, the more likely they are to sit up and hold their food.

I should not wonder if there were more muskrats now than when the Indians roamed the woods. We have killed off all their enemies. Being small, nocturnal in their habits, and of poor flavor owing to their musky tang, they have been allowed to multiply almost undisturbed. Such is the safety that lies in mediocrity and unobtrusiveness.

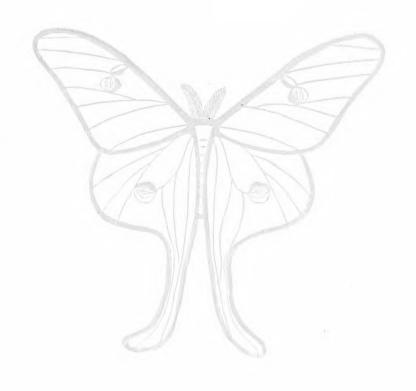
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So all Nature awaits the return of Spring. Whether it be the crow in his flock, the wasp in her sheltered cranny, the muskrat in its cave by the water, the rich thick sap in the root of the tree, or the stored-up life in the bulb, they all await the one far-off divine event. For back of all Nature there lies a Power that has been and is and is to be. What, after all, do we mean by Nature but the sum total of all these manifestations of purpose, of foresight, of helpfulness, of striving for higher and ever higher levels?

Why does evolution mean life more abounding, and degeneration mean atrophy and death, if there be not, pervading the universe, a power, a principle, a stimulus, a goal?

And shall we, as did the Hebrew tribes of old, falter to speak the ineffable name? Shall we not rather worship Him humbly as we see His power, thank Him gratefully that we have been permitted to think His thoughts after Him, look up to Him confidently for that we have come to see how He has infused us with Himself, and lovingly call Him Father and God?





Bureau Nature Study,

Ithaca, N. Y.

