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BIRDS AND NATURE
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SEPTEMBER.

The golden-rod is yellow;
The corn is turning brown;
The trees in apple orchards
With fruit are bending down.

The gentian's bluest fringes
Are curling in the sun;
In dusty pods the milkweed
Its hidden silk has spun.

The sedges flaunt their harvest,
In every meadow nook;
And asters by the brook-side
Make asters in the brook.

From dewy lanes at morning
The grapes' sweet odors rise;
At noon the roads all flutter
With yellow butterflies.

By all these lovely tokens
September days are here,
With summer's best of weather,
And autumn's best of cheer.
Helen Hunt Jackson.

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THE MALLOW.

A number of interesting plants are found grouped under the name of the Mallow Family (Malvaceae). They are the common Mallow, a weed of waysides and cultivated grounds; the Indian Mallow or Velvet-leaf, with its large velvety leaves and yellow flowers, a visitor from India which has escaped from cultivation and become a pest in corn and grain fields and waste places; the Musk Mallow, which has also escaped from our gardens; the Marsh-Mallow, the root of which abounds in a mucilage that is extensively used in the manufacture of confections; the Hollyhock of our gardens, which was originally a native of China and the beautiful Rose-Mallow of our illustration.

The Mallow Family includes about eight hundred species which are widely distributed in the temperate and tropical countries. The technical name is from a Greek word having reference to the soothing effect produced by many of the species, when applied to wounded surfaces.

All are herbs. Most of those found in the United States have been introduced from Europe and Asia. Only a very few are native, and no one of these is very common.

The flowers and fruits are all similar in structure to that of the common hollyhock.

The disk-like fruits of the common round leafed Mallow of our dooryards are often called "cheeses" by the children and are frequently gathered and eaten by them. The cotton plant, one of our most important economic plants, is also closely related to the Mallow. The Cotton of commerce is the woolly hair of the seeds of this plant which is a native of nearly all tropical countries and is cultivated in temperate regions.

The beautiful Rose-Mallow has its home in the brackish marshes of the Atlantic sea coast. It is also occasionally found on the marshy borders of lakes and rivers of the interior.

The plants grow to the height of from three to eight feet. The leaves are egg-shaped and the lower ones are three-lobed. The under side of the leaves is covered with fine and soft whitish hairs.

The flowers, produced in August and September, are large, varying from four to eight inches in diameter, and may be solitary or clustered at the top of the stem. The color of the petals is usually a light rose-pink, but occasionally white, with or without crimson at their bases.

Neltje Blanchan in "Nature's Garden" speaks of this beautiful plant as follows:

"Stately ranks of these magnificent flowers, growing among the tall sedges and 'cat-tails' of the marshes, make the most insensate traveler exclaim at their amazing loveliness. To reach them one must don rubber boots and risk sudden seats in the slippery ooze; nevertheless, with spade in hand to give one support, it is well worth while to seek them out and dig up some roots to transplant to the garden. Here, strange to say, without salt soil or more water than the average garden receives from showers and hose, this handsomest of our wild flowers soon makes itself delightfully at home under cultivation."





EAGLE LORE.

CURIOUS STORIES OF THE OLD-TIME FAITH IN THE "KING OF THE FEATHERED TRIBES."

Birds were trusted, honored and made the symbols of wisdom and power in the old time, and they have not, at least in their emblematical signification, been neglected in modern times. The eagle, in particular, is exalted to a high and potential distinction. On the banner of a hundred States he is displayed as a conquering symbol and floats to-day over many a fair realm where Rome's imperial standard never penetrated.

The eagle has always been considered a royal bird, and was a favorite with the poets. They called him king of the air and made him bear the thunderbolts of Jove. Euripides tells us that "the birds in general are the messengers of the gods, but the eagle is king, and interpreter of the great deity Jupiter."

The eagle figures in the early legends of all people. When the ancient Aztecs, the mound-builders of the Mississippi Valley, were moving southward under Mexi, their king, their god, Vitziputzli, whose image was borne in a tabernacle made of reeds and placed in the center of the encampment whenever they halted, directed them to settle where they should find an eagle sitting on a fig-tree growing out of a rock in a lake. After a series of wanderings and adventures that do not shrink from comparison with the most extravagant legends of the heroic ages of antiquity, they at last beheld perched on a shrub in the midst of the lake of Tenochtitlan a royal eagle with a serpent in his talons and his broad wings opened to the rising sun. They hailed the auspicious omen and laid the foundation of their capital by sinking piles into the shallows. This legend is commemorated by the device of the eagle and the cactus, which forms the arms of the modern Mexican Republic.

A goose, it is said, saved Rome once upon a time, but it was an eagle that directed the selection of the ancient Byzantium—now Constantinople—as the capital of the Eastern Empire. The site of ancient Troy had been settled upon by Constantine, and the engineers were engaged in surveying the plan of the city, when an eagle swooped down, seized the measuring line, flew away with it and dropped it at Byzantium. At any rate, this was the story told to the soldiers and marines, in order to reconcile them to the change of plan, which they might otherwise have deemed an unfavorable omen, though the splendid situation of the new capital and its long prosperity, prove how admirably sagacious was the choice of its founder.

In the reign of Ancus Martius, King of Rome, a wealthy man, whose name was Tarquin, came to that city from one of the Etruscan States. Sitting beside his wife in his chariot, as he approached the gates of Rome, an eagle, it is said, plucked his cap from his head, flew up in the air, and then, returning, placed it on his head again. Not a few suspect that the eagle was a tame one and had been taught to perform this trick. If so, however, the apparent prodigy lost none of its effect in the popular belief, and Tarquin succeeded Ancus as King of Rome. The eagle's head on the Roman sceptre, and later on its standard, took its origin from this occurrence.

Plutarch, in his life of Theseus, relates that when Cymon was sent by the Athenians to procure the bones of that hero, who had long before been buried in Scyros, to reinter them in his former capital, he found great difficulty in ascertaining the burial place of the ancient monarch. While prosecuting his search, however, he chanced to observe an eagle that had alighted on a small elevation and was trying with his beak and claws to break the sod. Considering this a fortunate omen, they explored the place and discovered the coffin of a man of extraordinary size, with a lance of brass and a sword lying by it. These relics were conveyed to Athens amid great rejoicing, where they found a resting place in the famous temple of Theseus, whose ruins are still in existence.

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The old historians state that the Greek poet Aeschylus lost his life through an eagle's mistaking his bald head for a rock and dropping a tortoise upon it in order to break the shell of his amphibious prey, but which broke, instead, the poet's skull. That an eagle, proverbially the keenest-sighted of created things, should mistake a man's head for a stone is absurd beyond the necessity of comment. The story is probably intended for an allegory, showing how stupidity can overwhelm genius, or a dull criticism smash a lively poet.

In A. D. 431 there was war between the Emperor Theodosius II. and Genseric the Vandal, and Marcian, the general of the former, was taken prisoner. The unfortunate captive was doomed to death. At the place of execution an eagle alighted on his head and sat there some time undismayed by the tumult around it. Upon seeing this, and believing that the captive was destined for some exalted fortune, Genseric pardoned him and sent him home. About eighteen years afterwards Theodosius died, and, as his sister had married Marcian, the latter became Emperor of Constantinople.

During the wars between the Christians and the Moors, of Spain, a Spanish knight engaged in combat with a gigantic Moslem. The conflict remained undecided for a long time, but at last the Spaniard began to lose ground. At this juncture an eagle, swooping from above, flew into the face of the Moorish giant, and, taking advantage of this sudden and miraculous intervention, the Spanish champion plunged his sword into the heart of his antagonist, thus winning the battle.

Rudolph, count of Hapsburg, one morning was looking out of his castle window upon the surrounding country, and while thus engaged noticed an eagle circling strangely above a certain place in the forest. Taking some men at arms he proceeded to the spot, where he found a

beautiful and high-born lady held captive by a band of robbers. He rescued her and afterwards married her. When a new emperor was wanted in Germany he obtained the election through the influence of his wife's relatives. In this romantic fashion began the glory of the present reigning house of Austria.

I have alluded to the prominence of eagles in the arms of nations and individuals. The famous ensign of the Roman legions verified the text of Scripture when, in referring to the eagle, Job says: "Where the slain are there is she," for the Roman bird flew over nearly the whole known world and delighted in destruction and in threatening it. The Byzantine Caesars sported a double-headed eagle to indicate that they were lords of both the Eastern and the Western world. The Russians adopted the symbol from those princes. About four hundred years ago a lady, who claimed to be the heir of the Byzantine Emperor, married Ivan III., Czar of Russia, who, therefore, assumed the Greek arms, which may possibly be restored again to Constantinople by Russian arms.

The United States chose for her emblem the same imperial and triumphant bird. Some have considered it as not altogether an appropriate device for our republican government. Students of natural history have observed that the eagle is mean and cowardly. He lives, moreover, a life of rapine, plundering birds that are bolder and more industrious than himself. This is rather a bad character for our national bird.

The ancients would probably be horrified at such a criticism of their royal bird, and, after all, it is not surprising that they held him in such reverence. These people of the long ago had no books nor newspapers, but they were proficient students in the book of nature. By them the birds were accounted prophets, and by their varied flights they foretold future events and regulated the movements and enterprises of nations.

We call the wisdom of birds instinct, but they considered it divine intelligence. Nor was it strange that they should take them for the interpreters of fate, seeing that in many things the birds were wiser than themselves, for they seemed to have a knowledge of the future that was denied to man.

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We have some idea of how these people regarded the movements of the birds from one of the ancient Greek writers, who, in a play entitled "The Birds," makes them give the following account of themselves: "We point out to man the work of each season. When the crow takes his flight across the Mediterranean it is seed-time—time for the pilot to season his timber. The kite tells you when you ought to shear your sheep; the swallow shows you when you ought to sell your watch-coats, and buy light dresses for the summer. We birds are the hinge of everything you do. We regulate your merchandise, your eating and drinking, and your marriages."

This Greek play-writer probably voiced the sentiments of the majority of the people, who had implicit faith in what they called "the prophecies of the birds;" and it is not surprising that they endowed the eagle—the king of the feathered tribes—with almost supernatural wisdom.

Phebe Westcott Humphrey.

THE SNOWDROP'S PHILOSOPHY.

"I should think you'd lose heart in this frosty air,"
Said a sparrow one day to a snowdrop fair.
"You're almost hidden down there in the snow,
And I see you shiver whene'er the winds blow.
If I were you I wouldn't bloom
If I couldn't grow with the roses in June.
What right have they any more than you,
To live in the summer when skies are blue
And bright with sunshine the whole long day?
They have it easy enough, I must say;
But you're so meekly quiet and white,
You're afraid to speak up when you have the right."

"But, my dear," said the snowdrop, "can't you see
That summer can do very well without me?
My place is to blossom right here in the snow,
No matter where the roses grow.
It's lovely to be a summer flower,
But I am content to do all in my power
To sweeten the gloom of this wintry day,
And be brave if the sky is so cold and gray.
I cannot be helpful by being sad;
I have my work and that makes me glad
To bloom my fairest and grow my best,
And let kind nature do all the rest."

Wildea Wood.

THE GLADNESS OF NATURE.

Is this a time to be cloudy and sad,
When our mother Nature laughs around,
When even the deep blue heavens look glad,
And gladness breathes from the blossoming ground?

There are notes of joy from the hang-bird and wren,
And the gossip of swallows through all the sky;
The ground-squirrel gaily chirps by his den,
And the wilding-bee hums merrily by.

The clouds are at play in the azure space,
And their shadows at play on the bright green vale,
And here they stretch to frolic chase,
And there they roll on the easy gale.

There's a dance of leaves in that aspen bower;
There's a titter of winds in that beechen tree;
There's a smile on the fruit, and a smile on the flower,
And a laugh from the brook that runs to the sea.

And look at the broad-faced sun, how he smiles
On the dewy earth that smiles in his ray;
On the leaping waters and gay young isles—
Ay, look, and he'll smile thy gloom away!
William Cullen Bryant.



LADY'S SLIPPER.
(*Cypripedium hirsutum.*)

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A. W. MUMFORD,
CHICAGO.

FLOWERS AND THEIR INVITED GUESTS.

It must be taken for granted in this paper that the reader has such knowledge of the parts of the flower as could be obtained from the paper on "A Typical Flower," printed in the June number.

When flowers first appeared it became necessary to secure the transfer of the pollen grains to the stigmas. This was necessary in order that the ovule might be developed into a seed containing a young plant or embryo. At first the currents of air were selected as the agents of this pollen transfer, and the flowers were adapted to what is known as wind-pollination. As the wind is an inanimate agent any transfer by it is largely a matter of chance. In order to increase the chances of successful pollination it was necessary for pollen to be developed in enormous quantities, so that it might fall like rain. In this way stigmas would be reached, but at the same time an enormous amount of pollen would be wasted. The evergreens are good illustrations of wind-pollinated plants, and their showers of pollen are very familiar to those who live near pine forests. When these showers come down in unaccustomed regions they are often spoken of as "showers of sulphur," and the local newspapers are full of accounts of the mysterious substance.

In wind-pollinated plants not only must the pollen be excessively abundant, but it must also be very light and dry. Sometimes the buoyancy is increased by the development of wings on the pollen grains, as in the case of pines. This habit of pollination is found not only among the evergreens, but also among many important families of the higher plants, as in the ordinary forest trees, the grasses, etc.

When the higher forms appeared, however, flowers of a different character gave evidence that a new type of pollination was being devised. Instead of the old wasteful method, insects were called in to act as agents of the transfer. By securing an animate agent there is a definiteness in the pollination and a saving in pollen production which is quite in contrast with the wind method. It must not be supposed that all flowers have learned to use insects with equal skill, for many of them may be said to be clumsy in their arrangements. On the other hand, certain families have reached a high degree of organization in this regard, and arrange for insect visits with a skill and completeness of organization which is astonishing.

In order to secure visits from insects, so that pollination may be effected, flowers have been compelled to do several things. In the first place, they must provide an attractive food. This has taken two prominent forms, namely, nectar and pollen. There are insects, such as butterflies, which are not only attracted by the nectar, but whose mouth parts have only been adapted for sucking up a liquid. There are other insects, however, like the bees, wasps, etc., which are able to take the more substantial pollen as food. Accordingly insects which visit flowers may be roughly divided into the two classes, nectar-feeders and pollen-feeders.

In the second place, the flower must notify the insect in some way that the food is present. This is done primarily by the odors which flowers give off. It must not be supposed that odors which are sensible to us are the only ones sensible to insects, for in general their sense of smell is far keener than ours. It is also probably true that the display of color, which is so conspicuously associated with flowers, is an attraction to insects, although this has become somewhat doubtful lately by the discovery that certain insects which were thought to be attracted by color have proved to be color blind. At present, however, we have no reason to suppose that color is not associated in some prominent way with the visits of insects.

It should be noticed, also, that two kinds of pollination are possible. The pollen may be transferred to the stigma of its own flower, or it may be carried to the stigma in some other flower, and this other flower may be some distance away. The former method may be called self-pollination, the latter cross-pollination. It seems evident that flowers in general have made every effort to secure cross-pollination. This would seem to imply that it is a better method for some reason, although we may not be able to explain why. Apparently, however, while flowers in general have tried to secure cross-pollination, they have not entirely abandoned the chances of self-pollination, so that if one should fail the other may be used. In this way it will be found that a great many plants have two kinds of flowers, the ordinary showy kind, and in addition to them inconspicuous flowers which are never seen except by those acquainted with their presence. For example, in the common violet, in addition to those flowers with which everyone is familiar, others are developed which are concealed by the cluster of leaves, which never open, but which are able to produce very well developed seeds.

With nectar and pollen provided as food, and with odor and color notifying the insects of their presence, it remains to be noted that the suitable insects are those which fly. A creeping insect is of no avail in the work of pollination, since the pollen will be rubbed from its body as it crawls from one flower to the next. How the flowers ward off the visits of creeping insects, which are attracted as well as the flying ones to the food provided, will be described in a subsequent paper.

A good illustration of the workings of insect pollination may be found in the sweet pea, or in any member of the pea family. The flower has a rough resemblance to a butterfly, whose projecting body is represented by a structure like the keel of a boat. In this keel is a cluster of stamens, and also the pistil with its stigma at the top. While lying in this keel the stamens shed their pollen upon the style, which usually has hairs or some sticky surface to receive it. Accordingly the style bears the stigma on top and masses of pollen stuck to its sides below. An insect being attracted to such a flower naturally lands upon the keel as upon a shelf, with its head toward the center of the flower, where the nectar is deposited. If the insect is heavy enough the weight of its body

pushes down the keel, but the contained style is anchored, so that it seems to dart out, and strikes the insect's body, first with the stigma at the tip, and then glancing along rubs its side against the body of the insect. The insect flies away with pollen rubbed upon its body, and when it goes through the same performance at another flower, the new stigma strikes it first and gets some of the pollen, and then some more pollen is smeared on, and so the pollen is carried from one flower to the stigma of another flower. It is easy to see the effect of the weight of a heavy insect by pressing down the keel with a pencil, when the style will be seen to dart forth at the tip.

Perhaps one of the most common ways of securing pollination is that in which the pollen and stigma are not ready at the same time in the same flower. The pollen may be ready to shed, but the stigma is not ready to receive, or the reverse may be true. This would seem very effective in preventing self-pollination. Illustrations of this kind are exceedingly numerous, but perhaps as common as one as any is furnished by the great fireweed, *Epilobium*. It has a conspicuous purple flower, and if a patch of the plants be examined the flowers will be found in two conditions. In one set the cluster of stamens will be found projecting straight out from the flower, while the style with its stigma is turned back out of the way under the flower. In the other set the stamens, having shed their pollen, are turned back behind the flower, while the style has straightened up, and the mature stigma holds the same position that the anthers did the day before. An insect, in visiting such a group, therefore, may fly straight towards a flower whose stamens are projecting and shedding, and its body will be dusted with the pollen. If it now flies to a flower which is a little older, whose stamens are out of the way, but whose style is projecting, its body carrying the pollen will strike the stigma. In this way the pollen is very effectively transferred from one flower to another.

It would be impossible to give any adequate account of the subject of insect-pollination in general, as it is an immense subject with an ever-increasing literature. Every kind of flower has its own particular way of solving the problem, so that the subject will never be completed until all flowers have been questioned and their answers obtained.

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Any account, however brief, should not omit mention of the orchids, which in the matter of insect-pollination have reached the highest degree of organization. So detailed are their adaptations that each kind of flower is adapted to a particular kind of insect. The accounts given of the various ways in which orchids attract insects and secure pollination really surpass belief, until one has actually observed some of the plants and their insects at work. Any greenhouse furnishes abundant examples of orchids, and our illustration represents one of the most common of our native orchids, the ordinary yellow Lady-slipper. In most orchid flowers there is a long tubular spur, at the bottom of which the nectar is found, which is to be reached by long probosces, such as can be found only in moths and butterflies. In Lady-slippers, however, there is a different arrangement. The flowers have a conspicuous pouch in which the nectar is secreted, and a flap overhangs the opening of the pouch. Behind the flap are the two pollen masses, between which is the stigmatic surface. A bee crowds itself away into the pouch and becomes imprisoned, and may frequently be found buzzing about uneasily. The nectar is in the bottom of the pouch, and after feeding the bee moves toward the opening overhung by the flap, and rubs itself against the stigma and then against the anthers, receiving the pollen on its back. A visit to another flower will result in rubbing some of the pollen upon the stigma, and in receiving more pollen for another flower.

One of the most remarkable cases of insect-pollination is that shown by the ordinary *Yucca*, which is pollinated by a small moth, the plant and the moth being very dependent upon one another. The flowers of *Yucca* occur in very large prominent clusters, and hang like bells. In each bell-shaped flower there are six hanging stamens, and a central ovary ribbed lengthwise like a melon. At the tip of the ovary is a funnel-shaped opening, which is the stigma. During the day the moth hides quietly in the recesses of the flower, but at dusk she becomes very active. She travels down the stamens, and, resting on the open anthers, scrapes out the somewhat sticky pollen with her front legs. Holding the little mass of pollen she runs up on the ovary, stands astride of one of the furrows, pierces through the wall with her ovipositor, and deposits an egg in an ovule. After depositing several eggs, she runs to the apex of the ovary and begins to crowd the mass of pollen she has collected into the funnel-like stigma. These actions are repeated several times, until many eggs are deposited and repeated pollination has been effected. As a result of all this, the flower is pollinated and seeds are formed, which develop abundant nourishment for the moth larvae, whose eggs had been laid in the ovule. Just how the insect learned that this behavior on her part would secure food for her young is hard to imagine.

In studying any flower there are three questions that should be asked: (1) How does it hinder self-pollination?; (2) How does it secure cross-pollination?; (3) How does it discourage the visits of unsuitable insects?

John Merle Coulter.

The mythical origin of the Asters is set forth in an old Greek story, which states that after the gods had abandoned the earth, because of the crimes and dissensions that came with the Brazen Age, Astraea, the goddess of innocence and purity, alone remained, endeavoring to redeem the degenerate race of mortals. She, too, finally left, and became known among the stars as the constellation Virgo, or the Virgin. After the wrath of Jupiter had been appeased by the destruction of the earth by water, Virgo, noticing that the summit of Mount Parnassus had alone escaped the flood, planted there a seed, whose flowers should reflect the azure hue of her new home and whose heart should typify the Golden Age that some day will come again to mankind. This plant, Virgo destined as a symbol of her mission of purity and so she gave it her early name, Astraea or Aster. That the plants might bloom for all races of men, Zephyrus, the lover of Flora, queen of the flowers, took the seeds and distributed them throughout the earth from polar snows to the sun-kissed lands of the equator. Hence it is that the Aster, in some of its varied forms, is found in all countries, over two hundred and fifty species being known to botanists. Although the plant is cosmopolitan, it is essentially an American form, one hundred and fifty of the total known species belonging to North America. Of the balance, Russia claims twenty, Europe ten and Canada sixty or seventy.

It seems as though Nature, after the first blush of spring, relaxed her efforts for a supreme endeavor towards the close of the floral season. Then she assumes her festal robes and the woodlands and fields become gorgeous with the purple of the Asters, the gold of the sunflowers and golden-rod, with here and there the cardinal and blue of the lobelias.

Among all this symphony of color, no plant is more lavish of its charms than the New England Aster (*Aster Novae Anglae*). Botanically considered, the Asters belong to the Compositae, a family of plants including from ten to twelve thousand species and characterized by large numbers of flowers, crowded together into single heads, each of which gives the impression of a single flower. What appear to be petals, are known as ray flowers and give the characteristic color, as the purple, blue or white of the Aster or the yellow of the Sunflower. These rays consist of flowers, whose petals have been joined together and spread out flat, the points of the petals usually appearing on the end of the ray. In the case of the Asters, the ray flowers, which occur in a single row, are pistillate or have a pistil and no stamens and hence are capable of producing seeds. The center or disk flowers are tubular, yellow in color and perfect, containing both stamens and pistils. The heads are surrounded by an involucre, having leaf-like tips and are variously massed or branched along the stems of the plant.

With few exceptions, the Asters are perennial, coming up each year from the old underground portions and flowering in autumn. They vary in height from a few inches to eight feet or more, but in the case of the New England Aster, the completed growth is generally from two to seven or eight feet. This species has a stout and somewhat hairy stem clothed with many leaves which are pointed, have entire edges and a clasping base. The ray flowers in the common form are purple, but in the two varieties of the species, they are rose-purple or white.

The plant derives its name from the fact that its general distribution in the Eastern States together with the beauty of its flowers gained it an early recognition among the pioneers of New England, where it soon became a favorite. The statement is made that it was the chosen flower of John Alden and Priscilla and, on many occasions, old books, handed down from revolutionary days, have been found to contain dried specimens of the flowers.



NEW ENGLAND ASTER.
(*Aster Novae-Angliae.*)



LATE PURPLE ASTER.
(*Aster patens.*)

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The Late Purple Aster (*Aster patens*) while not an uncommon form, is one of the most beautiful of all the Asters. The rays are long and showy, in color purplish-blue or deep violet. The plants attain a height of from one to three feet, the stems having rigid, bristly hairs and the leaves,

which are entire, have a clasping base.

The Asters have been highly considered from very early times. Virgil states that the flowers were used to decorate the altars of the gods and the ancients placed great faith in the efficacy of the leaves as a charm against serpents. The American Indians have always prized these plants as a cure for skin diseases, calling them the bee flower, as they supposed that the frequent visits of honey bees, concentrated in the Asters the virtues of many other forms of flowers.

Charles S. Raddin.

SCHOOL GARDENS.

There is nothing more desolate than the average surroundings of the public school, and it would be cheerful news to learn that the recent pamphlet brought out by the United States Department of Agriculture upon the School Gardens of the Rhine might bring about a reform in this direction. Attention is called to the matter by a writer in the Outlook, who finds the pamphlet highly suggestive. Says the writer: "It is a common experience to enter from an absolutely barren schoolyard into a schoolroom decorated with botanical and natural history charts, and to find these charts and text-books are the only mediums used for teaching these branches of the natural sciences. The pamphlet above named shows the practical application of the schoolroom work. The grounds are cultivated entirely by the pupils, two hours' work per week being compulsory. The result is that the community life is affected. The farms and gardens are cultivated with new knowledge; the boys and girls work in the home grounds with greatly increased interest. Destructive insects and disease are watched for. The products of the farms and gardens in this district bring the best prices, because they are handled with care and intelligence. The first requisite for such work is such practical knowledge as will make success possible. The introduction of the school garden into this country is entirely feasible. It would create a new avenue of employment for the students in our agricultural colleges and experiment stations; it will make another avenue for the use of the knowledge collected by our Department of Agriculture. Our township system would make a practical division for the control of one agricultural supervisor and instructor."—The Western Journal of Education.

THE FLICKER'S MISTAKE.

"My dear," said Mrs. Flicker, one bright day, as Mr. Flicker came flying home in high feather, "we have made a mistake—a horrible mistake."

Now, Mr. Flicker was a very polite bird, but he was so used to his wife's little peccadilloes that, though sometimes he listened patiently to her tale of woe, at other times he just tossed his head, absolutely without fear of what man might do to him. On this particular day the warblers were whistling and flashing in and out of willow trees across the stream, the wild grape and strawberry and the sweet clover made the air fragrant, the sun shone out gaily from a cloudless sky, far and wide on the earth lay greens upon greens, and overhead stretched heaven's blue—a June day—why should Mr. Flicker fear? With Mrs. Flicker it was different; she had laid the eggs, she had patiently kept them warm; she was now watching her little baby Flickers jealously; what wonder that she grew morbid and fearful, and exaggerated every small annoyance! Mr. Flicker saw now that she was trembling with excitement, as she said again, "We have made a horrible mistake."

"What about?" asked he.

"Do you know," she said, solemnly, "what kind of a tree this is in which we have put our nest?"

"A very good tree, indeed," said Mr. Flicker, bristling, for he had selected the tree; "a remarkably fine tree, with this hollow limb in the midst of so much foliage."

"But, my dear, it is a cherry tree."

"So much the better," said the gay Mr. Flicker; "most birds like cherry trees."

"Yes, and boys like cherry trees!"

"Well, and what of that?"

It will plainly be seen that Mr. Flicker was no logician, but then, he could fly far, far away toward the heavenly blue, while logicians—the very wisest of them—"on their feet must go plodding and walking."

"What of that!" mocked Mrs. Flicker, nervously. "Well, there have been boys in this tree this very morning, picking cherries, and I am worn out with fluttering and fussing and calling, to attract their attention from the nest."

Mr. Flicker thought he knew boys, and while he might be considered a fair and generous-minded bird in most things, it is a lamentable fact that he never could quite understand why Nature in her infinite wisdom had thought it necessary to produce anything so incongruous as a boy. But, as has been said, Mr. Flicker's reasoning powers were limited. He was sober now—boys always sobered him. But after all, he had the spirit and digestion of a bird, and even the fussy Mrs. Flicker fussed only in a bird-like manner. So they talked it over and hoped for the best, especially as the babies showed signs of the greatest precocity and bade fair to fly away in a few days and be safe from harm.

The next day as Mr. Flicker was returning from his favorite ant-hill, he was startled by the frightened screams of his wife, and for some time after he reached the nest she could do nothing but scream and cry and hop distractedly from branch to branch. Mr. Flicker followed her about and tried to comfort her, though he felt that this was no imaginary grievance.

"What is it, my love; what is it?" he begged softly.

"Go look in the nest," said she.

He flew to the nest, and then his cries and shrieks rose above hers, and they hopped from branch to branch like demented bird-folk. Mr. Flicker, when quite himself, was gay and trustful and debonair, but he was, besides all this, a proud and natural parent, and when he found that one of his precious babies was missing, his grief, though loud, was sincere. Mrs. Flicker told him how a dreadful, hideous boy, with frightful sprawling legs and arms had climbed the tree to pick cherries—how he had found the nest in spite of all that she could do—how he had pushed his long arm down into the hollow limb and taken out and examined one baby after another, and had then run off with one, putting the others back in the nest.

"Oh, help! help!" suddenly cried poor Mrs. Flicker, "here they come again! They will take all the others. What shall we do?"

Mr. Flicker looked, and, true enough, there they were, coming over the hill through the orchard—two boys, and another. The agonized cries sounded through all the trees, coming not so much from the Flickers themselves as from the friendly cat-birds and robins and cedar waxwings and sparrows who, forgetting the slights they had received from the Flickers, joined in a noble effort to attract the attention of the intruders and keep them away from the cherry tree. On they came, however, paying not the slightest heed to the medley of cries about them—two boys and a gray insignificant person who seemed to be directing the cruel expedition. Straight to the cherry tree they made their way, up went the sprawling boy, and before the crazy birds could tell what had happened, the three were making their way back through the orchard again. The cat-birds followed them and the others kept up their cries for some time afterward.

At first Mrs. Flicker refused to return to her empty nest, but as night came on she grew calmer and decided not to abandon her home. She knew she could lay more eggs and raise another family, but she would not believe that there could ever again be such brave and beautiful babies as her stolen ones. As she at last came to the nest, she heard a soft little familiar call, and peeping in—lo! there were the babies just as she had left them except that the stolen one had been returned and lay cuddled safe and warm beside the others! There was a happy Flicker family in the old cherry tree that night.

Not long after this the cherries disappeared, and the baby Flickers, one by one, took their flying lessons and flew away on their own strong wings. Then the nest was molested no more. And when the banks of the creek were bright with golden-rod and asters, and the milkweed pods were bursting, the Flickers started on their southern journey. Of course the next summer is a long way off, and no one can tell what may happen. But it might be that even if the Flickers cannot forgive, they can forget—which is the better, after all, if you can do but one. And when the April days come round again, remembering only the fragrant air and the fat ant-hills of the orchard, they may return again to the cherry tree. Who knows?

Nell Kimberly McElhone.

TIGER-LILIES.

I like not lady-slippers,
Nor yet the sweet-pea blossoms,
Nor yet the flaky roses,
 Red, or white as snow;
I like the chaliced lilies,
The heavy Eastern lilies,
The gorgeous tiger-lilies,
 That in our gardens grow.

For they are tall and slender;
Their mouths are dashed with carmine;
And when the wind sweeps by them,
 On their emerald stalks
They bend so proud and graceful—
They are Circassian women,
The favorites of the Sultan,
 Adown our garden walks!

And when the rain is falling,
I sit beside the window
And watch them glow and glisten,
 How they burn and glow!
O, for the burning lilies,
The tender Eastern lilies,
The gorgeous tiger-lilies,
 That in our garden grow!

Thomas Bailey Aldrich.

FLOWERS IN THE CRANNIED WALL.

Flower in the crannied wall,
I pluck you out of the crannies;
Hold you here, root and all, in my hand,
Little flower—but if I could understand
What you are, root and all, and all in all,
I should know what God and man is.

Alfred Tennyson.

[Pg 70]



WILD YELLOW OR
CANADIAN LILY.
(*Lilium Canadense.*)

FROM "NATURE'S
GARDEN."
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[Pg 71]

THE WILD YELLOW LILY.

Among our common wild flowers, that quickly attract the attention of the observer is the Yellow Lily (*Lilium canadense*). Its home is in the swamps, the wet meadows and fields of Canada and the United States, east of the Missouri river. It is also called the Canada, the Field and the Meadow Lily.

This plant, with about forty-five sister species—all beautiful, belongs to the genus *Lilium*. All are natives of the Northern Hemisphere and are found distributed around the world. About sixteen species are natives of the United States. The flowers vary in color. Some are red, others white or yellow and some are more or less mottled.

No plants are more frequently mentioned in Ancient Myths and by the classical poets. Though the white lily (*Lilium candidum*) was, even before the time of Homer, known as a garden flower, yet the earliest descriptions of the lilies found in cultivation were written by Gerard in the year 1597.

It is thought by some that the "lilies of the field," spoken of in the seventh chapter of Matthew, are the red lily described by Pliny. The white lilies have long been considered the symbol of purity and were often used by the great masters in the pictures of the Annunciation, in which they were represented as held by the Angel Gabriel. How appropriate is the white lily, with its glossy and pure white petals for the decoration of Easter time!

The slender stalk of the Yellow Lily arises from a scaly bulbous and thickened underground stem, growing to a height of from two to five feet. The leaves are narrow and lance-shaped, from two to six inches in length and usually attached in whorls of from three to eight. Each stalk bears from one to fifteen flowers, the ground color of which is yellow or reddish with brownish spots toward the base of each division, which are six in number and are spreading and gracefully arched. The flowers, appearing in June, July and August, are nodding and vary in length from two to four inches. The fruit pods are oblong, large, and bear numerous seeds.

Closely related to the plant of our illustration, and at times closely resembling it, is the beautiful Turk's Cap Lily (*Lilium superbum*). This species is wonderfully prolific in the production of flowers, sometimes bearing forty or more on a single stalk. It is one of the tallest of the lilies, and frequently the marshes of the eastern states are transformed by its presence into striking masses of color, orange, orange-yellow or red.

WHAT DO WE OWE THE BIRDS?

The answer to this question needs to be presented from two distinctly different points of view—the commercial and the esthetic. In presenting the commercial point of view it will be necessary to ignore the use of any bird as an article of food, because we are now speaking of the living bird. Likewise it will be necessary to ignore the side which might be presented by the millinery trade, because that, too, has to do with the dead bird. We shall have occasion to present the general subject of the demands of fashion at a later time. This paper, then, is concerned only with our debt to the living bird.

In the [June number](#) of *Birds and Nature* some general remarks were made about what the birds eat. In this paper it will be necessary to go more into particulars in order to get clearly before us just wherein our debt lies.

First of all, we owe our physical comfort to the birds, because they check the increase in insect life. The mosquito and gnat, the horse fly and common housefly would soon rival the plagues of Egypt were the birds to disappear. If anyone doubts this let him go into the Cascade mountains where the scarcity of the birds gives great liberties to the "deer flies." And they take all liberties without so much as a "thank you, I guess I will!"

We owe our fruits largely to the birds. This statement anyone may prove by simple experiment. First drive the birds from your garden because you think they are eating the buds and blossoms, instead of the insects which sting the buds. You will be rewarded with a scanty and stunted fruit crop. Next conclude that you won't get fruit anyway, and so let the birds do as they please. You will be pretty sure to harvest a fairly good crop at least. Lastly, encourage the birds to visit your garden and orchard in their northward passage, as well as during the summer season. Build nesting boxes for the swallows, wrens and martins. Plant a mulberry tree for the fruit-loving robins and cat-birds. Now your fruit and garden are returning an abundant yield of the best grade. If the birds take a little for themselves have they not earned it? There is enough and to spare.

We owe corn and other grains largely to the birds, because they help to keep in check the insects which attack the cereals. During the grasshopper plagues very many birds feed upon the grasshoppers which do not usually touch grasshoppers. Probably chief among our grain field helpers is the Bronzed Grackle, who is so much in disfavor for the ravages he makes upon those same fields when the corn is in the roasting-ear stage. But he earns far more than he eats. The birds of prey destroy vast numbers of the little rodents which help themselves too freely to the planted grains.

We owe the preservation of the remnant of our forests, and all our trees and bushes largely to the birds who eat the insects which attack the trees and bushes. The woodpeckers are after the insect which is destroying the tree, not after the life of the tree.

Space would fail us to speak of the debt we owe to all the birds. There are the scavenger water-birds—gulls, terns and the like—the scavenger land birds—the vultures—the ducks, geese and swans, who check the encroachments of vegetable life upon our streams, ponds and lakes; the herons, cranes, rails, coots, gallinules and shore-birds, which feed upon the water and mud-inhabiting insects and other small animals; the sparrows and grouse, which destroy vast quantities of the seeds of harmful plants. In short, the only birds about whose usefulness there is any doubt are the English Sparrow, Crow, Blue Jay and four of the hawks. These are far too few for us to condemn all birds.

We cannot afford to overlook the esthetic side of this question. How much of our pleasure and happiness do we owe the birds directly for their intensely busy lives, the neatness and beauty of their dress, the perpetual joy of their songs? Can you imagine a world without birds? Are the returned warmth and the green vegetation all that make the summer months more pleasant than the winter season? Rob the tropics of their birds and you rob them of their heart. Pasadena, California, is a bird paradise, but take away its mocking birds, its orioles, its towhees, its gorgeous humming birds, and the many other birds which enliven every lawn, and you have taken away one of its chief charms.

But it is not simply that we are entertained by the birds, nor even that we are pleased with their neatness and beauty. Where their lives touch ours we feel an uplifting influence. We are better fitted for the service which it is our privilege to render to the world by the touch of the bird life. Our horizon is broadened beyond the self-interest, the egoistic, to the altruistic conception of life. We cannot live in the presence of these creatures so full of life without being spurred to more earnest effort ourselves. When we fail to see in the world of nature about us what it is our privilege to see we are losing that much of life. Let us open our eyes to all the influences that may shape our lives toward best living.

Lynds Jones.

TO THE VESPER BIRD.

Sweet bird of twilight wake in me
Bright memories of melody
Outpoured from every nesting-tree
 At early morning gray.
O sing that I may ponder on
The songs away with noontide gone,
Ere shadows troop across the lawn
 And voices die away.
Long have I waited wistfully;
And lest thy gift unheeded be,
Lo, now my gardens are for thee,
 Thou truant all the day!
 Frank English.

THE VESPER SPARROW.

In the fields, the pastures and along the roadsides of the Eastern United States and the British Provinces may be found the unobtrusive Vesper Sparrow (*Pooecetes gramineus*). It is also known by other names such as the Bay-winged Bunting or Sparrow, the Grass-Finch and sometimes, though incorrectly, it is called the Field Sparrow. The latter name should only be applied to one of the Chipping Sparrows (*Spizella pusilla*).

The characteristics of the male and the female are the same. The exposed part of the outer and the tip of the second tail feathers are white. This character is very marked as the bird alights. The feathers of the underside of the body are usually yellowish-white and the tops of the wings are a light chestnut-brown. It does not seem to shun one's presence, but will run along the side of the road, a short distance ahead, occasionally stopping for observation.

The Vesper Sparrow builds its nest on the ground without reference to any special plant protection except that of grass and other low herbage. The eggs are usually four in number, the general color of which is light gray marked, in a variable manner, by dull reddish-brown spots or blotches.

When frightened from her nest the mother-bird will endeavor to attract the attention of the intruder by slowly flying away and occasionally feigning injury by falling.

Mr. John Burroughs, in his little book, "Wake Robin," writes in an admirable manner of the song and habits of this little bird. He says: "Have you heard the song of the Field-Sparrow? If you have lived in a pastoral country, with broad upland pastures, you could hardly have missed him. Wilson, I believe, calls him the Grass-Finch, and was evidently unacquainted with his powers of song. The two white lateral quills of his tail, and his habit of running and skulking a few yards in advance of you as you walk through the fields, are sufficient to identify him. Not in meadows or orchards, but in high, breezy pasture grounds, will you look for him. His song is most noticeable after sundown, when other birds are silent, for which reason he has been aptly called the Vesper Sparrow. The farmer following his team from the field at dusk catches his sweetest strain. His song is not so brisk and varied as that of the Song-Sparrow, being softer and wilder, sweeter and more plaintive. Add the best parts of the lay of the latter to the sweet vibrating chant of the Wood Sparrow (*Spizella pusilla*), and you have the evening hymn of the Vesper-bird—the poet of the plain unadorned pastures. Go to those broad, smooth, uplying fields, where the cattle and sheep are grazing, and sit down on one of the warm, clean stones, and listen to this song. On every side, near and remote, from out the short grass which the herds are cropping, the strain rises. Two or three long, silver notes of rest and peace, ending in some subdued trills or quavers, constitute each separate song. Often you will catch only one or two of the bars, the breeze having blown the minor part away. Such unambitious, unconscious melody! It is one of the most characteristic sounds in Nature. The grass, the stones, the stubble, the furrow, the quiet herds, and the warm twilight among the hills, are all subtly expressed in this song; this is what they are at least capable of."



FROM COL. CHI. ACAD.
SCIENCES.

VESPER SPARROW.
(*Pooecetes gramineus*.)
½ Life-size.

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A. W. MUMFORD,
CHICAGO.

THE WORSHIP OF NATURE.

The ocean looketh up to heaven
As 'twere a living thing;
The homage of its waves is given
In ceaseless worshiping.

They kneel upon the sloping sand,
As bends the human knee,
A beautiful and tireless band,
The priesthood of the sea!

They pour the glittering treasures out
Which in the deep have birth,
And chant their awful hymns about
The watching hills of earth.

The green earth sends its incense up
From every mountain-shrine,
From every flower and dewy cup
That greeteth the sunshine.

The mists are lifted from the rills,
Like the white wing of prayer:
They lean above the ancient hills
As doing homage there.

The forest-tops are lowly cast
O'er breezy hill and glen,
As if a prayerful spirit pass'd
On nature as on men.

The clouds weep o'er the fallen world,
E'en as repentant love;
Ere, to the blessed breeze unfurl'd,
They fade in light above.

The sky is as a temple's arch,
The blue and wavy air
Is glorious with the spirit-march
Of messengers at prayer.

The gentle moon, the kindling sun,
The many stars are given,
As shrines to burn earth's incense on,
The altar-fires of Heaven!

John Greenleaf Whittier.

BIRD-STUDY.

To be intimate with Nature is as important to the investigator as the ability to technically classify the things found therein.

In this connection we copy, by permission, the words of Olive Thorne Miller, from the "School Room Methods and Nature Study:"

"Recognizing a bird on sight or hearing, knowing his nest and eggs, when he arrives in the spring, and when he departs in the fall, does not by any means imply that one is acquainted with the bird himself. All these facts are easily acquired; they have been set down in the books these many years.

But whoso really desires to know the little being so beautifully enshrined; to see his home ways with his mate and little ones; to find out his personal habits; his likes and dislikes; his tastes; his disposition; in a word his personality, for him is something very different from book study. He must go into the field and observe for himself; for well as we may know our common birds by sight, glibly as we can explain their anatomy, give their scientific names, and their place in our classification, of their lives and habits we are in almost total ignorance.

This is a field of inquiry as fascinating as it is fresh and unexplored. Nothing but the greed of collecting and the passion for classifying, could so long have blinded men to the charm of studying life instead of death, the individual instead of the skin. And this is the beautiful work left for us to do, to make the world acquainted with the lives of our little brothers in feathers.

For this work are needed, patience that knows no fatigue, accuracy of observation, enthusiasm that scorns such trifles as wet feet, torn garments, insect bites and stings, burning sun or blistering wind, and above all—lacking which all else is useless—truthfulness that will report correctly, without exaggeration or coloring. To one possessing these qualities a whole world of delight is open.

Nor is this world so difficult to enter as it seems at first. Science—whose help is needed—has, to be sure, shrouded itself in technicalities, buried its facts under scientific terms, and hidden its names in a dead language. But all this, which perhaps was necessary, can be got over. With a little courage, and some perseverance, this bristling array of difficulties may be broken through, and the charming goldfinch be as lovely and bewitching under the name of *Spinus tristis*, as of thistle bird, or yellow bird.

How shall we go to work? This is the first question always. Let me give you a few hints: Some fine morning dress yourself in modest-hued array, dull olive of medium shade best; discard all conspicuous details of costume; take off ribbons and veils, and all fluttering things; reject the spring hat with its eccentricities of flowers, fruits, feathers, or general fluffiness, and put on a plain shade hat, as near the color of the dress as possible; leave parasol, bag or basket and book all at home. Slip into a flat pocket on the outside of your gown or coat, a small note book with sharpened pencil attached to it, and suspend by narrow ribbon around the neck, so that it will hang above the waist and be ready for instant use, an opera glass without its case. On your left arm carry a light folding camp stool—and start out.

Bid adieu to your friends, and go alone, for the temple of Nature can never be entered in crowds, nor even in pairs. Turn your steps to the best place you know of; an old orchard, a grove with underbrush near a house, a ravine, a swamp, or the edge of woods. Walk slowly and leisurely along, with little noise of footsteps, and without swinging arms.

Arrived in your chosen spot look sharply around for the flitting forms of the birds. When you see one, stop at once; quietly slip your stool off your arm and sit upon it, with as little motion as possible. If you place it against a tree trunk, to furnish a back, you can be comfortable in that one position an hour without moving.

Now slowly raise your opera glass to your eyes, adjust the focus to bring the bird clearly before you, and proceed to study him. First you want his description so that you can name him. Look very carefully at him, his size and shape, his coloring above and below, his peculiar markings, the shape of his tail at the end, and the color and shape of the beak. As you settle one point write it in your note book, which you have quietly drawn out of its pocket.

His description recorded, proceed to note his manners; whether quiet or restless, whether he jerks his tail, or his head; walks or hops. See what he is doing; picking up insects, digging them from bark or ground, seeking them among flowers or leaves, or whether he is eating seeds from the grass or weeds. Sit there as long as that bird is in sight, and note down everything he does, even his calls and his song as it sounds to you.

When you go home take your manual and look for a description that matches yours. This is where troubles begin, not only the obscure scientific terms, and the Latin names, but the knowing where in that big book to start. You will be helped by observing what the bird ate. If he hammered on the bark and picked his food from tree trunk or limb, look among the woodpeckers; if he flew out, made a turn or two and back to his perch seek him among the fly-catchers; if he was eating seeds, look among the finches; and so on.

When by a little work you have passed this Rubicon—where so many turn back discouraged—you will reap your reward, success. Having persevered, and named your bird without help, you will feel a new pleasure in his acquaintance, as if he belonged to you, and you will never forget him.

Then go out and make acquaintance with another. You will find him easier to identify, and as you will become familiar with its idiosyncrasies the manual will lose its terrors for you.

Of course all this trouble will be avoided if you begin with the study of scientific ornithology. But in that case you are in danger of becoming absorbed in the science, and getting to care more for the dry bones and the dead skin, than for the living bird, and thus adding one more to the ornithologists, and taking one from the students of life."

THE OREGON JUNCO.

Residents of the Atlantic, Middle, Southern and Middle Western States are, doubtless, well acquainted with the slate-colored Junco. This little feathered specimen is more familiarly known as "Snowbird."

The Oregon Junco ("Junco hyemalis var. Oregonus") is a sub-species, and is found throughout the Pacific coast region from California to Sitka. It is, by no means, confined exclusively to Oregon. Its darkest-hued plumage makes the bird very conspicuous when the ground is covered with a soft and spotless mantle of snow.

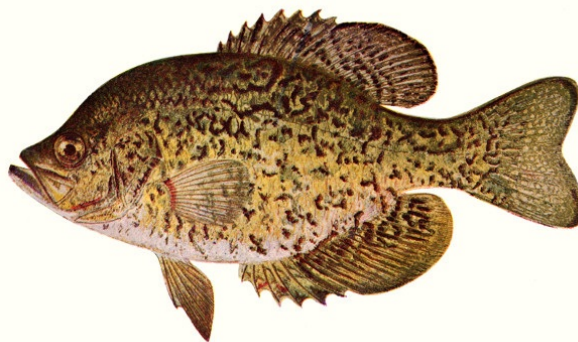
The sooty-black head, flesh-colored bill and white breast, sharply contrast in color. On the sides are pinkish colored feathers; the back is rufous-brown and the two outer tail feathers pure white, showing when the bird flies. In western Oregon it is a winter visitant, arriving with the first cool days of autumn.

As winter approaches these snowbirds become more plentiful, hopping about in the small bushes in quest of food. A great deal of pleasure and interest may be found in studying these birds, especially when the ground is covered with snow. By casting bread crumbs on the snow, the little fellows flock around, and are easily tamed. In winter their only note is a sort of chirp, sometimes uttered several times in quick succession when alarmed. With the warm days of spring they begin their song, sometimes many singing at once, and soon the majority disappear to a higher altitude to breed.

The Oregon Junco builds its nest in hollows in the ground under low bushes. The nest is constructed flush with the surface and in holes among the roots of bushes and trees, and under woodpiles. Usually, the nest is made of dry grasses rather loosely placed together, with a lining of cowhair, and contains four and sometimes five handsome greenish-white eggs, spotted and wreathed with purple.—J. Mayne Baltimore.

Olive Thorne Miller, in her fascinating little book, "The First Book of Birds," speaking of how the birds work for us, says: "Chickadees like to eat the eggs of cankerworms; and for a single meal one of these tiny birds will eat two hundred and fifty eggs, and he will take several meals a day. Now, cankerworms destroy our apples. When they get into an orchard in force, it looks, as Miss Merriam says, as if it had been burned over. Robins, cat-birds, and shrikes, and several others, like to eat cutworms, which destroy grass and other plants. As many as three hundred of them have been found in the stomach of a robin, of course for one meal. Ants are very troublesome in many ways, and three thousand of them have been taken from the stomach of one flicker."

Why kill these birds that are so useful to us and so beautify nature? Many others are just as useful and some that occasionally do damage amply repay us in other ways.



THE CALICO BASS.
(*Pomoxys sparoides*.)

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THE CALICO BASS.

The Calico Bass (*Pomoxys sparoides*) is so called because of the mottled and variegated coloring of the body and fins. It is also called the Strawberry Bass, the Grass Bass, the Bitter Head, the Lamp-lighter and the Barfish.

It is abundant in all the lakes and ponds of the region of the Great Lakes and the upper Mississippi river, where it shows a preference for quiet, cool and clear water and grass covered bottoms.

The Calico Bass is closely related to the Crappie (*Pomoxys annularis*) of the lower Mississippi valley. It is, however, seldom seen where the Crappie is abundant, as the latter prefers muddy sloughs and bayous and is not found as far north as the former.

The body of the Calico Bass is elongated, is much compressed and of a bright, silvery olive-green color. The sides and fins are mottled with a darker green or brownish-green, the blotches being gathered into irregular bunches. The vertical fins also have markings in the form of a network surrounding paler spots. The mouth is large and oblique. The usual length of the adult is about twelve inches.

The Calico Bass obtains its food largely from the lower forms of animal life, such as crustaceans, worms and insects.

It is said that "from the fact that it thrives well in slow-moving waters, it deserves the favorable consideration of owners of large mill ponds, where there is a steady flow of water, as it requires very little care, except the first planting of it in waters suitable to its nature. It is not averse to an occasional minnow, but is not regarded as peculiarly aggressive, though provided by nature with an armature that enables it to defend itself against all comers."

"Forthwith the sounds and seas, each creek and bay
With fry innumerable swarm, and shoals
Of fish, that with their fins and shining scales
Glide under the green wave, in sculls that oft
Bank the mid sea: part single, or with mate,
Graze, the seaweed their pasture, and through groves
Of coral stray, or, sporting with quick glance,
Show to the sun their waved coats, dropt with gold."
—Milton, "Paradise Lost."

THE GROWTH AND VARIATION OF FISH.

How can you tell the age of a fish? This question is often asked and just so often is the answer unsatisfactory.

A fish is a cold-blooded animal; that is, his temperature is nearly the same as that of the water in which he lives. His circulation is sluggish and his appetite is a variable quantity. He has the capacity to take in large quantities of food at one meal and properly assimilate it; on the other hand he is able to fast for weeks at a time. He has his own notions about eating, and it is quite impossible to induce him to change them, and all this has considerable influence on his rate of growth. It is out of the question to expect him to grow when he is fasting; on the other hand he must draw on the fat he has stored up in his body to furnish him energy for his muscular movements and to carry on the ordinary functions of nutrition. The fish here has an advantage over the warm-blooded animals, for he does not need to generate heat to keep his body at a constant temperature. The amount of food often eaten at one time is quite remarkable. I remember once of taking nearly one pound of sunfish from the stomach of a Large-mouthed Black Bass. This does not indicate that a bass must eat such meals three times each day, it only shows his capacity to make use of a large quantity of food when it is abundant and his stomach feels the need of it. A trout is a good feeder; his stomach and mouth are large, much in size like that of the black bass. From experiments conducted at Neosho, Missouri, by Mr. Page, he found that a young trout did best on a daily ration of solid food equal to about seventy-five per cent of its weight. On this amount the trout would reach an average length of six inches in one year. The average amount of solid food consumed daily by a man is from one and one-half to two per cent of his weight, or more than twice that consumed by our active, growing young trout. As mentioned before, the trout is relieved from generating heat to keep his body at a constant temperature, and at one usually much higher than the medium in which he lives.

As an example of the ability of fishes to go for some time without eating, we need only mention our Pacific salmon. There are five species of these large fishes on the Pacific coast. In the early spring (April) many of the largest species, the Chinook, start up the Columbia river for the purpose of spawning. They reach the headwaters of the Columbia in Idaho early in September. During this journey they eat nothing. We know they do not eat, for of the thousands caught each year for the canneries none are found with food in their stomachs; besides, this organ has become much shrunken. If they did eat on this journey there would not, I believe, be enough animal and plant life in the Columbia to furnish each salmon with more than one meal. Now many of them make the journey against a strong current for more than one thousand miles, and reach an elevation of about eight thousand feet above the sea. When they leave the ocean they are in excellent condition, by the time they have reached their journey's end they are thin and haggard, their vitality is so reduced that soon after spawning they die—literally die of starvation. Their eggs hatch during the winter. By the next winter the young salmon are from four to five inches in length, and by the following fall or early winter they go to the sea, having reached an average length of about ten inches. After leaving the fresh water, which only afforded them a scant subsistence for nearly two years, the generous ocean gives them plenty of sea room and an abundance of food, which in a few years prepares them to repeat the long journey of their parents. We are, in case of most fishes, ignorant of their life histories, as we are of the salmon's. We know the average rate of growth of the salmon for the first two years, but we know nothing more of them until they return to fresh water to spawn.

I mentioned that trout in the Neosho Fish Hatchery grew, under favorable circumstances, to a length of six inches in one year. It must not be taken for granted, however, that trout six inches in length are one year old. In their native streams, in cooler regions, they will not often attain this length in two or more years.

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In general we do not find large fishes in small bodies of water; neither do we find the fish in our small aquaria growing at an alarming rate. The fish disdains to outgrow his surroundings; he may feel his importance, and consider himself in many ways superior to the other fishes in the pond with him, but he will not permit himself to grow to such a size as to make the question of securing a living a difficult or irksome one.

Fishes spawn but once each year, and the time and length of the spawning season is not the same for all species. With some species the season is short, while with others it may extend through three or more months. In the latter case those produced the first part of the spawning season are at the end of six months much larger than those which appear at the close. It is therefore evident that the fishes of any single brood by the end of the year will vary greatly in size, often to such an extent that the broods of one season cannot be separated from those of the preceding season; especially is this true of our smaller species. Mr. Moenkhaus, in making a study of the two species of darters, the Sand Darter or "Johnny," and the Log Perch, found by collecting a large, miscellaneous lot of these fishes, from a given locality, that it was possible to separate them in groups according to size of one, two or three years of age, which indicates a quite uniform rate of growth for these two species.

Mr. Voris collected a miscellaneous lot of over five hundred specimens of the Blunt-nosed Minnow from Turkey Lake in Indiana, varying from one to three inches in length. These, when separated as far as possible, according to sizes, did not fall into distinct groups of different ages. In my own collecting and study of fresh water fishes I have always been impressed with the difficulty of recognizing the age of fishes, except that the smallest taken was considered to be the

product of the preceding spawning season. Here is an interesting question to which but little attention has been given. Any one will find much interest in studying the rate of growth of fishes under different circumstances. We know that the rate of growth is in no way uniform, as is the case with our warm-blooded animals. We also know that among fishes there is no uniform adult size, as there is in case of warm-blooded animals (birds and mammals). In general, we cannot speak of a fish as being full-grown; at the same time there seems to be a limit of size for each species in each body of water, beyond which only a few go. The Chinook salmon we mentioned reach an average weight of twenty to thirty pounds, although individuals are occasionally taken of forty, sixty or even one hundred pounds weight. These large fishes are by no means common, the other species of salmon never attain the size of the Chinook.

There is an interesting family of fishes in our fresh waters known as Minnows; these fishes are too small and too full of bones to become a favorite for the table. They are the most helpless of all our fresh water fishes, being soft, and, as they are slow swimmers, they become an easy prey to larger fishes, and form a large part of their food supply. They have been constantly driven into smaller streams and shallow water, until they have become exceedingly dwarfed. Their only use in the economy of fish life seems to be to assimilate small organisms, converting them into such shape that they can be taken by the larger fishes. Now the Minnows of all the United States east of the Rockies are small and, except in case of a few species, they are less than six inches in length. The predatory fishes, such as the Sunfishes and Perches, Pike and Pickerel, are their worst enemies. In the Rocky Mountains there are none of these fishes, and many minnows there grow to a length of two feet or more. The only enemy of importance they have is the trout, but the minnow finds a more congenial climate in the larger bodies of water, too warm for the trout. The struggle for existence has been a severe one, especially so in our streams where species of fish are the more numerous. It has greatly limited the growth of most species beyond an average size, and is in many places responsible for the fact that often a species may become dwarfed in certain bodies of water. In the Salmon river in Idaho it was not an uncommon thing to catch trout of three or four pounds weight. In the smaller tributaries and in the smaller mountain lakes it was unusual to catch one weighing over one-half pound, the average being less than one-fourth pound. I have no doubt that many of those from the small lakes of one-half pound were as old as the large ones taken from the Salmon river.

Fish eat and grow very irregularly. The average size of individuals, which we would ordinarily call adults, for some species, is different in different bodies of water. Their growth is influenced largely by the size and depth of the body of water in which they live, also by its temperature and the amount of suitable food it contains. The value or extent of each of these influences is imperfectly understood.

The forms of fishes are very numerous. Some are extremely long and slender, as many of the species of Eels, Pipe-fishes and the like, while others are extremely short, like Sunfish of the ocean. Others, like the Trunk Fishes, are nearly equal in all dimensions. The average form and the one which best suits our idea of a fish, is the Black Bass, or other fishes of similar pattern. To know the advantages of these forms one must study the fishes in their native element. The peculiar forms which many species take are the most noticeable in those found in the tropics. The struggle for existence there is the most severe, and it seems as if each species had labored to take on some peculiar form which would assist most in its preservation. In this respect color also plays an important factor. It is in the tropics and among the many species of corals that we find the most highly-colored fishes.

Many fishes have the power to change their color, and this they can do in a very short time. The flounders are a peculiar family, the young when born are symmetrical. Early in life they take on the habit of their parents and lie on one side, the eye on the underside disdains to look downwards and so begins to move toward the other side. The bones of the head suit themselves to this change and soon our flounder has both eyes on the same side of the head. The upper side is colored much to resemble sand, and the under side becomes nearly white. The flounder protects himself by covering his body, except the eyes, with sand. Flounders live on sandy bottoms, some in shallow water, while others are found in deepest parts of the ocean. If flounders are placed in an aquarium and arranged so the light can fall on the under side of their bodies, this, too, becomes dark, much like the other side.

It is interesting to study the habits of fishes in a small aquarium, and to especially notice their ability to change color, and how rapidly they do it. So many persons seem to be saturated with the idea that an aquarium must have in it one or more gold fish. This seems to me to be a mistake when our streams contain so many species suitable for the aquarium which are far more handsome than the gold fish, and which, if you give them half a chance, will teach you something of interest. Mr. Ford, of Berwyn, Illinois, has a small aquarium, in his house, in which he keeps from fifteen to twenty-six species of native fishes. Among these are several species of Darters, the most beautifully colored and the most interesting of all our fresh-water forms. Then there are Minnows, Suckers, Catfishes, Sunfishes, the Pike, Mud Minnow, Top Minnow, and so on. To one who would know fishes, any one of these species is more desirable than gold fish. The study of fishes in an aquarium, such as the one possessed by Mr. Ford, is extremely interesting. They will teach you much about their habits, besides giving you many lessons showing their ability to change color and adapt themselves to their surroundings.



A MOUNTAIN LAKE.

CHICAGO:
A. W. MUMFORD
PUBLISHER.

The Blind Fishes, which inhabit caves in this country, are very interesting. They have lost their color, if they ever had any, being white. In many the eyes have become so degenerated as to be entirely of no service when the fish is in the light. The head is furnished with tactile organs, which enables them to feel their way in the dark. In fact, they are well adapted for the life they lead. Dr. Eigenmann tells us that Blind Fishes were not accidentally swept into caves or driven there by their enemies, "but entered them deliberately and avoided coming out into the light." In other words, they preferred "darkness rather than light." Having simplified eyes and highly developed sense organs, they were able to live in the dark. The many ages they have lived in the caves has better fitted them for their existence in total darkness. The Blind Fishes were not always blind, but have become so because of their own preferences.

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The readers are, if they will only study fishes, sure to find them extremely interesting. There are a wonderful variety of fishes, each well adapted for the life it leads. You will find them in the brooks, creeks, rivers and lakes or ocean, wherever you happen to be, and you are sure to be highly repaid for all the study or attention you may give them.

Seth E. Meek.

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THE ORIGIN OF THE FISH.

A BIRD-FISH STORY.

Once upon a time, and that was in the long ago, there lived a Koko-bird along the forest shores of the Boozoo river. I am not quite certain in what country this river is but I believe it is somewhere in Gazazuland. It does not matter much where it is or was, but of one thing I am absolutely certain, and that is that the river did exist, else how could the bird have lived along its shores? Now this bird was quite beautiful, could sing quite well, and could fly quite gracefully; accomplishments which all of the other birds of the community willingly admitted, but the Koko-bird was very boastful. In a loud, arrogant voice he would proclaim himself the handsomest, the most musical and the most graceful of all the feathered tribe. At first his neighbors tried to ignore these boasts, hoping that the Koko-bird would in time learn better manners, but he did not; on the contrary, he became more boastful every day, in fact every minute, so that his presence became almost unbearable, causing great mental irritation and a feeling of nausea in those who were obliged to listen to him. A bird committee was therefore appointed to obtain an audience with the Golden Eagle, who was then the ruler of all the birds, and petition his majesty to convene the bird council in order that suitable punishment might be meted out to the boastful Koko. The very next day the meeting was called by special and very swift bird messengers. The Koko-bird was brought a prisoner before the king of the birds, the bird council and a vast concourse of birds from far and near, who had come to witness the trial. In a measured and stentorian voice the king asked the following questions of the culprit:

"Are you the handsomest of birds?"

"I am," replied the Koko-bird.

"Are you the best singer among birds?"

"I am," again replied the boastful bird.

"Are you the most graceful and the highest flyer among birds?"

"I am," replied the braggart for the third time.

The king of birds then flapped his right wing and there came forth the gorgeous bird of paradise, with the beautiful and wonderful tail feathers and crown, at the sight of which the members of the bird council individually and collectively flapped their wings in admiration. The eagle once more turned to the Koko-bird and in a terrible voice demanded:

"Are you still the handsomest among birds? Heed well your answer."

The Koko-bird gave one sidelong squint at the beautiful bird and said:

"I am," in a very indifferent tone of voice; whereat the assembled birds were astonished.

The king of birds then flapped his left wing and there came forth a nightingale which began to sing so sweetly that some of the listeners fell from their perches out of sheer ecstasy and they would have been hurt by the fall had they not caught themselves in the air by means of their wings. Even the king of birds was greatly moved, for he was seen to brush a tear from his right eye before he turned to the Koko-bird and spoke in a thunderous voice:

"You have heard this marvelous singer. Are you still the best vocalist among birds? Heed well your answer."

The Koko-bird merely yawned and said, "I am," and again the birds were greatly astonished.

The king of birds now nodded his head and there arose out of the multitude of birds a blue crane, whose home was near the Gingago river in farthest India. Its wings moved in even, silent, graceful undulations. It gradually rose higher and higher. All of the birds, with the exception of the Koko-bird, watched it spellbound until it appeared a mere speck in the distance. The Koko-bird gave one glance at the high flyer, then curled one foot up in his feathers, shook his head, closed his eyes and dozed peacefully.

For the third time the king of birds turned toward the Koko-bird and spoke in a voice even more terrible than on previous occasions.

"Are you the most graceful and highest flyer among birds? Answer me quick and heed well your answer."

The Koko-bird merely opened one eye and said sleepily, "I am," whereat the vast concourse of birds were astonished for the third time. Some opened their bills in amazement at such unheard-of audacity; others hooted and screamed, clamorously, demanding that the wicked Koko be severely dealt with.

The king of birds now flapped both wings to demand silence and attention. Those who had their bills open closed them with a snap and the clamorous ones became perfectly quiet. The king then turned toward the council and spoke in an even, stentorian voice, as follows:

"Gentlemen birds of the council. The prisoner, otherwise known as the Koko-bird, stands before you, self-accused and self-condemned. I commit him to your judgment. Let his punishment be as

severe as the bird law will permit."

The bird council then adjourned to the large council tree where they remained in closed session for one hour. They then returned to the bird assembly and the leader thus addressed the king of birds:

"Your majesty, the grand council of this bird assemblage, convened by you, find the prisoner guilty and fix upon the following punishment:

"1. Because of his boast that he is the handsomest of birds his tail and wing feathers shall be pulled out and all other feathers shall be shorn close.

"2. Because of his boast that he is the best singer among birds he shall be struck dumb.

"3. Because of his boast that he is the most graceful and highest flyer among birds, he shall forever be prevented from moving in the atmosphere in which we move."

No sooner had the speaker finished when the handsome feathers of the Koko-bird disappeared. This so surprised Koko that he actually awoke from his slumber. He tried to say, "Well! well! what has happened," but could not utter a sound. The king of birds now flew away, which was the signal for the adjournment of the assembly, for, you see, their work was done. All of the birds began to depart for their respective home trees, but before doing so each one said something sarcastic or insulting, hoping to humiliate the forsaken culprit. This merely annoyed Koko a little. He tried to retaliate by boldly declaring that he was the handsomest, the most musical and the most graceful of all birds, as he had often done before, but he could not, for had not the council decreed that he be "struck dumb?" He tried to catch the little sparrow, who, by his derisive twitterings, annoyed him even more than the vulture, by his coarse insults, but his wings would not carry him. He merely succeeded in falling into the Boozoo river.

"Now I shall be drowned," he thought, for you remember he could not talk. But behold! he did not drown; by means of his featherless wings and tail he could swim beautifully on top of the water as well as in it. His body feathers being gone, they did not become water-soaked and give him the snuffles, a severe cold, or perhaps pneumonia. Koko was astonished to find that water, which he had formerly feared, was not bad at all. He could drink whenever he wanted to without having to stand at the edge of the river bank, as he formerly did and get his feet all mud. In time his wings and feet became fins and the feather stumps became scales; in other words, the erstwhile boastful Koko became a fish.

The Koko-fish (for so must the Koko-bird be called now), would have lived in the Boozoo river peacefully had not an owl noticed him one day.

"O, ho! What is this?" said the wise one, blinking both eyes. "Such a creature was never seen before. I must investigate closer." So saying he flew to a lower limb and looked hard at Koko. Koko, in turn, stared at the owl out of one eye; he did not wink or blink but simply stared and said nothing.

"By my wisdom," said the owl, "if this isn't Koko. I know him by his eye. Well! well! what may not happen next?"

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That night the wise owl repaired in all haste to Urtzook in Tartary, where the bird council was again in session, and reported his wonderful find, whereat the king of birds and all present were greatly astonished for the fourth time. They expressed a fear that Koko would some day leave his watery element and return to them. The king turned to the wise one and said:

"How know you that the creature which you beheld in the limpid waters of the Boozoo is the erstwhile Koko? and let me remind you, heed well your answer."

"Uh! how do I know, indeed," replied the owl, "by his eye, by his cold stare."

"Our enemy, the Boa, also hath an eye with a cold stare; is he therefore also a metamorphosed Koko? Again heed well your answer," continued the king in a somewhat sarcastic tone.

The owl winked and blinked, adjusted his spectacles and made answer.

"The undeniable evidence that the creature referred to is the metamorphosed Koko-bird is as follows: All the wise birds of your kingdom, including your humble servant, have searched far and near and have found no Koko-bird. We, ahem, I, have found this creature with the cold stare; therefore, it follows that this staring, scaly, wingless and featherless creature must be the metamorphosed Koko-bird, for how could it be otherwise?"

All doubt vanished at such display of wisdom and the king of birds at once dispatched the Flipflap bird to the banks of the Boozoo river, instructing him to keep a sharp lookout on the now scaly Koko and to drive him back into the water should he attempt to leave it. Even to this day the guardian of fish may be seen perched upon a stump, closely watching the rippling waters. As soon as one of the finny tribe approaches near the surface he makes a dash for it, compelling it to return with all speed. For his faithful services the Flipflap bird has been dubbed Kingfisher, which is a much nicer name.

Albert Schneider.



BANANA.
 $\frac{2}{3}$ Natural-size.

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A. W. MUMFORD,
CHICAGO.

THE BANANA.

Tall and stately, capped by a gracefully arched group of leaves and a nodding spike of numerous flowers, the banana is noted alike for its beauty, its nourishing fruit and its many qualities of economic value. Some one has said, "The banana is the queen among ornamental herbs, and the household god of the laborer's cottage."

To him who dwells in the tropics the banana is as wheat and rice are to the inhabitants of more temperate regions.

Nearly all the authorities on the distribution of plants believe the banana to be a native of Asia and that it was not found in the New World previous to its introduction by man. An argument which strongly supports this theory is the lack of native names for the plant in Mexico and in South America. It was mentioned by the early Latin and Greek writers, but seems to have been unknown to the ancient Egyptians.

Botanical authorities quite generally agree that the numerous varieties of our common banana are produced from *Musa sapientum*. The generic name, *Musa*, is by some claimed to have its origin in the Arabic word *Moux*, their name for this group of plants. Others claim that the name was given in honor of Antonius Musa, a physician who cured Augustus Caesar of a disease that had been considered incurable. The specific name has its origin in the myth that the groves of the banana plant were used by the sages or wise men (*sapientes*) of India for their councils and for rest, they also partaking of the fruit.

Another species of the genus *Musa* is called *paradisiaca* from the mythical story that it was the forbidden fruit of Paradise. The common name of this species is the plantain and by many it is considered the parent of the numerous varieties in cultivation in Asia and the adjacent islands and also in the New World. Many eminent authorities believe that both the banana and the plantain, with the numerous varieties of each, are the same species.

The banana plant is herbaceous and dies down to the ground after fruiting. The true stem is underground and perennial, sending up new shoots each season, which grow rapidly and in a few months bear ripened fruit.

The stalk that bears the flowers grows to a height of from fifteen to twenty feet and is surrounded by the sheathing bases of the leaves. The flower cluster or spike is terminal and from two to four feet in length and nodding. The oblong leaves are dark green in color, from five to ten feet in length, and from one to two feet in width. The beautifully arching leaves and the pendulous cluster of flowers or fruits forms an attractive foliage and makes the plant a noted ornament for the garden.

The many varieties of both the banana and plantain, which vary in taste, color, form and size, are very widely distributed throughout the world, being usually found in a zone bounded by 38 degrees North and 38 degrees South latitude. It is said that a single plant will produce, on the average, in one year three bunches of fruit weighing fifty or more pounds. The amount of labor required in its cultivation is very small, especially in the older plantations.

The number of bananas on a single stalk of the ordinary variety varies from about one hundred to two hundred, with an average of about one hundred and thirty. When a plantation is fully developed growth is so rapid and so constant that ripe bunches of fruit may be gathered each week.

For the best results a good, fertile soil is required. It is interesting to note that but little moisture is needed, for the plants attract water, either from the air or the waters deep under ground, and the surface of the ground is always moist even in a time of unusual drought.

The stalk that bears the heavy bunch of fruit, occasionally weighing as much as eighty pounds, may be easily cut down by a single stroke of a scythe or a machete.

Under cultivation the fruit seldom produces perfect seeds, but if developed in a state of nature it is said that they will mature and that many varieties are produced.

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The banana is frequently used in coffee plantations to make the necessary shade for the young coffee plants and at the same time it yields an income while the planter is waiting for the production of the coffee berry.

Natives of the tropics have found the leaves a cool and useful thatching for the roofs of their huts.

The unripe fruits contain a large percentage of starch and the pulp, when dried and reduced to a powder, makes an excellent and nutritious flour or meal. The ripe fruit contains about twenty per cent of starch, the remainder having been changed into sugar during the process of ripening. Even intoxicating drinks are made by the Africans from the juice, known as "banana beer" and "banana wine." It is not the fruit alone that is used as food, as also the pith, the top of the flower cluster and the young and tender shoots delight the taste and nourish the body.

The economic value of the fibers of some of the species was known to the Chinese and Japanese from remote times. The fiber obtained from the leaves of both the banana and the plantain are valuable in the manufacture of paper and fabrics of various kinds.

One of the most interesting and valuable of the species of *Musa* is the Wild Plantain (*Musa textilis*) of the Philippine Islands. The fiber obtained from this plant is the Manila or Cebu hemp of commerce, which is used, in this country, mainly for the manufacture of binding twines, cordage and mats. In France the finer fibers are quite extensively used for the manufacture of fine veils, crapes, hats, delicate underclothing and many other articles of apparel. The natives of the Philippines call this fiber Abaca. It is called Manila because most of the fiber is exported from the seaport of that name. We are told that "Manila hemp began to be used extensively in this country, in Salem and Boston, in 1824 to 1827."

Probably the most peculiar of all the species is the Chinese banana (*Musa Cavendishii*), which is extensively cultivated in China and throughout the South Sea Islands. It is a dwarf, the plant seldom attaining a height of more than six feet. It is robust and yields a great harvest of fruit, a single bunch bearing from two hundred to three hundred bananas, the flavor of which is excellent.

The opposite of the Chinese form is the Abyssinian (*Musa ensete*), which may be called the giant plantain. It attains a height of thirty or more feet and the leaves are sometimes twenty feet long by three feet wide. The fruit is pulpless and dry, but the inner part of the stalk and the young stalks are boiled and used for food. It is without doubt the most handsome species of this wonderfully useful and beautiful group of plants.

William Kerr Higley.

Transcriber's Note:

- Minor typographical errors have been corrected without note.
- Punctuation and spelling were made consistent when a predominant form was found in this book; otherwise they were not changed.
- Ambiguous hyphens at the ends of lines were retained.
- The Contents table was added by the transcriber.

*** END OF THE PROJECT GUTENBERG EBOOK BIRDS AND NATURE, VOL. 08, NO. 2,
SEPTEMBER 1900 ***

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