Birds and All Nature

IN NATURAL COLORS

A MONTHLY SERIAL

FORTY ILLUSTRATIONS BY COLOR PHOTOGRAPHY

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BIRDS AND ALL NATURE.

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MY NEIGHBOR IN THE APPLE TREE.

NELLY HART WOODWORTH.

TROPICAL portions of the American continent, rich in an endless variety and beauty of bird-life, have shared with New England but a single species of Trochilidæ, *Trochilus colubris*, the ruby-throated humming bird.

This "glittering fragment of a rainbow" adds a decorative feature to our gardens, its nest so protected through diminutive size and perfect adaptation to the surroundings that it rarely comes under one's observation.

It is commonly asserted that the male is an arrant shirk, that he leaves the entire labor of building and furnishing the house as well as the heavy duties of housekeeping to the faithful mother, being in the fullest sense a *silent* partner either from choice or otherwise, a mere apology for a husband and head of a family.

Nor does he redeem himself when the prospective "twins" arrive and slender bills are lifted appealingly for food! No thanks to him that the naked, squirming little atoms replacing the two white eggs become gradually stronger, that some hint of plumage duly covers their nudeness, or that bye-and-bye they become birds in reality.

Two years ago this "little lady in green" made her nest upon an apple tree branch, concealing it so deftly that the gardner at work near by was unaware of the distinguished guests until the brooding was nearly over. When the little birds had flown the lichened residence, becoming a family possession, was considered the daintiest souvenir of the summer.

Being anxious to know if this rare, interesting episode would be repeated, the following summer I watched carefully for its repetition. Promptly in June I found that a humming bird was again "at home," this time upon a horizontal maple branch, twelve feet from the ground and directly over the sidewalk. This nest was soldered upon a long slender bough half an inch in thickness at the intersection of another, a mere twig a quarter of an inch through, the latter inwrought with, and concealed for a full inch in the structural fiber. Upon the 22d of the same month, by the aid of a ladder I found that two eggs "the size of yellow beans" were lying inside the downy cup shaped nest. Before this luckless visitation the tail of the brooding bird could be seen from the ground, but during the next two days there was no sign of life thereabout.

In the afternoon of the third day my bird was in the maple, darting hither and thither like a swallow, plunging into the insect swarms and securing several before they realized her presence. Then she came to the honeysuckle beside me, hovering over it in a bewildered, irresolute manner as if debating whether she could safely probe its scarlet cups. Just at this moment a big miller flew by and off she went in close chase, capturing it upon the wing. Then she rested upon a maple twig, leisurely preened her feathers,

drawing each one gently through her beak, and after a second visit to the honeysuckles darted toward the nest. Now, I thought, is the time, if ever, to decide if she is still housekeeping, and following quickly, I saw her standing upon the edge of the silken cradle. Her head moved rapidly from side to side as she regarded its contents, after which she rose lightly in the air, dropped upon the nest with the airy grace of a thistledown, and spread above it the feathered blanket of her soft, warm breast. For several minutes she ignored my presence, drawing her beak across the leaves or springing into the air for a passing insect which was captured and apparently given to her family. Once I detected a "squeak," and her head was instantly thrown to one side in a listening attitude. If it was the note of the mate he did not approach the nest, the thick leaves hiding the tree-top from which the sound proceeded.

There was a furious wind that night and the warm days were followed by a sudden fall in temperature.

From that time the nest was deserted; I could only conjecture that I had presumed too much upon her defenselessness, or, that the young, if young there were, were dislodged by the wind. This abandoned homestead was as round and perfect as a new coin just issued from nature's mint, a marvel of elegance in which all the instinctive gifts of decorative art united.

There were no visible signs of rebuilding during the twelve days that followed; casual trips to the honeysuckle, hovering over the flowers like some gorgeous insect with colors scintillating in the full sunshine, alone gave evidence of further interest or intention.

Upon the thirteenth day there was a marked change. Again she flew excitedly about the lawn, stopping abruptly to wheel about and dart off in an opposite direction, a vitalized complement of the spirit of the trees, mingling with and pervading the garden as freely as did the light and air. She threw herself against a summer warbler almost knocking him off his perch and, not content with this treatment, drew him from the lawn, which, by the way, was his own harvest field where he had gleaned diligently for several days.

Then the bird poised before me in mid-air, circled about my head before plunging into an apple tree in whose leafy mazes she disappeared. Just at that moment an accommodating breeze displaced the leaves; there was a flutter within, a flash of wings, an unusual agitation that told of something quite beyond the ordinary. As the breeze died away the leaves resumed their place thus preventing all further inspection. From the parlor windows, fortunately, there was less obstruction, —she was still twisting about, going and returning, dropping within the foliage and going through the most singular antics.

An opera-glass revealed the meaning; she dropped into a half-finished nest that had all this time been directly in range of vision. The tiny tenement was so deftly concealed, blending in color and apparent texture with the bough that held it, and so sheltered by overhanging leaves that it was still difficult to locate a second time.

With unbounded delight I watched her come and go a dozen times in less than that number of minutes, bringing at each arrival a quantity of vegetable fiber soft as a silken cobweb, adjusted invariably while standing inside the nest and turning completely around several times as if shaping the interior to her better satisfaction. She reached far over and pulled the fluffy cotton into place, beating it here and jerking it there, sinking her little breast into and shaping it to fit the soft contours of her body; or, covering the outside with trailing wings, beat them rapidly against the felted foundation which at these times was entirely hidden beneath their iridescence. Though still unfinished the delicate structure was lichen-decorated, simply perfect so far as it went, in this case defying the assertion that humming birds' nests are always completed before this ornate decoration is added.

In the succeeding weeks—weeks in which I entertained an angel, not unawares, her two ways of approach were unvaried; either passing the nest

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The changes a Feather undergoes in turning from Green to Yellow.

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entirely to rise from beneath, or, hovering over and over, drop down as lightly as a snowflake or the petal of an apple blossom. And such a pretty proprietary air—the complacence and importance for which great possessions are often answerable! As if the trees were there for her alone, the garden made simply for her convenience!

After working rapidly for two full hours she paused to rest upon a dead twig, opening and closing her wings in the twinkling fashion of a bluebird, an exercise prefacing a breakfast taken in the nearest tree as she poised beneath the leaves.

With appetite appeased she dropped upon the unfinished cradle and sat so still for twenty minutes that I was certain an egg was deposited. Doubtless the misfortunes attending previous nesting had interrupted the even tenor of life, the second housekeeping was more urgent than was anticipated.

For ten minutes more her form was motionless though her head moved from side to side in a ceaseless surveillance—a warbler lunching in the next tree glanced casually in her direction, and was evidently just wild with curiosity.

The situation was too much for him; he left his post hurriedly, flew over her and looked down, flew under and looked up, peered at her from an airy poise, still undecided as to who was rocking in that wonderful cradle. Craning his neck he hopped along the branch till he stood beside her, so near that his yellow coat literally brushed her garments, his attitude a quick pantomime of his thoughts, half paralyzed with questioning surprise as to what this remnant of a bird might be, not by any means to be bought *cheap* because it was a remnant.

A quick thrust from the hummer's beak brought him to his senses; he took leave for a few seconds, returning cross-lots to stare again from the same near point of view, which unwarranted impertinence was borne without flinching or changing her position. Later on these tours of inspection were thoroughly resented, the right of territory contested in many a battle when the defendant advanced and retreated with the rapidity of lightning, making furious thrusts at her adversary, and chasing him about till sheer exhaustion compelled her to desist. Then she would drop upon the nest still regarding him with undistinguished contempt till he took her to the tree-top, keeping an eye upon her as he dropped a song or swallowed an insect.

A young woodpecker came one day to her door; two quarrelsome robins stopped to say good morning; and goldfinches lisped their soft love notes, while she only hugged her eggs more closely with the dear, delicious shyness of affection.

When my little house-builder left that morning I was sure that the edge of a white egg rose above the low rim of the nest. From the attic window it was plainly visible, the cradled egg rocking in the wind, but, though the warbler was close by, to his credit be it said he did not once trespass upon other people's property.

Twice that afternoon my lady buzzed through the trees without halting to look in at home, nor when night came down did the wanderer return. She was busy about the next morning, all work being done in the early hours, and by eight o'clock a second egg lay beside the first. By nine o'clock the following morning the regular brooding began, the finishing touches being given to the nest long before the breakfast hour.

It was a noisy location, what with the clatter of lawn mowers, the drumming of pianos, and the singing of canaries, to which she listened with neighborly interest. In that chosen place, directly over the path leading from the sidewalk to the door, it was impossible to find even a degree of seclusion. The weather was fine, the piazza rarely vacant, and there were few hours in the day but someone passed the nest.

Nor did the trouble end with daylight; bicycle parties made the yard a starting-point for evening excursions, lanterns flashed while parting guests halted beneath the little house-beautiful, until I trembled for poor "Queenie" thus barred away from her own door.

Though she unvaryingly left the nest,

the persons passing were never once conscious of the nearness of bird or nest, swinging breezes often bringing the latter so near that it almost touched their faces.

I could see it hourly from my window, the overhanging leaf, the opalized lustre of the brooding bird, as if a store of sunshine was shivered, and falling over her feathers, then momentarily hidden as the swinging leaf intervened. More solid pursuits were forgotten or for the time regarded as of little importance; each delicate outline became familiar; the brooding leaf assumed a personality; it was a guardian of the home, vitalized, spiritualized, protective. It seemed to change position as the sun made the need apparent, shielding the little one in the long waiting days, so patient and passive in the sweet expectancy of nearing motherhood. My memory pictures her still, while a more tangible photograph upon my desk gives permanence to my "bird of the musical wing" as she brooded over the apple-tree nest.

With this home as a focus, lawn and garden seemed to hold the sunshine in suspension; uplifted grasses gave it recognition in smiling approval; shadows were invested with humane and beneficent attributes, and the very air was radiant with scent and gracious influence.

Sometimes the bird came to my window, her beak clicking against the glass in a vain effort to probe the flowers within.

There were visits, too, to the piazza, when the family were gathered there, poising above the embroidered flowers upon a lady's slipper and trying persistently to taste their illusive sweetness.

Thrice upon the fourth day of sitting she improved the nest with an extra beakful of cotton, holding it firmly for five or ten minutes before it was inwrought. This was repeated after two weeks when there was a decided change—the little, warm breast was pressed less closely against the nest treasures. Some amazing instinct, directly opposed to that dear experience by which *we* find a short path to a long wandering, taught her that their increased fragility would yield to her full weight, and her touch was of exquisite softness.

When three full weeks had passed a homely baby no bigger than a honey bee lay in the nest, a one day's advantage kept to the end, and noticeable in both size and strength. The next morning this mite was duplicated, their whole bodies trembling with every heart beat.

Life became now a problem of supply and demand, only a clearer expression of the one that has from all time agitated humanity. Then began that marvel of marvels, the feeding of the newly hatched birds. It was hardly worth while to question the wisdom of the process, though I confess that after each feeding I expected only two little mangled corpses would remain!

The food, partially digested in the mother's stomach, was given by regurgitation, her beak being thrust so far down their throats that I surmised it would pierce the bottom of the nest, to say nothing of the frail bodies churned violently up and down meanwhile. The great wonder was that the infants survived this seemingly brutal and dangerous exercise in which they were sometimes lifted above the nest, the food being given alternately at intervals of half an hour to an hour. They thrived, however, under a treatment that gave strength to the muscles, besides aiding in the digestion of food.

From the first, the comparative length of beak was their most noticeable feature, the proportion becoming less marked by the fourth day when fine hairy pin-feathers appeared, these increasing in size and reinforced by a decided plumage seen above the rim of the nest before the second week ended.

By the ninth day they attempted their first toilet, drawing the incipient feathers, mere hairs, through the beak, and on the tenth day, more surprising still, they had found their voices. Several times daily the branch was pulled down to the level of my eyes, the twins regarding me with the surprise and innocence of babyhood, sinking low into the nest meanwhile, and emitting a plaintive cry almost human in its pathos and expression.

So far as I know no observer has recorded this pleading, pathetic note from the infant hummers so noticeable whenever I came too near. The branch replaced and the disturbing element removed, they reappeared above the nest's rim, the slight form of the mother palpitant as she hovered near. Early in their lives when a cold rain followed the long drouth, her enforced absences were brief; hasty trips merely to the flower garden in the rear of the house, or to the flowering beans in the next yard, a favorite lunch counter patronized every hour ordinarily.

The leaf that served to so good purpose in the sunny days became heavy with raindrops, tilted to one side, and little streams trickled down upon her back and ran off her tail, while big drops splashing down from the higher branches threatened to annihilate the whole affair. Undaunted still, my Lilliputian mother hugged her precious charges, with drooping tail hanging over the edge of the nest, head drawn into her feathers, her whole appearance as limp and bedraggled as a hen caught out in a shower. When the infants had seen two weeks of life they refused to be longer brooded. From this time on they matured rapidly, filling the nest so full that my lady found no place for the sole of her foot, and often alighted upon their backs to give them food. In four days more their baby dresses were quite outgrown. These were replaced by green graduating gowns of stylish texture and fit, and, as my bird book stated that young hummers left the nest when a week old, I was watching eagerly for their debut.

Long before this the nest proper began to show signs of hard service. Before its occupants left it became a thing of the past, positively dissolving to a mere shelf or platform, and one side falling out entirely, the imperturbable twins sitting or standing upon what remained, content in the silence that all completed tasks deserve.

As I have said before, one of these little grown-ups surpassed the other in size and vigor, insisting gently or forcibly upon the best standing-place, and vibrating its wings for several seconds at a time. Plainly this one would be the first to launch upon the world.

Twenty-two days after hatching it spread its wings without apparent effort and alighted upon a neighboring twig. Clearly, life was regarded from a mature standard as it preened its plumage and looked about with an undaunted air.

Two days later the smaller twin followed the example, reaching the upper branches as easily as if flight were an every-day occurrence, both birds flitting about the familiar tree, and fed by the parent, until after the third day, they were seen no more.

There is something noble, simple, and pure in a taste for trees. It argues, I think, a sweet and generous nature to have this strong relish for beauties of vegetation, and this friendship for the hardy and glorious sons of the forest. There is a grandeur of thought connected with this part of rural economy. It is worthy of liberal and freeborn and aspiring men. He who plants an oak looks forward to future ages, and plants for posterity. Nothing can be less selfish than this. He cannot expect to sit in its shade nor enjoy its shelter, but he exults in the idea that the acorn which he has buried in the earth shall grow up into a lofty pile and shall keep on flourishing and increasing and benefiting mankind long after he shall have ceased to tread his paternal fields.—*Washington Irving.*

A DAY IN JUNE.

Bright is this day of smiling June,
When nature's voice is all atune

In music's swelling flow, to sing
Sweet songs of praise to nature's king.

From azure heights the lark's loud song
Is borne the balmy breeze along;

The robin tunes his sweetest strain,
And blithely sings his glad refrain

Of summer days and summer joys;
The tawny thrush his voice employs,

In chorus with the warbling throng,
To fill his measure of the song.

The river, too, with rippling flow,
As it winds through its banks below,

And leaps and plays in merry glee,
O'er rocky bed, 'neath grassy lea,

Or silent glides through sylvan shade,
To laugh again in sunny glade,

Sends back its murm'ring voice to swell
The music of each lovely dell,

Where Flora decks with brilliant sheen
The virgin sward of velvet green.

—From a forthcoming poem by Geo. H. Cooke, Chicago.

FROM COL. CHI. ACAD. SCIENCES.
6-99

WESTERN YELLOW-THROAT WARBLER.
Life-size.

WESTERN YELLOW-THROAT.

(*Geothlypis trichas occidentalis.*)

The birds are here, for all the season's late.
They take the sun's height, an' don' never wait;
Soon's he officially declares it's spring,
Their light hearts lift 'em on a north'ard wing,
An' th' aint an acre, fur ez you can hear,
Can't by the music tell the time o' year. —*Lowell.*

THIS common, but beautiful resident of the western United States begins to arrive about the middle of April and leaves during the month of September. It is one of the most conspicuous of the warbler family, is very numerous and familiar, and is decked with such a marked plumage that it cannot fail to be noticed. The adult male is olive-green above, becoming browner on the nape. The female is duller in color than the male without black, gray, or white on head, which is mostly dull brownish. The yellow of throat is much duller than in the male. The young are somewhat like the adult female. This is said to be the prevailing form in Illinois and Indiana, the larger number of specimens having the more extensively yellow lower parts of the western form, though there is much variation.

This little fellow is found among the briars or weed-stalks, in rose bushes and brambles, where it sings throughout the day. Its nest, generally built between upright weed-stalks or coarse grass in damp meadow land, is shaped like a cup, the opening at the top. The eggs vary from four to six, and are of a delicate pinkish-white, the larger end marked by a ring of specks and lines of different shades of brown. The western yellow-throat inhabits the Mississippi valley to the Pacific coast. It is found as far north as Manitoba; south in winter from the southern United States, through central and western Mexico to Guatemala. With a few exceptions the warblers are migratory birds, the majority of them passing rapidly across the United States in the spring on the way to the northern breeding-grounds. It is for this reason that they are known to few except the close observers of bird life, though in season they are known to literally swarm where their insect food is most plentiful—"always where the green leaves are, whether in lofty tree-top, by an embowered coppice, or budding orchard. When the apple trees bloom the warblers revel among the flowers, vying in activity and numbers with the bees; now probing the recesses of a blossom for an insect which has effected lodgment there, then darting to another, where, poised daintily upon a slender twig, or suspended from it, he explores, hastily, but carefully for another morsel. Every movement is the personification of nervous activity, as if the time for the journey was short; and, indeed, such appears to be the case, for two or three days, at most, suffice some species in a single locality; a day spent in gleaning through the woods and orchards of one neighborhood, with occasional brief siestas among the leafy bowers, then the following night in continuous flight toward its northern destination, is probably the history of every individual of the moving throng."

CHARLEY AND THE ANGLEWORM.

ALICE DE BERDT.

CHARLEY was going fishing and he took great pride in the quantity of squirming bait he carried in the tin box.

He was quite a small boy, only eight years old, but country boys learn to take care of themselves sooner than city children.

When he reached the little stream where he meant to fish, he found some one before him. It was a stranger whom Charley had seen once or twice at a neighbor's, where he was boarding during the summer.

The old mill was the best place in miles for fish, and Charley wished that the city boarder had chosen some other spot in which to read his book.

He gave a shy, not very cordial reply to the stranger's pleasant "Good morning!" and began to arrange his line. In a few minutes one of the largest earth-worms was wriggling in the water at the end of Charley's hook, and he himself was sprawled out upon the ground at the end of a long beam projecting from the mill intently regarding the water.

"No luck, my boy?" asked the stranger, watching Charley work with the struggling worm that was as hard to get off the hook as it had been to put on.

"No, sir," replied the little boy. "The fishes don't seem to bite."

"Not hungry to-day, eh?" said the stranger. "I should think that would be a good thing for the worms."

Charley opened his eyes. It had never occurred to him to consider the worms in the matter. They were to him nothing but ugly, stupid things, which, his father said, injured the roots of plants.

"Don't you think the worms are as fond of their life as you are of yours?" went on Charley's new friend. "In their little underground earth houses they are very comfortable and happy."

Charley smiled. This was a new view of the case to him, and he edged nearer to the stranger to hear what more he would say.

"They's on'y worms," said Charley.

"And a worm is a very good sort of creature in its way. They are harmless, cleanly animals. See, I can take that one of yours in the palm of my hand and it will not harm me in the least. Let me put it down on the ground and see how it hurries to get away. It is frightened. Now it is trying to force a way into that damp earth. I wonder if you know just how the worm makes its way through the ground."

Charley shook his head, and the stranger said:

"You have often noticed the shape of the worm, I dare say. One end of its body is much thicker than the other, which runs to a point. The thicker end of the body is the head. The body itself, you will see, is made of many small rings, held together by tiny muscles and skin, making it possible for the worm to bend and curl and wriggle in a way that is impossible for you and me, whose bones are fewer and fitted tightly together, so that they move about less easily.

"Now, if you will take this one in your hand," said the stranger, "and run your fingers very gently down its sides from tail to head, you will find that the body of the worm is covered with fine hooks. If you run your fingers along the worm in the other direction, you will think the body perfectly smooth. This is because all the hooks point in the other direction.

"When the worm wishes to enter the earth, it pushes its blunt head through the soil, lengthening its body by means of the muscles that hold together the soft, cartilage-like rings. At first only a few rings go into the ground. Master Worm then draws up his body into a thick roll by shortening his muscles. In this way he forces apart the soft earth to make room for his body, the points on the sides holding it there while he again lengthens his head, push-

ing more earth apart. It is in this way, by alternately or in turn lengthening or shortening his body that he makes his way through the earth, which is pushed aside to give him passage through its dark depths.

"As his home is underground, eyes would not be of much use to him, so Mother Nature, whose children we all are, has given him none. One of her laws is that none of us shall have what we cannot or do not make use of. He has a strong mouth, however. It is placed on the second ring of the body. His food is earth, which he swallows to obtain the organic particles contained in it. This makes him especially interesting, for nearly all animals obtain their food from the soil quite indirectly. Some get it from plants, the plants themselves having gathered theirs from the earth through their roots. Certain animals depend on other creatures, which in turn get food from the plants.

"The life-giving particles which go to build up all bodies come directly or indirectly from the earth itself. It seems odd that a man who is starving, no matter where he may be, starves with the very food which he needs directly beneath his feet, only he does not know, nor has the wisest man yet learned, how to convert it into food which will directly sustain and give health to the body. Yet the little earthworm, which you despise as stupid, has this wonderful secret, which day by day it puts into operation for its own benefit. Worms also eat leaves, which sometimes they drag into their homes.

"The worm has no feet as we understand them, but moves along the ground by sticking its sharp claws into the ground and by in turn lengthening and shortening its flexible body.

"The young worms grow from eggs, which are deposited in the earth in the autumn. They have to look out for themselves. During the winter they burrow deep into the ground, coming to the surface with the warm rains of spring. Worms also come to the earth's surface at night. If you look carefully in the garden with a lantern some evening, you may see them."

Charley was looking at his bait box with a good deal of respect.

"I guess I'll let the worms have another chance," he said, and he dumped them in a heap upon the ground, when, I regret to say, two hungry robins promptly pounced upon them and flew jubilantly home with two of the fattest in their beaks for a meal.

The stranger smiled kindly upon Charley.

"Never mind, my boy. Old Dame Nature meant the worms for food for the robins and perhaps bait for your hook when you really need fish for food, but she never meant any of us to needlessly harm any living creature, for when you are older and have learned to read well in her great story book you will find that after all, from earthworms to kings, we are only brothers and sisters in wise old Mother Nature's great family.

"I once knew a little boy like you who used to salute every living creature he met with 'Good morning' or 'Good afternoon' or 'Good evening.' He said it made him feel more friendly toward them. In his spare moments he loved to watch the woodland creatures and learn the secrets of their busy, useful lives."

"Where does he live?" asked Charley.

"Well, when he is not rambling over the earth hunting for curious insects he lives in a big city, where he sometimes writes books about butterflies and moths and other insects, and people, who as a rule know very little about the humbler children of nature's family, give him credit for being a rather wise man; but he really knows very little—there is so much to learn. Some day, when you are a man, if you keep your eyes open to what goes on around you, you yourself may know how little. That boy is a man now and takes great pleasure in having introduced you to Master Chætopoda, one of the humblest but most interesting members of Mother Nature's household."

And then Charley smiled, for he knew the stranger was talking about himself.—*Success.*

THE MYRTLE WARBLER.

(*Dendroica coronata.*)

C. C. M.

ONE of the most interesting facts concerning this beautiful warbler is that, though not common, it is a winter sojourner, and therefore of perpetual interest to the student of birds. About the last of March, however, multitudes of them may be seen as they begin to move northward. By the middle of April all but a few stragglers have left us, and it is not till the last of September that they begin to return, the majority of them arriving about the middle of October. The habitat of the myrtle warbler includes the whole of North America, though it is chiefly found east of the Rocky Mountains, breeding from the northern United States northward into the Arctic regions; and, what is regarded as strange for so hardy a bird, has been found nesting in Jamaica. Its winter home is from about latitude 40° south into southern Central America.

The adult female myrtle warbler is similar to the male, but much duller in color. In winter the plumage of the sexes is said to be essentially alike. The upper parts are strongly washed with umber brown, and lower parts more or less suffused with paler wash of the same. The young have no yellow anywhere, except sometimes on the rump. The whole plumage is thickly streaked above and below with dusky and grayish white.

The places to study these attractive warblers are the open woods and borders of streams. In their northern winter homes, during the winter months, spiders, eggs and larvæ of insects constitute their principal food, though they also feed upon the berries of the poison ivy, and in the early spring, as they move northward, upon "insects that gather about the unfolding leaves, buds, and blossoms." Col. Goss says that in the spring of 1880 he found the birds in large numbers on Brier Island and other places in Nova Scotia, feeding along the beach, in company with the horned lark, upon the small flies and other insects that swarm about the kelp and debris washed upon the shore. "They utter almost continually, as they flit about, a *tweet* note, the males often flying to the tops of the small hemlocks to give vent to their happiness in song, which is quite loud for warblers—rather short, but soft and pleasing."

These birds usually build their nests in low trees and bushes, but Mr. MacFarlane, who found them nesting at Anderson River, says they occasionally nest on the ground. Mr. Bremer says that in the summer of 1855, early in July, he obtained a nest of the myrtle warbler in Parsborough, Nova Scotia. It was built in a low bush, in the midst of a small village, and contained six eggs. The parents were very shy, and it was with great difficulty that one of them was secured for identification. The nest was built on a horizontal branch, the smaller twigs of which were so interlaced as to admit of being built upon them, though their extremities were interwoven into its rim. The nest was small for the bird, being only two inches in depth and four and a half in diameter. The cavity was one and one-half inches deep and two and a half wide. Its base and external portions consisted of fine, light dry stalks of wild grasses, and slender twigs and roots. Of the last the firm, strong rim of the nest was exclusively woven. Within the nest were soft, fine grasses, downy feathers, and the fine hair of small animals.

The eggs are three to six, white to greenish white, spotted and blotched, with varying shades of umber brown to blackish and pale lilac: in form they are rounded oval.

In autumn, when the myrtle warblers return from Canada, they mostly haunt the regions where the juniper and bayberries are abundant. The latter (*Myrica ceifera*), or myrtle waxberries, as they are frequently called, and which are the favorite food of this species, have given it their name. These warblers are so restless that great difficulty is experienced in identifying them.

FROM COL. F. M. WOODRUFF
6-99

MYRTLE WARBLER.
Life-size.

TAFFY AND TRICKSEY.

CAROLINE CROWNINSHIELD BASCOM,

A FEW of my readers may know who Taffy and Tricksey are, but as more will not I think it best to introduce them.

Taffy is the handsomest tiger cat I have ever seen, and as he has the crook in his tail, he belongs to the Tabby breed. Taffy is very large, usually weighing fourteen pounds, but he has a very small head, and very small, finely shaped paws. The under parts of them look like black velvet. In color he is jet black and the other fur very much like a raccoon's, light tan at the ends shading into yellow, then into drab. As the sun strikes him every hair seems full of light and he is one mass of iridescent colors. His marking is most beautiful. The top of his head is black branching out into five narrow black stripes down his neck. A black stripe three inches wide (without one light hair) going all the way down the back and to the end of the tail and under two inches; of course, on the tail the stripe is much narrower. Then, narrow black stripes go down each side of his back and tail. His tail is not long, but very bushy like a nice boa. I never saw more exquisite coloring and marking than Taffy has underneath, from his throat to his tail. His coat is beautifully soft and thick, and shines like satin, and his eyes are very green. He is particular about his toilet, but insists upon my helping him to keep it glossy. His own comb is kept on my dressing-table, and he asks me to comb him twice a day, and sometimes oftener.

I can tell you nothing of Taffy's antecedents, as I found him one morning in our back yard starved almost to death, and about as thick through the body as a shingle. At first I thought he had dropped down from Heaven, but I soon learned from his sayings and doings that he must have been quite intimate with the inmates of the lower region. I tempted him with chicken but it was some little time before I could put my hand on him; and to tame any animal you must be able to touch it with your hand. After two or three pats he seemed to realize that I was a good friend. Soon I had him in the house and for three years we have been devoted to each other. I have had a great many cats, but never one who had so much of the wild animal in him. All of my friends said I never could tame Taffy and it was many weeks before I had much influence over him, and I never feel quite sure now whether I am to be loved or scratched, as he still has the temper and the actions of a tiger when anything goes the wrong way.

He usually lies down like a tiger with legs straight out in front, tail straight out behind, and when I speak to him he will always blink his eyes and speak to me. If you touch him in passing he will grab at your feet and spit and growl. He never mews when he wants anything to eat, but will chase me or my maid, and grab at our feet. If he does not like what is given him to eat, he will walk all about his plate, and scratch as if he were covering it up.

I am the only one Taffy ever shows much affection for, but to me he is very loving. He will lie as long as I will let him with his paws about my neck, and head on my shoulder. If he is sound asleep anywhere, and I begin to read aloud, sing, or whistle, he will get directly up, jump on my lap, put his paws about my neck, his face close to mine, and begin to purr. As he always looks very pleasant I flatter myself he likes the tone of my voice.

When I had my bird, Little Billie, it would make Taffy simply furious if I put him out of my room and closed the door. One morning he was so ugly my maid did not dare open the door to come in. After that when I wanted him to go down stairs, I had my maid come to the bottom of the stairs and call "Taffy!" then there was never any trouble. When he is in a tearing rage I can always quiet him, by taking

tight hold of his paws, and kissing his eyes. I have told all of these things about Taffy so my readers will appreciate what I have been able to do with him. It is needless to say that when Little Billie went away, Taffy was the happiest cat in town. His devotion increased daily to me and he lived in my room, only going down to get something to eat.

I think by this time you are very well acquainted with Mr. Taffy, and I will present Tricksey to you. Of all the canary birds I have ever seen Tricksey is the prettiest, daintiest little bird you can possibly imagine. His color is light yellow with a much deeper shade between his wings, shading into almost an orange. His wings and tail are white with just a line of yellow on some of the feathers. His eyes are unusually large and bright, and his little legs and claws are very pink, and so slender they do not look strong enough to support his finely shaped body. Tricksey came from George H. Holden's, New York, so you will all know he is a very superior bird and sings like an angel.

Tricksey had never been out of his cage when he came to me, but before I had had him a week, he came out, perched on my finger, took things from my finger or mouth, would kiss me, and go all about my room on my finger, and very soon went all about the house with me. He was very fond of sweet apple, but I never let him have it inside his cage, but made him come to me for it. I kept a piece in a little dish on my table and he soon found out where it was and would help himself on the sly. I also kept on my table in a little china cup, some hemp seed which I gave to Tricksey as a great treat. Every time I would tap on the cup and make it ring, Tricksey would come out of his cage, down from a picture frame, or wherever he was, for a seed.

One day he had had his one hemp seed, and teased for more, but I said "no" and he went flying about the room having a fine time. Soon he flew back on the table, hopped over to the cup, gave it two or three taps to make it ring, then hopped on to the top, reached down and helped himself to two seeds. Tricksey is a very vain little bird and likes nothing better than to go over on my dressing table, walk back and forth in front of the mirror or sit on my pin cushion and admire himself.

Tricksey came to me one afternoon and Taffy knew nothing about his arrival until the next morning. When he came upstairs and saw a little yellow bird in a house of gold, he was like the little girl's Bunnie, who "was not a bit afraid, but awfully much surprised," when she heard firecrackers for the first time. His eyes were like balls of fire, while his mouth opened and shut making a hissing sound, and his tail going at the rate of a mile a minute. He walked into my room like a wild tiger, with an air as much as to say, "If this is Little Billie come back dressed in yellow, die he must," and sprang at the cage. I took him firmly by the paws, looked straight into his big angry eyes and said in a soft, firm voice, "Taffy, this is Tricksey, and he is not to be eaten or hurt any more than my Little Billie who went away." I let go of his paws, he walked out of my room and downstairs without looking back. In about an hour I looked out into the hall, and there sat my dear old Taffy on the top step looking very meek and wishful. I spoke kindly to him and asked him to come in and see his new brother Tricksey. After a few moments he came in very slowly and went behind my bed. Soon he came from under the valance, (the cage sat on a chair and I in front of it) never looked at the cage, jumped into my lap, put his paws about my neck and began loving me. I took him to bed with me and he never moved until Tricksey began to sing in a most delightful way, then he looked at him and listened very intently. I talked to him,and "smoothed his feathers," and soon he snuggled down in my arms and went to sleep. When he got out of bed he never glanced at the cage, but went directly downstairs, and I felt I had made a good beginning. Everyone said I could never teach Taffy not to catch Tricksey, and the reason his catship did not kill Little

Billie was because he was afraid of him, and so carefully watched. I knew there was not a place in the house I could hang the cage where Taffy could not get at it if he made up his mind to do so. Of course for days and weeks I felt anxious, and did not mean to leave them alone together. I never turned Taffy out of my room. If he went up to the cage and put up his paw I would say "Taffy, you must *not* put your paw on the cage," and as he always minds he would take it right down, sit by the cage, and I would talk to him kindly. Fortunately Tricksey was not at all afraid of Taffy.

Taffy always wears a yellow satin collar with bells all around. Often I would hear him coming upstairs when I was lying down and I would keep very quiet to see what he would do. Sometimes he would come over to the cage, look at Tricksey pleasantly, then lie down by the fire and go to sleep; more often he would lie down without even looking at him. But the moment he heard me talking to Tricksey he would get up and come to me to be petted, and I always gave him a great deal. One day when Taffy was in another room I let Tricksey out, and tried to be very quiet. I was sitting on the floor with Tricksey hopping about me. Before I hardly knew it Taffy was in my lap, and soon I had Tricksey on my knee eating seeds. If I took the cage on my lap with Tricksey inside Taffy would immediately jump up and crowd in between the cage and me.

Taffy was very much afraid the first time he saw Tricksey take his bath, and ran under the bed and peeped out from under the valance.

One morning the cage sat on the floor, and Tricksey was ready for his bath, when Taffy came in and sat close to the cage. Tricksey took a big drop of water into his bill and threw it into Taffy's face, Taffy moved back a little and looked all about to see where it came from. While he was looking Tricksey went into his bath, and splashed the water all over Taffy's face in a very roguish way. To say Taffy was surprised is speaking mildly. He turned to me with an angry cry and went out of the room. The next morning the same thing happened; but instead of going out of the room, he went on the other side, out of reach of the water, but where he could see all that went on.

After that he became so interested he did not mind if the water was splashed all over his face and would sit as close to the cage as he could get. While Tricksey was eating his breakfast he would lie down close to the cage and go to sleep. As I previously said I never meant to leave Taffy in the room with Tricksey, but he was often there hours before I knew it. When I found him he was always asleep in front of the cage or by the fire.

One morning after the bath I put the cage up in the window. Taffy did not seem to like it at all. He looked at me most wishfully, and began talking cat language, and I knew he was saying, "Please put Tricksey back on the floor." I did so, and Taffy began to sing, lay down with his back close to the cage, stretched out and went to sleep. He had been lying that way for an hour when some visitors came. It seemed too bad to disturb Taffy so I left him, and thought I would risk it.

Two hours passed before I went back, and you may imagine my delight when I found my two boys (so different in color, size and disposition) as happy as two kittens. Tricksey was singing merrily. Taffy had wakened, changed his position, and looked as if he felt very proud, being left to take care of his small brother. His eyes were as soft as velvet, and he spoke to me in a soft, cooing tone. Since then I have never felt there was any danger in leaving them together. I regret to say Tricksey has a strong will of his own and almost as bad a temper as Taffy.

At different times I had three wee baby birds brought in to me, but they all died. Tricksey was very jealous of them, and when he saw me feeding them he would become very angry, beat his wings against his cage, and beg for me to let him out. One day I put one of the little strangers on the floor and let Tricksey out. He flew at the waif and tore feathers out of the top of his head. I took the poor little frightened thing in my hand. Tricksey flew

on my finger and pecked at him. I put him in my other hand and Tricksey flew at him more angry than ever. Then I put him on the floor, and Tricksey was so happy he flew on my head, hopped about my shoulders and kissed me in the mouth. In the middle of the performance in walked dignified Mr. Taffy with a look which plainly said, "What more are you going to bring into this room?" He sat by my side looking at the newcomer and, before I knew what he was going to do, reached out his paw, and gave him a good slap which sent him off my lap onto the floor.

Early in the fall before I had any fire in my room I would bring Tricksey down in the morning and keep him until evening, and for two weeks Taffy never went near my room during the day, but stayed down there with Tricksey. The first day I had a fire in my room I did not bring Tricksey down as usual. After I gave Taffy his luncheon I missed him, but did not go to my room until five o'clock, and there was faithful Taffy sound asleep close to Tricksey's cage, and now he stays in my room all day. He has plainly shown that if Tricksey stays there he stays too.

I find that animals want to be treated very much like children. The more intelligent they are the easier it is to influence them, and the quicker they are to read you. First give them a great deal of love and kindness, always be firm, very patient, and above all *never* deceive them in the most trivial thing. I hope this little sketch of Taffy's and Tricksey's life may be of some help to those who love cats and dogs, but have felt they could not teach them to live in harmony together.

A SUGGESTION TO OOLOGISTS.

FRANK L. BURNS,
In Oberlin *Bulletin*.

BEFORE we enter upon another active campaign of bird-nesting, it is fitting that we should pause a moment to reflect upon the true aim of our toil, risks, and trouble, as well as delight and recreation. How many of us can define the phrase "collecting for scientific purposes," which, like liberty, is the excuse for many crimes?

If it is true, as has been asserted, that oology as a scientific study has been a disappointment, I am convinced that it is not on account of its limited possibilities, but simply because the average oologist devotes so much time to the collection and bartering of specimens that no time is left for the actual study of the accumulating shells. In other words, he frequently undertakes a journey without aim or object.

The oologist has done much toward clearing up the life-history of many of our birds, but as observations of this nature can often be accomplished without the breaking up of the home of the parent bird, it alone will not suffice as an excuse for indiscriminate collecting. After preparing the specimen for the cabinet his responsibility does not end but only begins. A failure to add something to the general knowledge is robbing the public as well as the birds. He who talks fluently of the enforcement of strict laws for the preservation of our wild birds, their nests and eggs, and fails to protect and encourage those about his premises, falls short of his duty; and if his cabinet contains bird skins or egg shells which might just as well have remained where Nature placed them, he is inconsistent, demanding that others abstain that he may indulge.

In conclusion I would say that when an oologist constantly keeps in mind and acts under the assumption that the birds are his best friends and not his deadly enemies, he cannot go far wrong, and the means he employs will be justified in the light of subsequent study and research of data and specimens. If any of us fall short in this we have only ourselves to blame. Let us then collect with moderation and fewer eggs and more notes be the order of the day.

FROM COL. CHI. ACAD. SCIENCES.

A-19

BLUE-WINGED YELLOW WARBLER.
Life-size.

THE BLUE-WINGED YELLOW WARBLER.

(*Helminthophila pinus.*)

NOT a great deal is known about many of the warblers, and comparatively little has been observed of this member of the very large family, comprising more than one hundred species. This specimen is also recognized by the name of the blue-winged swamp warbler. Its habitat is eastern United States, chiefly south of 40 degrees and west of the Alleghanies, north irregularly to Massachusetts and Michigan, and west to border of the great plains. In winter it lives in eastern Mexico and Guatemala.

It has been pointed out that the name of this bird is misleading, as the blue of the wing is dull and inconspicuous, and not blue at all in the sense in which this color distinction is applied to some other birds. When applied to the warblers, it simply means either a bluish-gray, or slate, which seems barely different from plain gray at a short distance.

In half-cleared fields which have grown up to sprouts, and in rich open woods in the bottom-lands, where the switch-cane forms a considerable proportion of the undergrowth, the blue-winged yellow warbler is one of the characteristic birds, says Ridgway. The male is a persistent singer during the breeding-season, and thus betrays his presence to the collector, who finds this, of all species, one of the easiest to procure. His song is very rude. The nest is built on the ground, among upright stalks, resting on a thick foundation of dry leaves. The eggs are four or five, white, with reddish dots. The food of the warbler consists almost wholly of spiders, larvæ, and beetles, such as are found in bark, bud, or flower. The birds are usually seen consorting in pairs. The movements of this warbler are rather slow and leisurely, and, like a chickadee, it may sometimes be seen hanging head downward while searching for food.

INDIRECTION.

"We hear, if we attend, a singing in the sky."

RICHARD REALF.

Fair are the flowers and the children, but their subtle suggestion is fairer;
Rare is the rose-burst of dawn, but the secret that clasps it is rarer;
Sweet the exultance of song, but the strain that precedes it is sweeter;
And never a poem was writ, but the meaning outmastered the meter.

Never a daisy that grows, but a mystery guideth the growing;
Never a river that flows, but a majesty scepters the flowing;
Never a Shakespeare that soared, but a stronger than he did enfold him;
Never a prophet foretold, but a mightier seer hath foretold him.

Back of the canvas that throbs, the painter is hinted and hidden;
Into the statue that breathes, the soul of the sculptor is bidden;
Under the joy that is felt, lie the infinite issues of feeling;
Crowning the glory revealed, is the glory that crowns the revealing.

Great are the symbols of being, but that which is symboled is greater;
Vast the creation beheld, but vaster the inward Creator;
Back of the sound broods the silence; back of the gift stands the giving;
Back of the hand that receives, thrills the sensitive nerve of receiving.

Space is nothing to spirit; the deed is outdone by the doing;
The heart of the wooer is warm, but warmer the heart of the wooing;
And up from the pits where these shiver and up from the heights where those shine,
Twin voices and shadows swim starward, and the essence of life divine.

OUT-DOOR SCIENCE.

FREDERICK A. VOGT,
Principal Central High School, Buffalo.

THE first step to take in teaching science to young people and in popularizing the study among older people is to throw away much of the traditional polysyllabic phraseology and use a little common sense and good old Anglo-Saxon now and then—to teach nature, instead of science.

There is not only great danger in being too technical, but in telling too much. We all like to talk on our pet subjects. We rattle along, airing our opinions and pouring out big volumes of knowledge, and expect the poor pupils, like great dry sponges, to absorb the gracious gift. But they don't absorb; it isn't their business; they belong to quite another sub-kingdom; and while we are just about to congratulate ourselves on our facility of expression and wise beneficence, we are rudely made aware that our eloquence was all lost; and, worse still, we have been guilty of repression, of stifling natural curiosity, and crushing what might become a priceless, inquiring, intellectual habit.

Is it any wonder that so few ever go on with this geology, mineralogy, botany, or zoölogy, after they leave school? What is our object as teachers? Is it to cram geology and botany down passive throats in one or two school terms, or is it to lead our students so gently and awaken so keen a desire that they shall study these sciences all their lives, to be a never-ending joy, a pure pleasure and a solace amid coming cares and darkening days? Oh, I, too, have been guilty, and may heaven forgive my exceeding foolishness! The remainder of my days are being spent in penance, in propitiating the office of the recording angel by a more humble and righteous way of life.

So much for the language of the teacher, and now for the means of giving reality to his teaching efforts This can only be done by the laboratory method or investigation in the field. With the latter, out-door work only does this paper especially treat.

ACTUAL CONTACT WITH NATURE.

While I do not for a moment decry the use of books, either for collateral reading or for text-books—in fact, I plead for a wider reading and profounder study of the best scientific writers—still, I feel just as you must feel, that there is something radically wrong in much of our science teaching, and that we have come to regard books as more real than the earth, the sky the rocks, the plants, and the animals, which are all about us.

Just why this is so, I am unable to understand. Nature is so lavish! On all sides, easy of access, are the phenomena and the realities, while the school-room is artificial, and the teacher, alas, in perfect keeping with the school-room.

Can it be that pupils are averse to actual contact with nature? Not at all. From the earliest childhood throughout life there is in most persons a remarkable turn toward curious investigation, and thorough understanding of the things of nature. That I know from my own experience while teaching in the grammar schools.

One day I asked the pupils to bring me in any specimens of stones they might find in the vacant lots and the fields; and then I promised to give them a talk about these stones. I expected perhaps twenty or thirty specimens. What was my amazement and secret horror when, the next day and the next came dozens and dozens of specimens until, in a few days, I had over a ton and a half, containing 3,000 specimens. There were granites, gneisses and schists and quartzes; there were sandstones, slates, shales, limestones, glacial scratchings, marbles and onyx; there were geodes, crystals, ores, stone hammers, arrow-heads, brickbats, furnace slag, and fossils. I took everything smilingly, and at night the janitor and I buried many duplicates and the useless stuff in a deep hole where they wouldn't be likely to get hold of it again.

We soon possessed an excellent cabi-

netful, and had fine times talking about the making of stones—the crust of the earth—former inhabitants, the great ice age, and such simple geology as they could understand; and they did understand; that did not end it. We studied plants in the same way; physics and chemistry, with home-made apparatus. Of course, it all took time, and a good deal of it; and there wasn't any extra pay for it, either; but there are labors whose recompense is far more precious than dollars and cents.

And so I find enthusiasm also for outdoor science, among secondary pupils and among the great body of intelligent people of our cities; and if nature is so accessible, and pupils are so eager for its secrets, and we still worship books and ignore the visible objects and forces so freely at our disposal, there is no other conclusion to arrive at, except that the teacher himself is either too ignorant or too indolent to make proper use of them. It takes time; it needs enthusiasm; it needs a genuine love for the subject in hand, and a profound interest in and sympathy with the student.

The subjects in which field work may be made very useful are geography, geology, botany, and zoölogy, and the objects are, of course, apparent to all. First, it cultivates a familiarity with nature, which is wholesome and desirable. We are living in an artificial age. Children nowadays get too much pocket money; there is too much theater; too much smartness; too much flabbiness for the real business of life; too much blasé yawning; too many parties; too much attention to dress; the color of the necktie; the crease of the trowsers, or the make of a gown. The only meaning science has for many of the richer classes is the curved ball of the pitcher, the maneuvers of the quarterback, or the manly art of self-defense.

I know of nothing that will counteract the indifference of parents and lead the young mind back to a simpler and more humanizing condition of life than to make it familiar with old mother earth, the stream, the valley, the tree, the flower, and the bird.

Another object of field work is to develop habits of correct observation. Pupils ordinarily take too much for granted. They will swallow anything that is printed in a book, or that the teacher may choose to tell, always providing the pupil is sufficiently awake to perform the function. It is hadly an exaggeration that they would believe the moon was made of green cheese, providing the statement came with august solemnity from the teacher's chair. There is too hasty generalization and a prevailing unwillingness to careful examination. Careful field work opens the eye and corrects much of this slovenly mode of thinking, creates honest doubt, and questions an unsupported statement. The pupil wants to see the pollen on the bee before he believes in cross-fertilization; he wants to see rocks actually in layers before he will believe they could have been deposited in water, and he pounds up a fragment of sandstone to get at the original sand; he wants to see the actual castings before he will believe all that Darwin says about his wonderful earthworms; and few things escape the eye of the pupils who go out with the understanding that it is business and their duty to observe and take notes.

Another object of field study is to see life in its environment. Stuffed birds and animals in cases are all very good; shells look pretty behind nice glass doors, and herbaria play a very important part; yet, after all, how much better to see a thrush's flight; to hear the pewee's song; how much more satisfactory to watch a snail creep and feed; how much more delightful to study the blossoming hepatica; to note its various leaves, its soil, its surroundings, and discover why it blooms at the very opening of springtime.

More can be learned from a handful of pebbles on the beach than a whole book written upon the same subject.

Yet another object is to acquire specific information not contained in books. The feel of a leaf, the odor of the honeysuckle, or the pine, the cry of the kingfisher, the locomotion of a horse, and the locomotion of a cow, the formation of miniature gorges in a rain storm, and the wearing of a shore under the action of the waves, these and countless other manifestations can never be described in mere words.—*The School Journal.*

THE GOLDEN-WINGED WARBLER.

(*Helminthophila chrysoptera.*)

THIS member of the large family of warblers is considered rare, or only common in certain localities of its range, which is eastern United States in summer and Central America in winter. Its common names are blue golden-winged warbler, and golden-winged swamp warbler. It makes its appearance in May, when it may occasionally be seen about orchards. It soon retires into dense underbrush, however, and few persons who are not woodsmen ever get more than a glimpse of it. It breeds all through its range, but only casually north of Massachusetts. It builds its nest on or near the ground, in a plant tuft. It is made of grass, and is deep and bulky. The eggs are four or five, white, with reddish dots.

Ridgway says that June, 1885, he found these birds breeding along the southern edge of Calhoun Prairie. Richland county, Illinois, and Mr. H. K. Coale states that on May 11, 1884, in a wood on the Kankakee river, in Starke county, Indiana, he found the golden-winged warbler quite common. Eight were seen—all males, which were singing. Some were flushed from the ground and flew up to the nearest small tree, where they sat motionless next the trunk. The locality was a moist situation, overgrown with young trees and bushes.

PET ANIMALS AS CAUSES OF DISEASE.

PAPERS presented last summer at the French Congress for Tuberculosis at Paris demonstrate, says *The Medical News*, what has hitherto been very doubtful, that aviary and human tuberculosis are essentially the same pathologic process due to the same germ modified by a cultural environment, but convertible under favorable circumstances one into the other. An Englishman has found that more than ten per cent. of canaries and other song birds that die in captivity succumb to tuberculosis, and parrots have come in for a share of condemnation in this connection. By far the larger number of monkeys who die in captivity are carried off by tuberculosis, and while, fortunately, the keeping of monkeys as house pets is not very general, at the same time there is some danger of contagion. Nocard, the greatest living authority on tuberculosis in animals, and the man to whom we owe the best culture methods for the tubercle bacillus, found in a series of autopsies on dogs that out of two hundred successive autopsies on unselected dogs that died at the great veterinary school at Alfort, near Paris, in more than one-half the cases there were tubercular lesions, and in many of them the lesions were of such a character as to make them facile and plenteous disseminators of infective tuberculous materials.

Parrots are known to be susceptible to a disease peculiar to themselves, and a number of fatal cases in human beings of what was at first supposed to be malignant influenza, pneumonia was traced to the bacillus which is thought to be the cause of the parrot disease. Cats are sometimes known to have tuberculosis, and that they have in many cases been carriers of diphtheria and other ordinary infections is more than suspected. There is not at present any great need for a crusade on sanitary grounds against the keeping of pet animals, but they are multiplying more and more, and it does not seem unreasonable that greater care in the matter of determining the first signs of disease should be demanded of their owners, and then so guarding them as to prevent their being a source of contagion to human beings. Attention should be paid to this warning as regards children, as animals play more freely with them and the children are more apt to be infected.

FROM COL. CHI. ACAD. SCIENCES.
6-99

GOLDEN-WINGED WARBLER.
Life-size.

A FLY-CATCHING PLANT.

WILLIAM KERR HIGLEY.
Secretary of The Chicago Academy of Sciences.

Queen of the Marsh, imperial Drosera treads
Rush-fringed banks, and moss-embroidered beds.
—*Erasmus Darwin, in The Botanic Garden, 1789.*

SOME of the most interesting forms of nature are not the most showy and are not easily observed by the untrained eye. Many of their characteristics can only be known by carefully conducted investigations, both in the field and in the laboratory.

The advance of science has shown us that it is as natural for some plants to obtain much of their nourishment from the animal world, by a true process of feeding, as it is for animal forms to obtain their sustenance, either directly or indirectly, from the vegetable world.

There are many species among the lower orders of plants that are well known animal parasites, but there are also, among our more highly organized flowering species, forms that improvise a stomach and secrete an acid fluid for the digestion of nitrogenous food which is afterwards absorbed and used in tissue building. These are in no sense of the term parasites.

Such a plant is our common round-leaved sundew (*Drosera rotundifolia*, L.). The generic name Drosera is from the Greek, meaning dew.

This rather insignificant, but pretty little plant is distributed nearly throughout the world, and is usually found in bogs, or in wet sand near some body of water. The flower stalk is seldom more than six or eight inches in height and bears very small white or pinkish-white flowers.

The interesting feature of this species, however, lies in the rosette of about five or six leaves growing from the base of the stem. These leaves lie upon the ground and are usually about one-fourth to one-half of an inch in length, and are generally nearly orbicular in form. The upper side is covered with gland-bearing tentacles. The glands are covered by a transparent and viscid secretion which glitters in the sunlight, giving rise to the common name of the plant. There are usually over two hundred tentacles on each leaf and, when they are not irritated, they remain spread out. The viscid fluid of the glands serves as an organ of detention when an insect lights upon the leaf. The presence of an insect, or, in fact, any foreign matter, will cause the tentacles, to which it is adhering, to bend inward toward the center of the leaf and within a very short time all the tentacles will be closed over the captured insect, which is soon killed by the copious secretion filling its breathing apparatus.

Though these sensitive tentacles are not excited by either wind or rain they are by the repeated touchings of a needle, or any hard substance. It is said that a fragment of hair weighing but 1–78,740 of a grain will cause a perceptible movement.

By experiment it has been shown that a bit of hard-boiled egg, or a fragment of meat as well as an insect will cause not only an inflection of the tentacles but also of the edges of the leaves, thus forming an improvised stomach, the secretion of the glands then increasing and becoming acid. At this stage the secretion is not only capable of digesting but is also highly antiseptic.

This power of digesting and absorbing nitrogenous food is absolutely necessary to the existence of the sundew, for it usually grows in a poor soil and its few and not greatly elongated roots are of little service except to absorb water, of which it needs a large amount for the production of the copious secretion. Specimens may be developed by planting in moist cotton and furnishing with plenty of water.

The length of time that the tentacles will remain inflected depends on the vigor of the leaf and the solubility of the material causing the excitement.

The time varies from one to seven or eight days.

Easily dissolved and readily absorbed food in too large an amount seems to cause overexcitement and overtaxation, and frequently results in the death of the leaf.

The large number of insects, especially flies, captured by these plants would lead one to believe that they are attracted by the odor of the plant, or the purplish color of the tentacles, rather than by the desire to use the leaves as a resting-place.

The sundew belongs to the natural order *Droseraceæ*. This contains about one hundred and twenty-five species, of which one hundred and ten belong to the genus Drosera, and are chiefly natives of Australia, though the round-leaved species is common throughout the United States, Europe, and Asia.

Closely related to the sundew is the Venus fly-trap (*Dionæa muscipula*, Ellis). This is a native in the eastern part of North Carolina only.

The leaf of this plant is provided with two lobes, which close quickly when the sensitive hairs, which are situated on the upper surface of the leaf, are irritated by an insect. The acid secretion flows out and the leaves remain closed till digestion and absorption are completed.

Dr. Asa Gray has referred to this species as "that most expert of fly-catchers."

TREES AND ELOQUENCE.

W. E. WATT.

FORTY years in the pulpit of Plymouth Church in Brooklyn Henry Ward Beecher stood and poured forth a stream of eloquence which shook the world. During the stress of civil war he stemmed the current of English sentiment with his peculiar powers and brought about a change of feeling which was the salvation of our Union. This greatest of our pulpit orators was a lover of trees, and some of his finer passages were inspired by them.

Without doubt, better trees there might be than even the most noble and beautiful now. I suppose God has, in his thoughts, much better ones than he has ever planted on this globe. They are reserved for the glorious land. Beneath them may we walk!

To most people a grove is a grove, and all groves are alike. But no two groves are alike. There is as marked a difference between different forests as between different communities. A grove of pines without underbrush, carpeted with the fine-fingered russet leaves of the pine, and odorous of resinous gums, has scarcely a trace of likeness to a maple woods, either in the insects, the birds, the shrubs, the light and shade, or the sound of its leaves. If we lived in olden times, among young mythologies, we should say that pines held the imprisoned spirit of naiads and water-nymphs, and that their sounds were of the water for whose lucid depths they always sighed. At any rate, the first pines must have grown on the seashore, and learned their first accents from the surf and the waves; and all their posterity have inherited the sound, and borne it inland to the mountains.

I like best a forest of mingled trees, ash, maple, oak, beech, hickory, and evergreens, with birches growing along the edges of the brook that carries itself through the roots and stones, toward the willows that grow in yonder meadow. It should be deep and sombre in some directions, running off into shadowy recesses and coverts beyond all footsteps. In such a wood there is endless variety. It will breathe as many voices to your fancy as might be brought from any organ beneath the pressure of some Handel's hands. By the way, Handel and Beethoven always remind me of forests. So do some poets, whose numbers are as various as the infinity of vegetation, fine as the

choicest cut leaves, strong and rugged in places as the unbarked trunk and gnarled roots at the ground's surface. Is there any other place, except the seaside, where hours are so short and moments so swift as in the forest? Where else except in the rare communion of those friends much loved, do we awake from pleasure, whose calm flow is without a ripple, into surprise that whole hours are gone which we thought but just begun—blossomed and dropped, which we thought but just budding?

Thus do you stand, noble elms! Lifted up so high are your topmost boughs that no indolent birds care to seek you, and only those of nimble wings, and they with unwonted beat, that love exertion and aspire to sing where none sing higher. Aspiration! so heaven gives it pure as flames to the noble bosom. But debased with passion and selfishness it comes to be only Ambition!

It was in the presence of this pasture-elm, which we name the Queen, that we first felt to our very marrow that we had indeed become owners of the soil! It was with a feeling of awe that we looked up into its face, and when I whispered to myself, "This is mine," there was a shrinking as if there were sacrilege in the very thought of *property* in such a creature of God as this cathedral-topped tree! Does a man bare his head in some old church? So did I, standing in the shadow of this regal tree, and looking up into that completed glory, at which three hundred years have been at work with noiseless fingers! What was I in its presence but a grasshopper? My heart said, "I may not call thee property, and that property mine! Thou belongest to the air. Thou art the child of summer. Thou art the mighty temple where birds praise God. Thou belongest to no man's hand, but to all men's eyes that do love beauty, and that have learned through beauty to behold God! Stand, then, in thine own beauty and grandeur! I shall be a lover and a protector, to keep drought from thy roots, and the axe from thy trunk."

For, remorseless men there are crawling yet upon the face of the earth, smitten blind and inwardly dead, whose only thought of a tree of ages is, that it is food for the axe and the saw! These are the wretches of whom the scripture speaks: "A man was famous according as he had lifted up axes upon the thick trees."

Thus famous, or rather infamous, was the last owner but one, before me, of this farm. Upon the crown of the hill, just where an artist would have planted them, had he wished to have them exactly in the right place, grew some two hundred stalwart and ancient maples, beeches, ashes and oaks, a narrow belt-like forest, forming a screen from the northern and western winds in winter, and a harp of endless music for the summer. The wretched owner of this farm, tempted of the devil, cut down the whole blessed band and brotherhood of trees, that he might fill his pocket with two pitiful dollars a cord for the wood! Well, his pocket was the best part of him. The iron furnaces have devoured my grove, and their huge stumps that stood like gravestones have been cleared away, that a grove may be planted in the same spot, for the next hundred years to nourish into the stature and glory of that which is gone.

In many other places I find the memorials of many noble trees slain; here a hemlock that carried up its eternal green a hundred feet into the winter air; there, a huge double-trunked chestnut, dear old grandfather of hundreds of children that have for generations clubbed its boughs, or shook its nut-laden top, and laughed and shouted as bushels of chestnuts rattled down. Now, the tree exists only in the form of loop-holed posts and weather-browned rails. I do hope the fellow got a sliver in his fingers every time he touched the hemlock plank, or let down the bars made of those chestnut rails!

BATS IN BURMESE CAVES.

INTERESTING caves exist at Hpagat, twenty-six miles up the Salween, from Moulmein. They are hollowed out in the base of an isolated limestone hill about 250 feet high, rising precipitously from the river. Capt. A. R. S. Anderson, the surgeon-naturalist, gives an interesting account of these caves in an Indian government report which is abstracted by "Natural Science." The entrance is about twelve feet high and is much ornamented by Buddhistic sculptures. As the sun was setting the party took their stand on the sand-spit facing the entrance of the caves and soon saw a pair of falcons leave their perch on the trees and fly to and fro over the river. They were speedily joined by other birds, including common kites and jungle crows, and the entire flock, to the number of sixty or a hundred, flew to the entrance of the caves, close to which they remained wheeling about in midair. A few minutes later the bats began to issue in ones and twos, and were soon pursued by the birds of prey, but appeared to have no great difficulty in eluding capture by their rapid and jerky flight, and their pursuers made no very determined or long-sustained efforts to capture them, but soon returned to their vigil over the cave. A minute or two passed and a sudden rush of wings was heard, and the bats were seen to emerge from the cave in a dense stream which slowly became more and more packed, and continued of about the same density for some ten minutes and then gradually thinned away, until, at the end of twenty minutes, the last had emerged. The stream of bats when at its maximum was ten feet square, and so dense as to closely resemble smoke pouring from a chimney in a gale of wind. This resemblance was increased by the slightly sinuous course pursued by the bats as they flew off into the afterglow. They were so densely crowded that they frequently upset each other and fell, helplessly into the river below, where they succeeded in reaching the bank only to fall a prey to the expectant crow. When the great rush occurred the falcons, kites, and crows entered the stream of bats and, flying along with it and in it, seized as many bats as they required for food. Capt. Anderson, by throwing his walking-stick into the stream of bats, obtained six specimens. During the last twenty years the bats appear to have considerably diminished in numbers, owing to the depredations of their bird enemies and to their constant disturbance by collectors of bat manure.

A METAL BIRD'S NEST.

IN THE Museum of Natural History at Soleure, in Switzerland, there is said to be a bird's nest made entirely of steel. There are a number of clockmaking shops at Soleure, and in the yards of these shops there are often found lying disused or broken springs of clocks. One day a clockmaker noticed in a tree in his yard a bird's nest of peculiar appearance. Examining it he found that a pair of wagtails had built a nest entirely of clock springs. It was more than four inches across and perfectly comfortable for the birds. After the feathered architects had reared their brood, the nest was taken to the museum, where it is preserved as a striking illustration of the skill of birds in turning their surroundings to advantage in building their nests.

FROM COL. CHI. ACAD. SCIENCES.

6-99

MOURNING WARBLER.
Life-size.

THE MOURNING WARBLER.

(*Geothlypis philadelphia.*)

BASKETT, in his valuable "Story of the Birds," says that the warbler forms feed variously, but they use little vegetable matter. Some have ground-haunting, and even swamp-haunting habits; others have fringed tongues hinting of juices and nectars, while tree-trunk exploring, as in creepers, nuthatches, titmice, etc., also prevails. They have been described as at once the most fascinating and the most exasperating of birds. In the spring they come with a rush and although the woods may be full of them, only a faint lisp from the tree tops gives note of their presence, and unless you are a very good observer you will not know they are about at all. If you listen to other birds, instead of resolutely devoting yourself to warblers, you will lose the opportunity of the sight of a diminutive bird disappearing in a tree top. Some of the warblers dash about among the leaves on the ground hunting for gnats, others hunt over the branches of the trees, though some of them hop gaily on the ground, while others walk sedately, bobbing their heads or tilting their tails. The majority of the tribe fly northward to nest in pine forests. A few, however, remain and build in our parks, gardens and shrubbery. They are all insect-eaters, destroying ants, flies, caterpillars, larvæ, plant lice, canker-worms, and May flies. They are therefore of great value in the protection of vegetation.

The mourning warbler, whose common name is black-throated ground warbler, has its habitat in eastern North America, breeding from northern United States northward; more rare in the Atlantic states. It winters in south-eastern Mexico, and Costa Rica, and thence south to Colombia. During the spring migration this bird is very common. Early in May, 1881, they were found in abundance near wheat lands in Indiana, most of them being observed about brush piles in a clearing, and along fences in the immediate vicinity. In the early part of June, 1871, a pair were seen in a thicket along the border of Fox Prairie, in Richland Co., Illinois, and it was presumed at the time that they were breeding there, but they may have been merely late migrants. It is known to breed in mountainous portions of Pennsylvania, New England, New York, Michigan, Minnesota, and eastern Nebraska, northward. It has been found nesting in Illinois south of latitude 39. Its nest is built on or near the ground in woods. One discovered by Burroughs in the state of New York was built in ferns about a foot from the ground, on the edge of a hemlock wood. It contained three eggs. The nests are usually composed of fine strips of bark and other fibrous material, lined with fine hair. The eggs are white, with a sprinkling of reddish dots near the larger ends.

The feeling that all life is one life slumbers in the child's soul. Only very gradually, however, can this slumbering feeling be transfigured into a waking consciousness. Slowly, through a sympathetic study of nature and of human life, through a growing sense of the soul and meaning of all natural facts and of all human relationships, and through recreating in various forms that external world which is but the objective expression of his own inmost being, the individual attains to a consciousness and unity of life and to a vision of the Eternal Fountain of Life. —*The Nest.*

THE RAVEN AND THE DOVE.

ELANORA KINSLEY MARBLE.

"YEA, master," croaked the raven, "I understand," and spreading his sable wings over the waste of waters he flew, anxious, as was Noah, for a sight of dry land.

The day passed, evening fell, and the raven had not returned.

"An ill-omened bird," gloomily said Shem, "so black and uncanny looking. His croak, even, hath to mine ear an evil sound."

"What thou sayest is true, brother," returned Ham. "Verily the raven hath a wicked look. A bird of more cheerful aspect, it seemeth to me, might well have been chosen. The albatross, so majestic, with powers of flight excelling all other creatures of the air; the eagle, or better still the stormy petrel, so light of body, its webbed feet enabling it, with expanding wing, to rest at will upon the face of the waters."

"Coo-o-o," came a low, plaintive call from a far corner. "Coo-o-o."

"Ah, my turtle dove," responded Japheth, "so loving, so true! Had the choice of a messenger been left to me, my brothers, verily would I have chosen the dove. Naught but death would have kept it, believe me, from its mate and us."

Noah turned from the window and gazed sternly upon his three sons.

"What signifieth the complexion of bird, beast, or man," he demanded gravely, "when one standeth in need of courage, intelligence, strength? Among all the winged creatures of the air within the ark, canst thou name one with instinct more subtle than the raven's? Black and uncanny looking, forsooth! Witness his speech, I tell thee," decisively, "the bird hath understanding."

As Noah ceased speaking, there came a low, faint tapping at the window. With a glad countenance he hastened to open it, and in flew the raven, quite exhausted.

"Water, water, everywhere," croaked the bird, and after wearily eating the food Noah gave him, tucked his head beneath his wing and was soon fast asleep.

Upon the morning of the next day, Noah again sent the raven forth, also the next, and the next.

"Water, water, everywhere," croaked the raven, as before, upon his return, and after wearily eating of the food which Noah gave him, tucked his head beneath his wing and was soon fast asleep.

"Verily," sneered Ham, who with his brothers had grown very impatient, "the sable-plumaged bird which thou dost insist upon sending forth daily, knoweth naught, to my mind, but the words which he so glibly speaketh. Surely he hath heard them uttered an hundred times."

Noah reflected. "What thou sayest, my son, may be true," he responded, "for of a surety when gazing from the window these many, many months, those words of our speech have been the daily burden. To-morrow, then," his gaze fixed upon the stormy petrel, "we will send forth——"

"Coo-o-o" came a plaintive call from the corner. "Coo-o-o."

"The dove," finished Noah, thoughtfully, "for verily it doth seem to answer me. Though devoid of speech, its affectionate nature may yet prompt it to devise some way by which its message may be interpreted."

And so upon the morning of the next day Noah opened the window of the ark and, the dove, poising upon his finger, spread her beautiful wings and over the waste of waters took her joyful flight.

The day passed, evening fell, and the dove had not returned.

A dark frown was settling upon the brow of Ham, when a faint tapping was heard at the window.

"Water, water, everywhere," croaked the raven, maliciously, as Noah hastened to open it and draw the exhausted bird within. "Water, water, everywhere."

"Verily, oh, raven!" despondently said Noah, "it doth appear that the dove, not more than thou, didst find a place for the sole of her foot. I will wait yet another seven days," he added thoughtfully, "ere I send her forth again."

And Noah waited seven days, and on the morning of the eighth he sent the dove forth again in quest of dry land.

The day passed, but ere evening fell the bird returned, bearing in her bill, as a token that the waters had abated, a freshly-plucked olive leaf.

"Thou art God's own messenger," joyfully said Noah, tenderly caressing the dove. "Verily something more than instinct guided and prompted thee in thy flight this day."

And Noah waited yet another seven days ere he again sent forth the dove.

This time, to the ark, the dove returned no more.

"Coo-o-o," more plaintively than usual, called her mate the next morning. "Co-o-o-o."

"He mourns for his lost love," pityingly said Japheth, the youngest son. "Verily, something hath befallen the bird!"

"Nay," responded Noah, "liberty is sweet. After long captivity in a dark, close house-boat, freedom might well try the fidelity of e'en a turtle dove. She awaits his coming, perchance, in the nearest pine or willow tree. Open then the window and let him forth."

And Japheth did as his father commanded, but sorrowfully, for it chanced that in close companionship, lo, these many days, with these innocent children of nature, Japheth had come to acquire a tender love and care for both beast and bird.

"Go, thou mourning dove," he said, unconsciously bestowing a fitting name upon the gentle bird. "Go!" And, spreading his beautiful wings, off the dove joyfully flew, following with unerring instinct the path in the air yesterday taken by his mate.

And yet a few days and Noah removed the covering from the ark and looked, and behold, the face of the ground was dry.

THE MAYFLOWERS.

(The trailing arbutus, or Mayflower, grows abundantly in the vicinity of Plymouth, and was the first flower that greeted the Pilgrims after their fearful winter.)

Sad Mayflower! watched by winter stars
And nursed by winter gales,
With petals of the sleeted spars
And leaves of frozen sails!

What had she in those dreary hours,
Within her ice-rimmed bay,
In common with the wild-wood flowers,
The first sweet smiles of May?

Yet, "God be praised!" the Pilgrim said,
Who saw the blossoms peer
Above the brown leaves, dry and dead,
"Behold our Mayflower here!"

"God wills it: here our rest shall be,
Our years of wandering o'er,
For us the Mayflower of the sea
Shall spread her sails no more."

O sacred flowers of faith and hope,
As sweetly now as then
Ye bloom on many a birchen slope,
In many a pine-dark glen.

Behind the sea-wall's rugged length,
Unchanged, your leaves unfold,
Like love behind the manly strength
Of the brave hearts of old.

So live the fathers in their sons,
Their sturdy faith be ours,
And ours the love that overruns
Its rocky strength with flowers.

The Pilgrim's wild and wintry day
Its shadows round us draws;
The Mayflower of his stormy bay,
Our Freedom's struggling cause.

But warmer suns ere long shall bring
To life the frozen sod;
And through dead leaves of hope shall spring
Afresh the flowers of God!

—*Whittier.*

THE CHESTNUT-SIDED WARBLER.

(*Dendroica pennsylvanica.*)

LYNDS JONES.

FOR one reason or another we come to think of this or that bird as an exquisite. This may be due to color pattern, form, carriage or song, but whatever it be, the bird's presence adds color and beauty to all our surroundings. It is not easy to tell why the chestnut-sided warbler impresses me as an exquisite. His colors are not so bright, nor their pattern in either the contrast or harmony that may be found with other warblers, but there seems to be something about the bird that makes the day brighter, the wearing field-work easier, and hours of fasting forgotten when he flits into view. I have sometimes half suspected that he was more than half conscious of my admiration from the manner in which he displayed his pretty colors and trim form. But no doubt this is base slander. The slightly opened wings, spread tail, and quick movements give an alertness to the little fellow which adds to his otherwise bright appearance. The females and fall birds lack the distinct contrasts of color found in the male in his spring dress, but they usually have some trace of the chestnut on the side of the body, which, with the small size, will serve to distinguish them from all others.

The tree-tops seem to possess few attractions for this warbler, but in village parks he may often be found well up among the branches gleaning from the buds and new leaves for insects and their eggs. In the woods he gleans much nearer the ground, but I have never seen him upon the ground searching among the fallen leaves. Many times he may be found among the low underbrush, preferably not at the edge of the woods, but usually a few rods in. He seems rather partial to damp woods, but may often be found among the uplands as well, where insect life is abundant.

The song is uttered while feeding, the bird seldom arresting his search for food, but turning his head this way and that scanning each leaf and stem. It is often a less spirited song than that of many other warblers, seeming to be a sort of soliloquizing accompaniment to the pressing duties of sustaining life, but it is none the less a pleasing song. There is a somewhat close resemblance to some phrases of the yellow warbler's song in the rendering of the chestnut-side, but a little attention and a discriminating ear will readily distinguish the difference both in quality and in quantity. The song is more often heard on the college campus here than in the woods, and there it sounds something like this: "*Wee-chee wee-chee wee-chee-e-e-e*," with the accent on the first syllable of each phrase. This, in common with other warbler songs, cannot be well represented by a whistle, but rather by hissing or whispering the syllables between the closed teeth. The pitch is too high for my whistle. In the woods a common form of the song is, "*te te te te wee chu;*" and occasionally, "*to wee to wee to wee tee e-e-e.*" In the woods the song seems to be far more spirited than in the village, as well as being different. This difference may be rather due to the fact that the first migrants are those that visit the village, while the later ones are found in the woods. It is well known that with many of the warblers the first singers, or at least the first songs heard, are often different from the later ones.

In the vicinity of Oberlin, Ohio, this little warbler makes his appearance about the fifth of May and does not leave for the north until the last week of May. It can not be called common at any time, some years not being seen at all, but may usually be found in the shrubbery fringing woods, or in the shade trees in the village. None have been found during the summer months, and it is doubtful if any remain to nest. The winter is spent in the Bahamas and Mexico, and from there southward. The species ranges north to Manitoba, Ontario, and Newfoundland, and west

FROM COL. F. M. WOODRUFF.
6-99

CHESTNUT-SIDED WARBLER.
Life-size.

to the plains, being a bird of eastern North America. It breeds from New Jersey and Illinois northward. I once found it breeding in central Iowa.

The nest resembles that of the yellow warbler, both in situation and composition. It is usually placed in the fork of a bush or shrub from two to eight or nine feet from the ground, made of the fibrous bark of the milk-weed, or some other hempen material, grass and sometimes leaves, lined with some sort of plant down and long hairs. The bark fibers are wound about the bush twigs, securely lashing the nest into the crotch. The four or five eggs are of a creamy-white color, with a wreath of reddish and dark brown spots and dots around the larger end, the spots becoming smaller and less numerous both ways from this wreath. They average about .66 x .50 of an inch.

In the fall they are among the first warblers to appear, often being seen early in August, and continuing in the region for several weeks. At this time of year their bright colors are wanting, but they are the same birds for all that, and may be readily recognized by their trim form and animated carriage.

NATURE STUDY—HOW A NATURALIST IS TRAINED.

SOME VIEWS OF JOHN BURROUGHS.

THE knowledge of nature that comes easy, that comes through familiarity with her, as through fishing, hunting, nutting, walking, farming—that is the kind that reaches and affects the character and becomes a grown part of us. We absorb this as we absorb the air, and it gets into our blood. Fresh, vital knowledge is one thing; the desiccated fact is another. Do we know the wild flower when we have analyzed it and pressed it, or made a drawing of it? Of course this is one kind of knowledge and is suited to certain minds; but if we cannot supplement it with the other kind, the knowledge that comes through the heart and the emotions, we are poor indeed.

I recently had a letter from the principal of a New England high school putting some questions to me touching these very matters: Do children love nature? How shall we instil this love into them? How and when did I myself acquire my love for her? etc. In reply I said: The child, in my opinion, does not consciously love nature; it is curious about things; about everything; its instincts lead it forth into the fields and woods; it browses around; it gathers flowers; they are pretty; it stores up impressions. Boys go forth into nature more as savages; they are predaceous, seeking whom they may devour; they gather roots, nuts, wild fruit, berries, eggs, etc. At least this was my case. I hunted, I fished, I browsed, I wandered with a vague longing in the woods, I trapped, I went cooning at night, I made ponds in the little streams, I boiled sap in the maple-woods in spring, I went to sleep under the trees in summer, I caught birds on their nests, I watched for the little frogs in the marshes, etc. One keen pleasure which I remember was to take off my shoes and stockings when the roads got dry in late April or early May, and run up and down the road until I was tired, usually in the warm twilight. I was not conscious of any love for nature, as such, till my mind was brought in contact with literature. Then I discovered that I, too, loved nature, and had a whole world of impressions stored up in my subconscious self upon which to draw. I found I knew about the birds, the animals, the seasons, the trees, the flowers, and that these things have become almost a grown part of me. I have been drawing upon the reservoir of youthful impressions ever since.

If nature is to be a resource in a man's life, one's relation to her must not be too exact and formal, but more that of a lover and friend. I should not try directly to teach young people to love nature so much as I should aim to bring nature and them together, and let an understanding and intimacy spring up between them.—*The Outlook.*

JOHN'S HAWK.

EMMA YARNALL ROSS.

JOHN came home one evening from a ramble in the country with a peach-box under his arm. He set the box very carefully on the back porch and then sat down himself on the top of the box.

His mother was watering some geraniums in a bed near by and paused in her work to look at the lad.

"Where did you get those peaches, John?" she asked, coming toward him with a pleasant smile.

John gave a low laugh. "This is a peach *box*, mother," he said, "but if what is in it is a *peach*, it belongs to a new variety, I think. Look at him, he is a beauty!"

"John Bonham, I hope you have not brought another pet to this house! Where in the world are we to stow away all these creatures on one little town lot? There is your groundhog, your owl, the crow, the coot, the tub of fish, the big dog, the little dog, and three Christopher Columbus cats."

"Now, mother, please stop; poor Chuck stays most of the time in his hole under the corner of the house, and the owl keeps the mice out of the cellar, and Jim Crow has not stolen anything for a month except that half dollar and your piece of lace and sister's red ribbon. You said I might have the wash boiler to make a swimming-pool for the coot, and I am going to feed the fish to him, so they will soon be gone and you can have your tub again. I heard you tell Mrs. Bland that our dogs guarded the whole neighborhood from burglars, and my Christopher Columbus cats are cute enough for anyone to be glad to have them. Mrs. Goodall says she 'wants one of them real bad.' You see, mother," said John, persuasively, "this fellow was such a beauty I just had to bring him home. Jake Timmons shot him through the wing as he was carrying off a dove; he was going to wring the hawk's head off, but I told him I would give him ten cents for it, for I wanted to try an experiment with the bird. I know I can tame him and make a pet of him; see, he can move around even if his wing is broken."

John's mother looked through the bars of the peach crate and saw a full-grown hawk with a beautiful brown head, eyes with blood-red rims, a strong, hooked beak, and long talons which he struck angrily into the stick John thrust at him through the bars.

"I never saw a more fierce, cruel-looking bird," she said. "See him tear at that stick! He will be tearing you next."

"I shall give him no chance to tear me, mother, for I intend to tame him."

"You might as well try to tame a tiger."

"Well, I am going to try taming him," said John, in a low, determined tone. When his mother heard him speak in that way she knew his mind was made up to succeed, and he had never yet failed in taming any of his pets.

John put the hawk in his dog-house, the front of which was formed of strong iron bars, and the next day his mother saw him sitting before this improvised bird-cage, going through some fantastic motions with his hands and gently chirping to the bird. No accident happened to the young naturalist in his care of the hawk, and gradually his mother ceased to think of it.

One afternoon, about three weeks after this, the family were seated on the piazza when they were startled at seeing John come around the corner of the house bearing the hawk on his wrist. Over the bird's head was drawn a gay-colored hood adorned with tiny bells and tassels—John had read how hawks were dressed in medieval times, and had made the hood himself. A long string was tied to one of the hawk's legs, and, setting the bird down gently, the boy tied the string to a small tree. All were watching him to see what he would do next, and all kept silence as he lifted a warning hand and

uttered a low "H-u-s-h!" He then removed the hood from the bird's head, when it immediately began tearing at the string, snapping viciously at objects near it, and running to and fro in an excited and angry manner.

John seated himself on the ground before the bird and began clucking to it softly, with the index finger of his right hand extended and pointing straight at the bird's eyes; then he turned quietly in whichever direction the bird moved, slowly waving his hand round and round in a circle and never taking his eyes off the bird's eyes.

Gradually the hawk ceased to run about, then stood still gazing steadily, as though fascinated, at John's finger. It would shut its eyes slowly, then open them suddenly, only to shut them again more slowly than before. At first the bird stood perfectly erect; then its head began gradually falling over on its shoulder, and, without any warning, it tumbled backwards, its eyes shut, its legs sticking straight up in the air, its body perfectly rigid. John continued for a time to wave his hand in a circle with the index finger extended; then he walked over to the porch leaving the hawk on the ground, where he lay for nearly thirty minutes, when he gradually returned to consciousness.

A number of persons walking by had stopped in the street to look at John and the bird, and now exclamations of surprise were heard as they saw the actions of the hawk.

"What did you do to that bird?" asked a gentleman of John; "I never in my life witnessed so strange a performance."

"I call that hypnotism," said the lad. "I have been working with him every day since I brought him home, and for a week I have never failed to bring him under my influence and put him to sleep in this way. If I go to the cage to feed him, he flies at me in a great rage at first, but if I pass my finger in a circle before him several times he becomes quiet, and will take a mouse from my hand without biting or tearing me with his talons. Sometimes I partly hypnotize him and lay the mouse at his feet, and although he may be very hungry he will not touch the food until I let him out from under the influence of my finger. When he is over being hypnotized he is as fierce as he was when I brought him home, and I do not believe he can ever be made tame like other birds. Perhaps if I had captured him when he was young, with the down still on him, I could have tamed him, but now he is too old and fierce."

"Well, my lad," said one of the men, laughing, "if he is not tamed you have him pretty well under your thumb and finger at least."

John's wonderful hypnotic influence over the hawk was soon known throughout the town and crowds of people often gathered to see him go through this truly wonderful feat of hypnotizing the fierce hawk.

The hawk belongs to the family of the *Falconidæ*, which is so called from the Latin word *falcis*, meaning a scythe, the talons of the *Falconidæ* being curved in the form of a scythe, thus giving the name to the species.

The wings of the hawk are so short they do not extend to the tip of the tail, for which reason it is called an ignoble bird of prey, to distinguish it from the true falcon, the wings of which extend to the tip of the tail and which is called a noble bird of prey. The hawk's bill is short, curved from the base, often terminating in a sharp point called a tooth. They have rather short, exceedingly strong legs and long incurved talons with which they tear their prey.

The species are numerous and widely distributed over the world; the goshawk and the sparrowhawk are the best known and most important. The hawk is a diurnal bird of prey, which means that it hunts in the day time. It flies with exceeding swiftness, having been known to travel a distance of 1,350 miles in twenty-four hours.

The hawk has very acute vision; hence the expression, "Keen-eyed as a hawk." It soars to a great height, always endeavoring to get above the bird it is pursuing in order to swoop down upon it from above. It soars in a series of arcs and against the wind, which helps it to rise as it does a kite.

The hawk does not attack its prey with its beak, as is generally supposed, but with its talons. After securing its prey by swooping on it and fastening its claws in its victim it gently descends to the ground.

The young hawk yet in the nest is called an eyas, one that can hop is a brancher, and a young hawk able to catch game is called a soar hawk. Young hawks taken in flying are called passage hawks, and the training of these is called reclaiming.

Hawking was for many years a sport followed by kings and the nobility in Europe. It is of very ancient origin, having been followed in Asia and Europe before the time of the Christian era.

The hawk builds its nest in the forks of a tree or on some inaccessible cliff. The female is larger than the male and lays two or three eggs.

CURIOUS TREES.

1. In Malabar, a tree called "the tallow tree" grows; from the seeds of it, when boiled, is procured a firm tallow which makes excellent candles.

2. The "butter tree" was discovered by Park in the central part of Africa; from its kernel is produced a nice butter which will keep a year.

3. The *palo de vaca*, or "cow tree," grows on rocks in Venezuela, South America. It has dry and leathery leaves, and from incisions made in its trunk a kind of milk oozes out, which is tolerably thick and of an agreeable balmy smell. At sunrise, the natives may be seen hastening from all quarters furnished with large bowls to receive the milk.

4. A tree of Madagascar, called the "traveler's tree," yields a copious supply of fresh water from its leaves, very grateful to the traveler. It grows in the most arid countries, and is another proof of the tender care of our Heavenly Father in supplying all His creatures' wants. Even in the driest weather a quart of water can be obtained by piercing a hole at the bottom of the leaf stalk, and the liquid is pure and pleasant to the taste. The leaves are of enormous size, varying from ten to fifteen feet in length.

5. The date tree is a species of palm, and almost every part of it is valuable. Its fruit is delicious and it is also esteemed for the palm wine drawn from its trunk. Its leaves are made into hats, baskets, fans, and many other articles, and the fibres of the leaf stems are made into cord and twine. A department store might almost be furnished from this tree.

6. The "sorrowful tree" is found on the island of Goa, near Bombay. It is so called because it flourishes in the night. At sunset no flowers are to be seen, but soon after it is covered with them. They close up or drop off as the sun rises. It has a fragrant odor, and blossoms at night the year round.

7. There is a tree in Jamaica called the "life tree," whose leaves grow even when severed from the plant. It is impossible to kill it save by fire.—*Normal Instructor.*

BLACK-THROATED BLUE WARBLER.

THE BLACK-THROATED BLUE WARBLER.

(*Dendroica cærulescens.*)

LYNDS JONES.

THE bird-lover has many red-letter days in his calendar, particularly when the birds are moving northward. The earliest arrivals, while snow still covers the ground, give their own peculiar thrill of delight, and waken in him new energy and great anticipations for the coming season of bird study. But these early arrivals soon become a part of the landscape and cease to lend any peculiar delight. Not so with the host of warblers, for they are here one day and may be up and away the next, not to be seen again for two or three months or even a year. One must be on the alert during warbler time if he expects to catch a glimpse of the passing host. But there are distinctively "warbler days" during this warbler time. These vary in different years with the weather and the advance of vegetation, from late April to the second or even third week of May, in northern Ohio and central Iowa, and proportionately later or earlier north or south of that latitude.

The subject of our sketch is not among the early migrating warblers nor yet among the later ones. He usually travels with the second large flight, and may then be expected late in April or early in May. The earliest Oberlin, Ohio, record falls on April 27, 1896, and the latest on May 10, 1897. Whether the birds arrive early or late they usually remain in the vicinity two weeks, the males being present during the first week and the females during the second. I have never found the two sexes present on the same date. The species cannot be said to be common even during the height of the spring migration, nor yet are they rare. Few are seen during the fall migration at Oberlin, and they during the last week of September and the first week of October. Further west in the Mississippi valley the fall migrants seem greatly to outnumber those of spring.

This is not a tree-top inhabiting species, but seems to prefer the middle branches of the trees or the tops of shrubbery, often descending to the ground and gleaning there much after the fashion of the Maryland Yellow-throat. In the higher woods free from underbrush he seems to prefer ground gleaning, but where low underbrush affords a place for low gleaning he is seldom seen on the ground. In village parks he is fond of a much higher perch, and must be looked for there well up in the trees, even to the top-most branches, where he gleans among the bursting buds and new leaves. On the Oberlin College campus he is a regular spring visitor in early May, and here seems to appreciate his environment and rare opportunities, for he sings his best to the accompaniment of the medley of pianos in the Conservatory of Music across the way, and the deeper tones of the great pipe organ in the chapel hard by. Here I have heard him singing at all hours of the day, while in the woods his song is less often given. One is at a loss to assign a reason for the decided preference for the college campus, which is in the center of the village activities. Rumbling wagons and tramping feet cause the birds not the slightest alarm, but swiftly moving bicycles act upon the birds' nervous system much as upon that of an elderly woman.

The song of this warbler is variously rendered by the various writers upon bird songs. None of these renderings seems to describe the song as I hear it on the college campus. It is singing as I write: "*Tu euu euu e-e-e-e-e!*" A variation sounds, "*C'weu, c'weu, c'wee-e-e-e;*" sometimes "*c'weu, c'weu, c'w', c'w', c'wee-ee-e-e-e.*" There is also often a single phrase which sounds more like a scolding note than a song. It is: "*Tw', tw', tw', tw', twee'e-e-e-e-e,*" or even "*Z-z-e-e-e-e,*" rarely it may sound simply "*Z-z-z-z-z-z.*" The song

is uttered in a spirited manner while the bird is feeding and flitting about in the foliage, it interfering with the feeding only as a sort of after-thought, causing a momentary pause as the bird raises his head and straightens his body for the effort. It is one of the warbler songs that are easily recognized and not readily forgotten.

Were it not for the white spot or patch on the wing of both male and female at all seasons of the year and in all plumages, this warbler would easily escape the notice of all but the alert ornithologist. His black throat and breast, white belly and blue back and wings and tail are not conspicuous in the trees and foliage.

The black-throated blue warbler spends the winter months in Guatemala and the West Indies, and migrates north to Labrador and Hudson's Bay, nesting there and in the northern parts of the United States. It ranges west to the border of the plains.

The nest is placed in low shrubs or bushes from a few inches to two feet above the ground, and is composed of dry fibrous bark, twigs, and roots, lined with black rootlets and hair. The outside is often more or less covered with cocoons. The thick swampy woods with an undergrowth seems to be the favorite resort for the nesting birds. The four eggs are buffy-white to greenish-white, rather heavily blotched with varying shades of brown. They average about .69 x .50 of an inch.

THE EMPEROR'S BIRD'S NEST.

Once the Emperor Charles of Spain,
With his swarthy, grave commanders—
I forget in what campaign—
Long besieged, in mud and rain,
Some old frontier town of Flanders.

Up and down the dreary camp,
In great boots of Spanish leather,
Striding with a measured tramp,
These Hidalgos, dull and damp,
Cursed the Frenchmen, cursed the weather.

Thus, as to and fro they went,
Over upland and through hollow,
Giving their impatience vent,
Perched upon the Emperor's tent,
In her nest, they spied a swallow.

Yes, it was a swallow's nest,
Built of clay and hair of horses,
Mane or tail, or dragoon's crest,
Found on hedge-rows east and west,
After skirmish of the forces.

Then an old Hidalgo said,
As he twirled his gray mustachio,
"Sure this swallow overhead
Thinks the Emperor's tent a shed,
And the Emperor but a *macho!*"

Hearing his imperial name
Coupled with those words of malice,
Half in anger, half in shame,
Forth the great campaigner came
Slowly from his canvas palace.

"Let no hand the bird molest,"
Said he solemnly, "nor hurt her!"
Adding then, by way of jest,
"Golondrina is my guest,
'Tis the wife of some deserter!"

Swift as bowstring speeds a shaft,
Through the camp was spread the rumor,
And the soldiers as they quaffed
Flemish beer at dinner, laughed
At the Emperor's pleasant humor.

So unharmed and unafraid,
Sat the swallow still and brooded,
Till the constant cannonade
Through the walls a breach had made
And the siege was thus concluded.

Then the army, elsewhere bent,
Struck its tents as if disbanding,
Only not the Emperor's tent,
For he ordered, ere he went,
Very curtly, "Leave it standing!"

So it stood there all alone,
Loosely flapping, torn and tattered,
Till the brood was fledged and flown,
Singing o'er those walls of stone
Which the cannon-shot had shattered.

—*Longfellow.*

BIRDS AND ALL NATURE.

ILLUSTRATED BY COLOR PHOTOGRAPHY.

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THE POINTER.

(*Canis familiaris—Sagax aviculavius.*)

THERE is a wide difference of opinion among naturalists as to the stock from which our dogs of the present day came. Hallock says that some have it the wolf, others the jackal or fox, while not a few claim that the wild dog of India is the source from which sprang all the varieties. He maintains, however, that it cannot be declared with any degree of certainty what the parent stock was. Certain it is that to no one animal can the paternity of these useful races be credited, as they are so widely different in form, color, and characteristics, and man could never have developed and brought together such vast differences, opposite natures and shapes, as can be seen in domestic dogs, unless the original species were in possession of the rudiments. Neither could food, climate, nor any contrivance whatever so completely alter the nature, decrease the powers of scent, render the coat short, long, or curly, lengthen or shorten the limbs, unless separate types had furnished the material.

Ancient bas-relief and monumental delineations picture the dog as distinct in its characteristics thousands of years ago as at the present day, and fossil remains have been repeatedly discovered so little resembling either the wolf, jackal, or fox, and so different in type, as to be classified with the spaniel, terrier, hound, bulldog, pointer, and pug; and as we know these to be made dogs, or in other words hybrids, the species must have been fully as numerous as at the present time.

There are numerous species of wild dogs differing from one another almost as much as our own domestic animals of to-day. Granting that the spaniel, greyhound, and terrier sprang originally from the wolf, as some argue, why not point out first why the male dogs are so dissimilar? And again, why are the wolves of different countries unlike, and which species of wolf is the true and only one? Without wishing to conflict with the opinions of those so much more learned on the subject than ourselves, we would ask, would it not be much more reasonable to suppose, without positive proof, that the origin of the domestic dog can be referred to numerous aboriginal species, crossing with the wild varieties—as we know our dogs will frequently do, including the wolf, jackal, and the fox, if we like, climate assisting, and man aiding by judicious intermixing and breeding—until the present high standard of this useful animal has been reached?

It is noticeable that we have in America far more well-bred setters than pointers, and greater attention seems to have been paid in the last few years in procuring the former blood than the latter. This arises from the fact that the setter is the greater favorite of the two, and justly the choice of the sportsman when he desires a dog that will unflinchingly stand the rough-and-tumble nature of our shooting. Of the two, the point of the shorter-haired animal is far the more marked when on game, and the training once received by him is always retained, and on each returning season he enters the field to be depended upon, while the setter oftener has to be partially rebroken each year; and if not owned by a sportsman who shoots continually, becomes headstrong and unreliable.

"For the person whose business will not allow him to take his gun in hand but two or three times in the autumn," says an authority, "we advise by all

means that his dog should be the pointer; but for the one who takes advantage of the open season for different game from its beginning to its close, we recommend the setter as best able to bear continued work in all descriptions of cover."

The short hair of the pointer enables him to do work on the prairies while "chicken" shooting where water is seldom found, and which he can do without for a long time; but in New Jersey, Delaware, and Maryland, and in countries where the game invariably takes to the briery thickets on being started, the pointer is at a disadvantage, as it refuses to enter them.

The pointer originally is a cross of the Spanish dog with the greyhound, or foxhound, by which the delicacy of the nerves of the nose, to some extent, is diminished, and the body rendered more light and elegant. No dog has a higher step, sense of smell, or shows greater intelligence or docility. The principal reason that he becomes rigid, or points, by the scent of game, is from the extraordinary condition of his nervous system, acquired centuries ago and handed down by his ancestors. According to Hallock, a thoroughly broken pair of high-bred pointers are so obedient to the voice and gesture of their master and so well trained to act with each other, that a wave of the hand will separate them, one going to the right and the other to the left, so that they hunt the entire ground, crossing each other regularly in front of the sportsman as he walks forward. There is one matter that is generally overlooked in ranging with the pointer. If in early life you have taught him to retrieve, and a case occurs in the field where he has to cross a stream, as the dog returns with the bird, never tell him "down charge." His coat is so thin and his organization so delicate that he is sure to catch cold; therefore, by all means, allow him to run around a little.

Points for the show bench, as given by the *Fancier's Gazette*, are:

Head should be moderately long, narrowing from the skull; the skull not too prominent above the eyes, as this gives a heavy appearance; rather deep in the lip, but not any flaw, or very slight; nostrils open, with level jaw; eyes moderately bold; ears thin, set in to the head, just where the skull begins to recede at the sides of the head, hanging flat on the cheek; throwing the ears back so as to show the insides has a bad appearance, and too often indicates a cross; neck medium in proportion to head, and body rather inclined to be long, but not much so, thickening from the head to the set-in of the shoulders; no looseness of the throat skin; shoulders narrow at the meeting of the blade bones, with a great amount of muscle, long in the blades, set slanting, with arm of the leg strong and coming away straight, and elbow neither out nor in; the legs not great, heavy boned, but with a great amount of muscle; leg pressed straight to the foot, well-rounded, and symmetrical, with foot well rounded (this is the forelegs and feet); chest moderately deep, not over wide, but sufficiently wide and deep to give plenty of breathing-room; back level, wide in loins, deeply ribbed and with ribs carried well back; hips wide and full of muscle, not straight in the hock, but moderately bent; stifles full and well developed; the stern nearly straight, going off tapering to the point, set-in level with the back, carried straight, not above the level of back; symmetry and general appearance racy, and much beauty of form appears to the eye of a real pointer breeder and fancier. The weights considered best for different purposes are from fifty pounds to about sixty-five pounds. Coat short and glossy, but a deal here depends on condition.

POINTS IN JUDGING.

Head	25
Neck	10
Shoulders	15
Legs	10
Feet	10
Loins	10
Stifles	5
Stern	15
	100

Color and Coat.—The coat ought to be very short and soft, and fine, and the skin thin and flexible. Most people in England prefer the lemon-and-white to liver-and-white, or black-and-white.

THE PSYCHOLOGY OF BIRD STUDY.

IT is of advantage to know why a given occupation is profitable, why it is attractive or otherwise, to what sort of minds it is best adapted, and how it should be conducted to yield the best returns.

Other things being equal, the mind acts most healthfully on what is most pleasing. Children are attracted most by things having life, character, color, and rarity. Whatever has life appeals directly to the young mind, especially where the various stages of life are apparent. Birth, infancy, the family relation, society, paternity, sickness, death, joy, sadness, homes, building of nests, eggs, incubation, flying, singing, fighting, foraging, searching covert places, digging, boring, hammering, wading, swimming, catching, devouring, sentry duty, migration, gregariousness, dress, differences in appearance of sexes and ages, moulting, mimicking, special equipment for occupations, anatomy, physiology, hygiene, usefulness to man, assistance in agriculture and arboriculture, destructiveness to noxious life, swiftness, deliberation, expertness, stupidity, instincts for remarkable performances, lack of judgment in certain lines, loquacity, vivacity, sympathy and mutual helpfulness, resemblances to humanity and differences, and apparent moral sensibility, are among the leading features of birds in general which make them attractive to the youthful mind.

Where any of these subjects may be utilized in the ordinary instruction of children the results are more permanent and direct than where the same sort of instruction has been attempted with material that appeals less strenuously to the soul of the learner. That which arouses the most intense activity makes the most lasting impression. Even where the impression is a painful one the result endures; as in old England the memory of landmarks was impressed upon young boys by showing and flogging the boys at once. The unreasoning pain and the sight of the landmark remained forever associated. Modern research has found that pleasant sensation opens the mind and that attention is easily concentrated where inclination also leads. Whatever is discovered by the pupil while thoroughly aroused is of most lasting value. The ideas which school men have for centuries been trying to beat into the minds of children by senseless and dull repetition have been found to be easy of acquisition and in many instances matters almost of intuition if they may first be brought into the consciousness in a natural manner.

The instructor who has not the time nor the tact and invention needed to open the minds of his pupils first and then arrange matters so that self-directed activity will follow, will have a great deal of hard work before him if he hopes to compete with those who have found the secret of the mind's growth and act upon it intelligently. Such teaching cannot produce the results which are now being acquired in our best schools.

A whole system of education could be arranged with bird life as material for arousing and fixing the interest of the learner. But this is not our purpose. A whole system should take in all of the universe that is capable of interesting the learner. Our purpose is to take the most intensely absorbing field and show how it may be tilled.

Birds are used because so much more and better activity is to be secured by using them as the material for school work than from any other.

Why birds are so commanding to the growing mind will become clear to one who will patiently follow the thought in the remainder of this article. In avoiding technical terms the statement has been weakened, but it is believed that those who would enjoy the reading better if the terms were technical and closely accurate do not need to have the matter stated to them at all. Hence the statement is made in the terms of common speech with the object in mind of giving the reasons to those not much accustomed to the terms used by writers on psychological topics.

The mind is somewhat like the eye. It takes in whatever is before it. It is never concentrated upon one object alone, but has to occupy itself to some extent with the surroundings of the object. It is impossible to fix the mind, or the attention, exclusively upon one thing. We frequently ask our pupils to do this, but it is impossible. The mind at any one instant resembles the surface of a wave of water, part of what it carries is low, another part higher, and some other things are highest. But few things can be at or near the crest at once. Many things are around the base. As with the eye a few objects are at or near the focus, many things are where they are sensed but are not in the supreme position. And as the wave of water runs along its course so the mind moves forward. It will either run directly away from the subject or it will turn the subject over and carry it along in continually changing aspects. The mind cannot stand still. It cannot keep anything more than an instant except by turning the thing about and perceiving it in relation to other things. We still consider we have the thing in mind after we have ceased to think of it as a whole and pass on to thinking of its relations to other things.

The mind differs from the wave of water in that it is not extensive to the right and left of its course. It is like a hill with a small crest that can hold but few objects upon its surface. When we say we are thinking profoundly upon a subject we mean that that subject and its connections are continuously upon the crest of the wave, and that unrelated things are either not in the mind at all or they are at least not at the focus.

The things that are in the mind but not focal are continually striving, as if they were alive and very active to get at the focal point. Just as the eye is continually tempted to wander, making one object after another its focal one, so the mind is bound to travel unless it has been trained to turn from the thing to its relations and related things and from them back to the main thing again. That is the only way to pay attention. You cannot pay attention to one physical thing for more than an instant. But you can hold a chain of connected things running through the mind, but the things are continually modified by their relations and the absolutely same thing is never again in the mind. When it appears again it is clothed upon or enlarged or modified by what the mind has discovered about it and its relations or has invented and attached to it.

It is easy to repeat the multiplication table without having it focal in the mind. You may read half a page of print with your focal point upon some other matter. You may pray and find in your mind at the same moment a wicked thought. Worse than this, you may continue your prayer

and the wicked thought may become focal. Not by your desire that it shall be so, but by the power of marginal things in the mind which makes them focal without your apparent anticipation or desire to have them at the focus. You cannot say that the multiplication table is not in the mind when you are repeating it and wondering who will be at the party this evening. It is there but not focal. When you are reading the words of the page the words may be in your mind, but the focal point may be occupied at the time by wondering how the baby learned to climb so young and guessing whether you ought to catch her or run the risk of her falling, and if she should fall how much she would be injured, what the people would think of you for sitting there and letting her fall, why babies have to fall so much, whether they really learn much about slipping or center of gravity by falls so early in life, and a thousand other items in child study. But the reading is in your mind much as it used to be when your teacher said to you, "Now I want to see you keep your eyes on your book for fifteen minutes without looking off."

The mind grows at first by use of the senses. The sight is the main instrument of youthful mental growth. Things which can be seen or visually remembered are most appropriate subjects for juvenile thinking. You cannot well converse with children upon the pleasures of hope, the uses of adversity, nor any of the forms of mind stuff that are called abstractions. True, they like to play upon words and commit them to memory so as to reproduce them. But this is not because of the real meaning of the words committed but because the ear is pleased. Children enjoy talking like adults as well as looking and acting like them in their unstudied masquerades.

The proper material for juvenile mind action is what may be acquired by the senses. All those subjects in the second paragraph of this article are mainly appeals to the senses. These readily become focal in any mind, but chiefly in the mind that has never been trained away from the senses by abstract thinking. No child can pay attention to anything else when a bird flies in at the window. The bird and its act, its motive, its fellows, its appearance, its nest, its young, and a thousand other notions rush to the focus of his mind, no matter how diligently he may strive to keep them down. Instead of repressing in the mind what is naturally inclined to become focal, education is now finding out the value of permitting these things to come naturally into the mind and so operating upon them that mental growth ensues with little or no friction, and without asking the learner to flaggellate himself continually that he may have knowledge to use in that distant and half-believed-in time when he shall be a man.

Everyone knows that children are delighted with colored pictures. But there is an intensity of delight aroused by a certain class of colored pictures which has been a matter of surprise to most educators and parents since color photography has become practical for illustration. Infants in arms, who have never seen any birds except a few of the size of a canary, are so fascinated with the bird charts that psychologists have found a new problem presented.

If we look upon the child as he views an accurate colored picture we note that he is affected just the same as if the bird itself were before him. His imagination carries him beyond the picture to the thing itself, even in

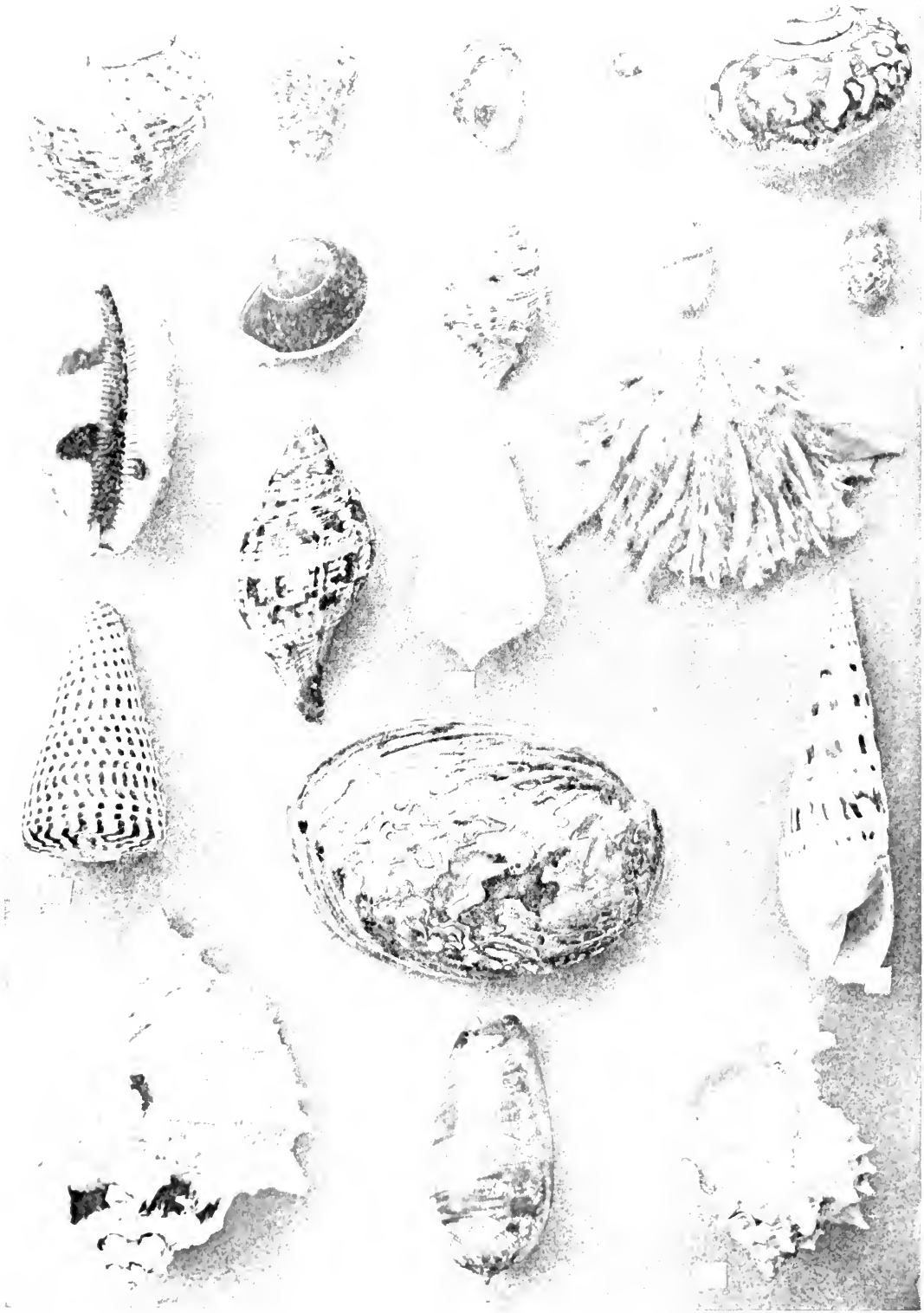
the instances where he has never seen the bird nor any like it. As to his mental state, we can say that the bird rises directly to the focal point in his mind, and it is not the bird picture that holds him but the bird itself. For teaching purposes this is peculiarly fortunate, for the child is ready to grasp any suggestion from the teacher in order to enjoy the bird more at length. All the subjects of school work will ordinarily appeal to the child, rising readily into the focus of attention where the bird, its relations, its acts, and things pertaining to it, become the material for school activity.

This liveliness and readiness are not so manifest where mounted specimens are used, because the element of death becomes focal at the first instant, is displaced with difficulty, and continually recurs with sickening frequency during the exercise. The acts associated with the capture and death of the bird are too dangerously strong to be avoided. They should by no means be suggested.

Mr. Aima B. Morton puts it in this way: Why do children like colored pictures to abstraction? Because the child is father to the man. And what do we love more than tone and color, music and pictures? It is an inherent quality, the soul of life leading us back to nature, the All-mother. We have hung up pictures and maps of a poor quality before the class for years, and then lectured away at them *ad infinitum* and *ad nauseam*, thinking, because we understood, that the child also understood. But this is not so. We nearly always suppose too much, especially in lower grades.

Diesterweg said: "If you speak about a calf in the school room, bring it in and show it." This principle is still true to-day. All things in nature, as far as possible, should be present *in propria persona*. Where not possible, we must try to approach that ideal by bringing the very best, and natural pictures of the objects, that is colored ones, and the vivid imagination of the child does the rest. It does not see the picture, the object itself is there, nature has entered the school room.

So we learn that bird study, aided by color photographs, is psychologically the most valuable means to the attainment of school ends. It is attractive to the young mind because it furnishes material which rises most readily to the focal point in the mind. It relieves teacher and pupil of the strain attendant upon work where it is difficult to get the class to "pay attention." It is chiefly adapted to growing minds. No matter how strongly the matured mind with its powers of abstract thinking may be drawn toward it, it is yet more attractive to the mind that has not been trained to any sort of restraint. To get the best results, bird study should not be conducted with a view to storing the child's mind with scientific knowledge, nor for the sole purpose of employing it effectively to teach language and other branches of school effort. But it should be pursued as a mode of activity which developes mind, acknowledging the fortunate circumstance that school learning and bird knowledge will both be acquired at the same time, although they are not the direct objects of the pursuit.



Shells. Kindly loaned by J. M. Wiers.

CHICAGO:
A. A. MUMFORD, PUBLISHER.

SHELLS AND SHELL-FISH.

	Scientific Name.	*Common Name.*	*Named by*	*Where Found.*
No. 1.	Turbo Argyrostona.	Silver Mouth.	Linn.	Singapore.
No. 2.	Strombus Bitubereulata.	Kid Conch.		West Indian Islands.
No. 3.	Nerita Peleronta.	Bleeding Tooth.	Linn.	West Indies.
No. 4.	Strombus Urceus.		Linn.	Amboina.
No. 5.	Turbo Sarmaticus.	Turk's Cap.	Linn.	Algoa Bay.
No. 6.	Cypræa Argus.	Eyed Cowry.	Linn.	New Caledonia.
No. 7.	Helix Hæmastoina.	Red Mouth Snail.	Linn.	Ceylon.
No. 8.	Murex Pomum.		Smet.	Florida.
No. 9.	Oliva Inflata.		Linn.	Singapore.
No. 10.	Conus Arenatus.	Sandy Cone.	Hwass.	Red Sea.
No. 11.	Fascioloria Tulipa.		Linn.	West Indies.
No. 12.	Conus Leoninus.		Gmelin.	Florida.
No. 13.	Spondylus Pictorum.		Chem.	California.
No. 14.	Conus Literatus.	Lettered Cone.	Linn.	Ceylon.
No. 15.	Haliotis Iris.	Green Abalone.	Gmelin.	Japan.
No. 16.	Terebra Maculata.	Marlin Spike.	Linn.	Sandwich Islands.
No. 17.	Murex Regius.	Red Murex.	Wood.	Panama.
No. 18.	Oliva Porphyria.	Tent Shell.	Linn.	Panama.
No. 19.	Murex Bicolor.	Pink Murex.	Val.	Mexico.

WHO does not love the beauty of shells? Who, when visiting the sea-shore, has not sought them with eagerness? Their beautiful colors are pleasing to the sight.

The Indians have always loved shells on account of their bright colors. No doubt they many times tried to paint their faces the same color. They used to make money from the pink or purple portions of them.

There are thousands of different kinds of shells. To get the full beauty of them we must see them in their native homes amidst the sands and stones and the roaring sea.

Mr. Emerson tells of finding the "delicate shells on the shore," and how the fresh waves seemed to add new beauty to them. He wiped away the foam and the weeds and carried them home. He could not take the foam and waves and sky and ocean's roar. He says the shells

"Had left their beauty on the shore,
With the sun and the sand and the wild uproar."

Did you ever place a large shell to your ear and listen to its roar? It sounds like the distant roar of the sea. Mr. Wordsworth says:

"I have seen
A curious child, who dwelt upon a tract"
Of inland ground, applying to his ear
The convolutions of a smooth-lipped shell;
To which, in silence hushed, his very soul
Listened intensely; and his countenance soon
Brightened with joy, for from within were heard
Murmurings, whereby the monitor expressed
Mysterious union with its native sea."

We can not all go to the sea to study its wonders. So we will have to do the best we can studying pictures of shells, making collections of as many kinds as possible and studying about the animals that have lived in them.

Each shell, it matters not how small, has been the home of a living creature. Each has an interesting story for us if we will but read it.

Shell-fish have no bones as other fish have. They, therefore, need a solid house in which to live. The shells not only serve them for houses, but for bones to keep their pliable bodies in shape, for ships in which to sail, and for beautiful dresses, starched and shining.

If these soft animals had no solid shells they would immediately be eaten by other animals of the sea or dashed to death by the waves.

But it is not alone the beauty of shells that renders them interesting. Conchology, which treats of shells, is as a science at least as old as the days of Aristotle, the study of which was resumed, along with that of the other sciences, when the dark ages had passed away. Since the beginning of the nineteenth century it has given place to a more extended and comprehensive study of molluscous animals, the presence or absence of a shell having been found not to constitute one of the most important characteristics which distinguish different classes of mollusks. Conchology was only the form of the science suited to a time when the shell was more considered than its inhabitant. Yet it is claimed that the relations between shells and the mollusks which possess them are such that the labors of the merest conchologists have contributed to the real advancement of science, both zöological and geological.

Shells consist of carbonate of lime secreted by the animal and intermixed with some animal matter. In the species in which it is least developed it appears as a hollow plate, which serves as a protection to the breathing organ and heart. The protuberances and ridges seen on many univalve and bivalve shells appear in the course of their growth by the margin of the mantle, turning out at a considerable angle and thus building up a plate in this position for a certain distance. This growth then ceases, the mantle retracts, or may be regarded as changing itself into the shelly layers, and thus it extends in the original direction, carrying out the shell with it, till it turns again to form a second plate or ridge; and so the process goes on. Many mollusks possess the power of altering and enlarging their shells to adapt them to their growth, which they appear to do as if by an intelligent will.

The distinguishing marks of shells are the number of parts of which they are composed, and their peculiar forms and prominences. Some consist of a single piece, some of two pieces, and some of three. The textures of shells are described as pearl, fibrous, horny, and some are glassy and translucent. The pearly shells are in alternate layers of very thin albuminous membrane and carbonate of lime, which by their minute undulations give the pearly lustre. This structure is the least permanent and in some geological formations the shells that were provided with it have disappeared, leaving only their casts, while those of fibrous texture are preserved unchanged. Colors, however beautifully exhibited upon the surface of shells, are to them no more distinctive features than to the minerals and flowers upon which they are also prominently displayed. They are most richly developed upon those surfaces most exposed to the light and in the class of shells found in shallow waters.

The whole number of species of molluscous animals known is estimated at about twelve thousand recent and fifteen thousand fossil. Many of the living species furnish wholesome food, and some are esteemed as delicacies. The marine shells, by the immense numbers in which they are produced, perform an important office in abstracting from the sea-water its excess of calcareous matter and thus aid in maintaining its purity.

As objects of beauty, shells have always been admired and frequently been used as ornaments Some varieties were used by the Athenians as ballots, with the name upon them of the person to be banished, whence the term ostracism. Some shells have served the purpose of coin among rude nations. Others are noted for the pearls which are secreted between their valves around some foreign substances. Mother-of-pearl is the polished shell of nacreous. Rare species of shells are highly prized by collectors, and single specimens have been sold for large sums. The South Sea Islanders use the conch as an instrument of music, blowing into the shell through the broken top, thereby producing a loud and mellow sound. It is a species of sea conch which is represented by the god Triton. In many rural parts of the United States conchs are used in place of dinner bells or tin horns to call persons from a distance.

THE FLOWN BIRD.

R. H. STODDARD.

The maple leaves are whirled away,
  The depths of the great pines are stirred;
Night settles on the sullen day
  As in its nest the mountain bird.
My wandering feet go up and down,
And back and forth, from town to town,
Through the lone woods and by the sea,
To find the bird that fled from me.
I followed, and I follow yet,
I have forgotten to forget.

My heart goes back, but I go on,
  Through summer heat and winter snow;
Poor heart, we are no longer one,
  We are divided by our woe.
Go to the nest I built, and call,
She may be hiding after all,
The empty nest, if that remains,
And leave me in the long, long rains.
My sleeves with tears are always wet,
I have forgotten to forget.

Men know my story, but not me
  For such fidelity, they say,
Exists not—such a man as he
  Exists not in the world to-day.
If his light bird has flown the nest,
She is no worse than all the rest;
Constant they are not, only good
To bill and coo, and hatch the brood.
He has but one thing to regret,
He has forgotten to forget.

All day I see the ravens fly,
  I hear the sea-birds scream all night;
The moon goes up and down the sky,
  And the sun comes in ghostly light.
Leaves whirl, white flakes about me blow—
Are they spring blossoms or the snow?
Only my hair! Good-bye, my heart,
The time has come for us to part.
Be still, you will be happy yet,
For death remembers to forget!

FOREST PARK, SPRINGFIELD, MASS.

THIS is one of the most beautiful public parks in the United States. In his annual report, which is a handsomely printed and illustrated volume, President Marsh says that while there are few changes during the year in the make-up of the big family of birds and animals that compose the zoölogical and ornithological department, it continues to be an ever-increasing source of pleasure to the thousands of persons who visit the park for recreation, and no part of the park is more thoroughly appreciated. The departure from the usual plan of park menageries in arranging an exhibit of domestic animals has been a marked success, giving to the park visitors a chance to become acquainted with the more common breeds of the higher types of our domestic animals, an education in which the average city resident is sadly lacking. The exhibit of thoroughbred cows has been especially a source of pleasure and instruction. The collection comprises seven thoroughbred cattle, no two of the same breed, and children and grown people alike take delight in visiting the barns to see these splendid animals, finding it as instructive as it is entertaining.

This is a departure that might be favorably considered by other boards of park commissioners. All of the domestic animals of superior breed might be annually exhibited with great advantage to the general public.

The ornithological and zoölogical exhibits of Forest Park are hardly surpassed anywhere, containing as they do one hundred and eighty-nine specimens of animals and three hundred and ninety-seven of birds.

MARBLES.

MR. GEO. D. MERRILL,
Head Curator, Department of Geology, U. S. National Museum.

THE origin of the name marble, like that of many another name now in common use, is somewhat obscure. By many authorities the word is supposed to have been somehow connected with the Greek word meaning "sparkle." However this may be, a sparkling appearance is by no means universal among marbles, but is limited to those which, like the white statuary or other crystalline varieties, have a granular structure, the sparkling itself being due to the reflection of light from the smooth surfaces of the constituent minerals. As used to-day, the word marble is made to include any lime rock of such color and hardness as to make it desirable for ornamental, or even the higher grades of building work. Stones of precisely the same composition and origin, which are not of the desired color, are classed simply as limestones.

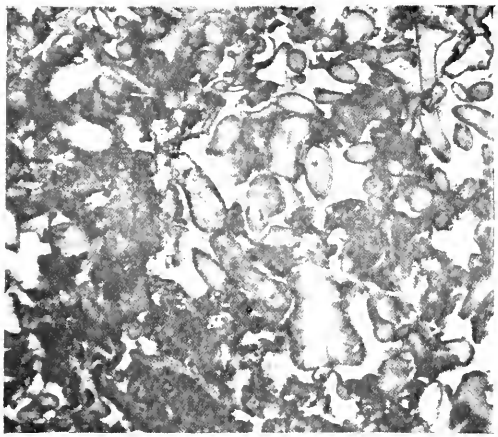
Accepting the definition given above, it follows, then, that with a few exceptions, to be noted later, marbles are but hardened and otherwise changed beds of marine sands and muds, containing, it may be, still recognizable fragments of the corals and mollusks of which they were originally composed. But inasmuch as these muds were rarely of pure carbonate of lime, but were contaminated with matter from seaweeds and animal remains, or by iron compounds, so the resultant marble is not always white, but, if containing matter from plants or animals, gray, blue gray, or even black; and if containing iron, buff, pink, or red. If the change in form of the original muds was just sufficient to produce crystallization, we may have a marble full of fossil remains which may be of a white or pink color, standing out in fine contrast with the darker ground. If, on the other hand, the change was complete, we may have a marble of small granules, pure white in color, and of a texture like loaf sugar, such as to render it suitable for statuary purposes.

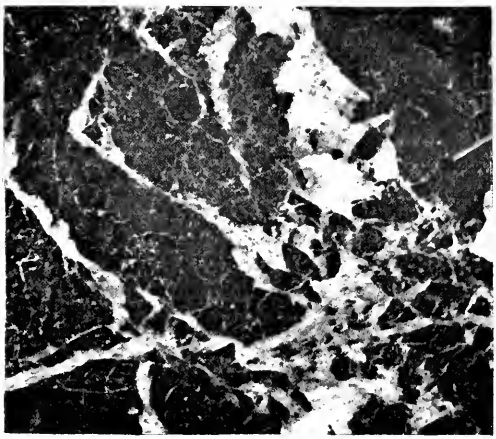
At one early period of the geological history of the North American continent, all that portion now occupied by the Appalachian mountain system was sea bottom, and on it was being deposited not merely sediments washed down from the land, but, in favorable localities, deposits of lime, sand, and mud. This deposit went on, on a gradually sinking floor, for long ages, until the lowermost beds were buried under thousands of feet of the later formed materials. Then began the slow uplifting of the sea-bottom in the form of long, parallel folds to form the mountain ranges. During this uplifting the lime sediments, which are the only ones we need consider here, were changed to marbles, and have since been exposed and made available to the quarriers through the wearing-down action of rain and running streams. So, then, a quarry is but an excavation in the hardened mud formed on the bottom of a very ancient sea.

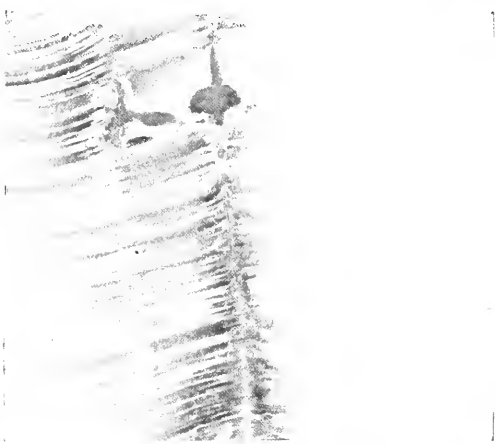
In the Vermont marble region the beds are highly inclined and of varying colors. From the same quarry there may be produced pure white, gray, blue gray, and greenish varieties, often variously veined and blotched owing to the collection of their different impurities along certain lines. Some of these quarries have been worked a depth of two hundred feet and more.

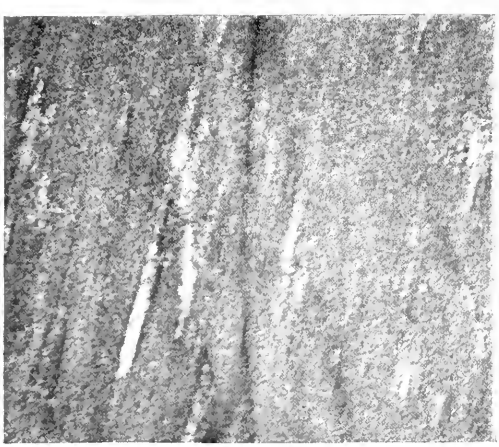
Not all marble beds are upturned at this steep angle, however, nor have they been worked so deeply. In Georgia, the quarries are often in hillsides, extending scarcely at all, if any, below the surface of the ground. Where opened in the valley bottoms they have the form of huge rectangular pits, with perpendicular walls. In Tennessee, many of the sediments were so slightly changed that the fossil remains are still easily recognized, and the stone is of a pink or chocolate red color, owing to the abundance of iron

The marbles are quarried mainly by channeling machines, which cut out the stone in blocks of any desired









CHICAGO:
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MARBLES.

OLD TENNESSEE.
SIENNA.
FLORENTINE VERMONT.

ALPS GREEN
MEXICAN ONYX.
AFRICAN MARBLE.

size, or at least in sizes such as the nature of the beds will allow. Blasting is never resorted to in a properly managed quarry, since the shock of the explosion is likely to develop flaws in so tender a material. When freed from the quarry bed and brought to the surface the stone is sawn into the desired shapes by means of "reciprocating" blades of soft iron, the cutting material being sand, washed under the blades by small jets of water.

The use to which any particular marble is put is governed largely by its price and color, though texture or grain often are taken into consideration. The coarsely crystalline white and white clouded marbles of southern New York, Maryland, and Georgia, are used almost wholly for building purposes; the pink and variegated marbles of Tennessee for interiors and for furniture; while the white and blue-grays of Vermont find a large market for interiors, cemetery work, tiling, and, to a much smaller extent, for building.

It was stated before that not all our marbles were changed (metamorphosed) marine sediments. The exceptions are (1) the onyx marbles, which, though composed of carbonate of lime, like the last, are deposited from solution, and (2) the so-called verdantique marbles, which are mainly altered eruptive rocks. These last differ widely from those we have been describing, being of a prevailing green color, though often variegated with white or red. They are, in fact, not to be classed with the lime rocks at all. The names *verdantique*, *verte antique*, and *verde antique* are but varying forms of the same words, indicating a green antique marble. The term antique has been applied simply because stones of this type were used by the ancients, and particularly by the Romans.

The so-called onyx marbles are, as noted above, spring deposits, differing from ordinary lime deposits only in color and degree of compactness. The name has also been made to include the stalagmites and stalactites in caves, such as were used by the ancient Egyptians in the construction of alabastrons, amphoræ, funeral urns, and various household utensils. The material is translucent and often beautifully clouded and veined in amber, green, yellow, and red colors. Owing to its mode of origin it shows a beautiful wavy banding, or grain, like the lines of growth in the trunk of a tree when cut across the bedding. This fact, together with its translucency, has been the cause of the wrong use for it of the name onyx, which properly belongs to a banded variety of agate. Equally wrong and misleading is the name "oriental alabaster," which is commonly applied to the Egytian variety, the true alabaster being a variety of gypsum.

The larger part of our onyx marbles comes to-day from Mexico, though there are equally good materials of this type in Arizona and California.

The foreign supplies come in part from Egypt. Their use is almost wholly for interior decoration, as wainscotings, and the like, and for tops to small stands, bases for lamps, and so forth. These are by far the most expensive of all the stones to which the name marble is properly applied.

Some of the most noted of our foreign marbles are those of Carrara, Italy, which are ancient sediments thought to have been changed at the time of the uplifting which formed the Apennines. They are of white and blue-gray colors, sometimes beautifully veined. A beautiful, mellow yellow to drab variegated variety, very close in texture and almost waxy in appearance, is found near Siena, and is known as Siena marble. It is a great favorite for interior decorative work, as may be seen to advantage in the vestibule of the new public library building in Boston, and the rotunda of the National Library building at Washington.

Other marbles, which at the present time are great favorites with the architects, are the so-called Numidian marbles, from Algeria. These are of yellow, pink, and red color, and often beautifully mottled. Their textures are so close that they take a surface and polish almost like enamel. Since their first hardening these beds have been shattered like so much glass into

countless angular fragments, and then the whole mass, with scarcely any disturbance, once more cemented into firm rock. The result is such that when large blocks are sawn into slabs, and the slabs then polished and spread out, the same series of veins, of angular blocks and streaks of color, may be traced from slab to slab, even repeating themselves with only slight changes throughout the entire series.—*Nature and Art.*

THE WHIPPOORWILL.

MRS. MARY STRATNER.

A VALUED pet of ours is the whippoorwill or *Antrostomus vociferus.* When most of the other songsters have tucked their heads under their wings our whippoorwill wakes up to the business of the night.

First, he darts about catching insects and moths for his babies' breakfast—for this is their breakfast time—or if his babies are not hatched he takes the insects to the faithful mother-bird on the nest. After this is done he thinks his business cares are over, and he feels free to enjoy himself.

Our especial whippoorwill always selects the same spot, year after year, just about ten yards from our front door, in a clear white space on the shell-walk, and there, squatted on the ground and facing us as we sit on the piazza in the moonlight, he vociferously demands that we "whip poor Will." This demand he keeps up for a minute or two. Finding that we do not intend to heed his request, as our sturdy six-year-old Will objects, he commences a low muttering kind of grumbling.

Suddenly he has a new idea and he now orders us to "Chuck Will's widow! Chuck Will's widow!" but this order, too, goes unheeded, as our Will has no widow, and if he had why should we chuck her?

Now he does some more grumbling and finally flies away. We had almost forgotten him, when back he comes and squats in the same place. First he gives a low "Chuck, chuck;" then cries out shrilly, "You free Wheeler! You free Wheeler!" We know of no Wheeler who needs freeing, so again we cannot comply with his wishes.

Then, as if disgusted with our unresponsiveness, he flies up in a near-by orange tree where he laments somewhat like an Irishman: "O whirr-r, whirro! O whirr-r, whirro!"

He keeps this up so long that it causes some sleepy boy to say: "I wish that old bull-bat would be still." And sometimes the boy feels tempted to get up and drive him away, but he remembers in time that this feathered friend rids us of many obnoxious insects. For this reason the southern whippoorwill, or bull-bat, is protected by law in many of the states.

We know where *our* whippoorwill nests every year in May, and we often pay the mother-bird a visit in order to get a peep at her brown speckled eggs, and later at her two brown babies; but we never bother them, contenting ourselves with taking their picture with a kodak.

This last is very difficult to do, for mamma whippoorwill always selects a dense, shady part of the woods for her motherly duties. The nest is flat on the ground, generally under a palmetto leaf, which keeps off the rain. It is composed of dry leaves which seem to have been just scratched together, and is not noticeable unless the bird is there. Even then, the brown color of the bird blends with that of the ground and leaves, so that it takes sharp eyes to detect her.

When the young birds first leave the nest they sprawl about in a comical manner. When in repose they squat flat on the ground, with wings spread out to the fullest extent, and they keep up a rolling motion with their bodies from side to side, for all the world as if they wanted to roll over, but were prevented from doing so by the position of their large wings.

TWILIGHT BIRDS.

COLE YOUNG RICE.

Swallow, I follow
  Thy skimming
Over the sunset skies—
Follow till joy is dimming
To sadness in my eyes.
And hollow seems now thy twittering
High up where the bittering
Night-blown winds arise.

Throstle, the wassail
  Thou drinkest
Daily of chalice buds—
Wassail in which thou linkest
Thy notes of springtime moods—
Should docile thy elfish fluttering
Where twilight is uttering
Sorcery through the woods.

Plover, thou lover
  Of moorlands
Drained by the surfing sea—
Lover of marshy tourlands,
What is the world to thee?
Nay rover, wing on unquerying
O'er mallows ne'er wearying
Over the pebbly sands!

But sparrow, the care o'
  Thy nesting
Pierces thy vesper song—
Care o' the young thy breasting
Shall warm through the blue night
  long—
Till, an arrow, seems thy dittying,
Of pain to the pitying
Heart that knows earth's wrong.

AWESOME TREES.

WE made a side trip to the big trees of the Mariposa group, which are about one hour's ride from the hotel, says a correspondent of the Pittsburg *Dispatch*. If the smallest of these trees could be planted anywhere in Pennsylvania the railroads would run excursion trains to it and make money. The trees in this grove are so large that it takes a good while to fully appreciate the facts about the size of the biggest of them. The "Grizzly Giant" is thirty-four feet through at the base and over 400 feet high. This tree would overtop the spires on the Pittsburg cathedral by over 100 feet. The trunk of this tree is 100 feet clear to the first limb, which is twenty feet in circumference. Many other trees here are very nearly as large as this one, and there are 400 in the grove. Through several tunnels have been cut and a four-horse stage can go through these tunnels on the run and never graze a hub. You get an approach to an adequate idea of their size by walking off 100 yards or so while the stage is standing at the foot of a tree and glancing from top to bottom, keeping the stage in mind as a means of comparison. The stage and the horses look like the little tin outfit that Santa Claus brought you when you were a good little boy.

These trees are no longer to be called the largest in the world, however. A species of eucalyptus has been found in Australia as large or larger. Emerson warns us against the use of the superlative, but when you are in this region of the globe you can't get along without a liberal use of it. He himself says of Yosemite: "It is the only spot I have ever found that came up to the brag." And as I stood in the big tree grove I remembered that some one called Emerson himself "the Sequoia of the human race."

THE EDGE OF THE WOOD.

ELLA F. MOSBY.

THE ideal place for birds, says Mr. Frank Chapman, is the edge of the wood where field and forest meet, and a stream is not far off. If an orchard be in sight, so much the better. It was my delight to spend a summer, or part of it, in just such a spot not long ago, and I made many charming discoveries here. In the first place I learned that tt is by no means necessary for birds to "be of a feather" in order "to flock together." I came one bright morning on a flock of indigo buntings near the water's edge, the proud father, in exquisite blue, like finest silk, with shimmering lights of green playing over it, the mother in siena brown, and the babies, neither blue nor brown, but a sooty black, with only a solitary wee feather now and then to show the blue that was coming. What an odd, but what a pretty, happy little family!

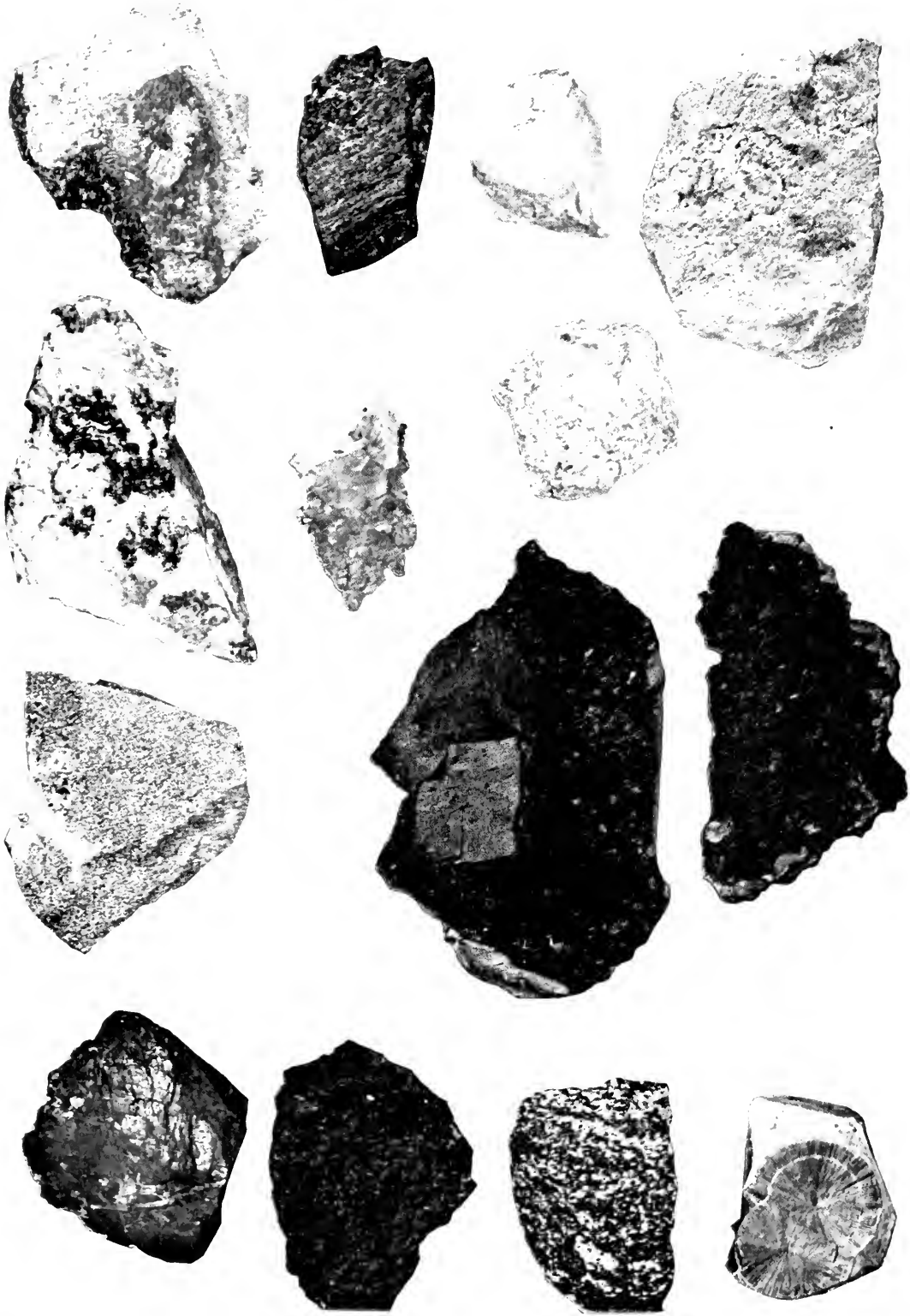
The banks of the stream were thickly overgrown with milk-white elder, orange butterfly-weed, and a thousand feathery grasses and nodding leaf-sprays, already touched on edge with crimson or gold "thumb-marks." On the tall stalks swung the goldfinches, "a little yellow streak of laughter in the sun," and every stake or post in the fence near by made a "coigne of vantage" for the merry wrens to call and whistle. The calls of birds express, bird-fashion, every feeling that the heart of man knows—surprise, fear, joy, hope, love, hate, and sorrow. If we could only contrive to think *bird-thoughts*, as perhaps an Audubon may have done, or a Wilson, we might understand these strange signals and cries, often uttered by invisible speakers from a world above ours.

I learned at this time that the quails, or Bob-Whites, have many calls instead of the *one* from which they are named. There is the low, sweet mother-talk to the brood, the notes of warning, the "scatter calls" of autumn from the survivors of an attack, "*Where are you? Where are you?*" and a sort of duet between male and female at nesting time. When she leaves the nest, she calls *Lou-is-e?* and he strikes in on the last syllable with "*Bob;*" she repeats, and he bursts forth "*Bob White!*" with emphasis. Then the clear, ringing whistles through midsummer sound up and down the meadow from one quail to another. The old farmer interprets their colloquy thus:—

> "Bob White, Bob White,
> Pease ripe, pease ripe?"
> "Not quite, not quite."

These birds are very tame during the spring and fall, and will come into town, on the edges of the streets, and call from roof and door-step without fear, sometimes even mounting into a tree close beside a window and whistling for an hour or two.

On the contrary, it is by the edge of the wood and after the brood is reared, that tree-top birds, like tanagers and cardinals, grow most friendly and fearless. Frequently, when I raised my glasses to look at some plain brown or gray bird, the scarlet of a tanager would flash across the field, and the rose glow of the cardinals appear in the grass. The female cardinal, with her lovely fawn tints and rose linings, and her beautiful voice, equals the male in interest. She is a bird of lively emotions, and being rebuffed by a catbird one day, made the lawn ring with her aggrieved cries, while her mate sought to comfort her most tenderly. They are not graceful on the ground, but they have a stout air of proprietorship that is not unpleasing. Both of our tanagers, the summer and scarlet, the cardinals, and the brilliant orioles, live together very peaceably, nor have I seen any sign of envy, malice, or spite among them. I suppose each one of us has his own Arcadia; mine—and that of these winged neighbors—assuredly lies at the boundary-line between shadowy forest and sunny meadow—at the edge of the wood!



ORES.

CHICAGO:
A. W. MUMFORD, PUBLISHER.

SPECIMENS AT TOP OF PAGE ARE GOLD BEARING ROCK.

SILVER QUARTZ. NATIVE COPPER. TIN ORE. E. H.
NICKEL PYRITES. LEAD CRYSTALS. BLUE CARBONATE COPPER.
SPATHIC IRON ORE. KIDNEY IRON ORE. ZINC ORE. NEEDLE IRON ORE.

ORES.

NICKEL is a silver-white, ductile metal, discovered by Cronstedt in 1751. It is closely allied to iron and cobalt, and is associated with many ores. Nickel, according to Deville, is more tenacious than iron. It is magnetic at ordinary temperatures. Many of the copper coins of the European continent and the United States are alloys containing various proportions of nickel. Nickel-plating has become an industry of great importance in the United States. It is used for magnetic needles, for philosophical and surgical instruments, and in watch movements.

SPATHIC IRON ORE.—Carbonate of iron, when found in a comparatively pure and crystallized state, is known as spathic or sparry. In its purest form it contains 48 per cent. of iron. The ore is found near Hudson, N. Y., and in Tuscarawas county, Ohio.

COPPER.—Copper is one of the most anciently known metals, and its name is derived from the island of Cyprus, where it was first obtained by the Greeks. In the earlier times it does not appear to have been employed by itself, but always in admixture with other metals, principally tin, forming bronze. Great masses of native copper have been found both in North and South America.

TIN.—Tin is a beautiful silver-white metal, with a tinge of yellow. There was no tin produced in the United States in 1896. The tin-producing countries are Malacca, Banca, Bolivia, Australia, and Cornwall.

ZINC.—A metal of a brilliant white color, with a shade of blue, and appearing as if composed of plates adhering together. It is not brittle, but less malleable than copper, lead, or tin; when heated, however, it is malleable, and may be rolled into plates.

LEAD.—A metal of a dull white color, with a cast of blue. It is soft and easily fusible. It is found native in small masses, but generally mineralized by sulphur and sometimes by other substances. It is the least elastic and sonorous of all the metals.

YOUNG WILD BIRDS.

THE thickness of the foliage on the trees, the high vegetation of the cultivated land, and the natural tendency of young birds to keep quiet and still, make the study of them a matter of some difficulty. In the hedgerows and by the woodsides unfamiliar notes and calls of birds are constantly heard—the notes of young birds, which cannot be identified owing to the thickness of the foliage, and though in the large woods the cry of the young sparrow hawks and the flight of the pigeons and woodpeckers betray their presence, it is almost impossible to watch them, or to ascertain their way of procuring food. Probably most of the larger species are fed by the old birds long after they leave the nest.

Of game birds, young partridges are the most self-reliant, and young pheasants the least able to take care of themselves. The present writer has never seen young quails, but as those coveys which are hatched in England often number as many birds as the quail usually lay eggs, it may be presumed that these, the smallest of all the game birds, are not less active and precocious than the young of the partridge. The latter are almost as active upon land as young wild ducks are upon the water. They run swiftly and without hesitation, even among thick vegetation, when they are no bigger than a wren, and follow or precede their mother through mowing grass, hedgerows, or the sides of furze breaks and copses, seeking and catching insects all the while, and neither losing themselves nor betraying their whereabouts by unnecessary noise or excursions.

MANDIOCA.

ANNA R. HENDERSON.

MANDIOCA (*Jatropha Manihot L.*) is the principal farinaceous production of Brazil, and is largely raised in nearly all parts of South America; in fact, is the main bread food of that continent, and is therefore worthy of consideration.

It is difficult for dwellers in northern climes to conceive of a land which does not look largely to fields of wheat or corn for sustentation; yet millions inhabit such a region, and strange to say, derive their bread from a root which combines nutritious and poisonous qualities.

Mandioca is indigenous to Brazil, and the Indians, strange to say, discovered methods of separating its nutritive and detrimental qualities. The Portuguese, learning its use from them, invented mills for its preparation, and it became the bread food of a great tropical region where wheat and Indian corn do not thrive.

The plant has a fibrous stalk, three or four feet high, with a few branches and but little foliage; light-green five-fingered leaves. The roots are brown tubers, often several inches thick, and more than a foot in length.

It is planted from slices of the tubers and is of slow growth, taking eighteen months to mature. The poisonous quality is confined to the juice of the roots, and even this may be rendered innocent by boiling. It then becomes vinegar by fermentation. The leaves may be eaten by cattle. The roots must be ground soon after digging, as they become putrid in a few days.

The Indians scraped the roots to a pulp with oyster shells, and after pressing it, dried it before the fire, or cut it under water into thin slices which they dried.

I will now describe the Portuguese method of making farina from mandioca, as I witnesssed it in my Brazilian home, a *fazenda*, plantation, near Rio de Janeiro, Brazil. The mandioca, which loves a dry soil, was grown on the hillsides among the orange and the coffee trees. It was cultivated by the hoe. When its great masses of tubers were mature they were dug and hauled to the farina house, a cool room, tile-roofed, dirt-floored, and which contained mill, presses, and drying-pans. Then the merry work began. The negroes, who love to work in company, would sing, as, seated on benches or stools, they scraped the brown skin from the tubers. These were washed and fed to the mill, while the children took turns riding the mule which pulled the creaking beam that turned the mill.

The tubers are very juicy and, on being ground, make a milky white mass, which is put into soft baskets made of braided palm leaves. These baskets are placed under a heavy screw press, and the milky juice which flows from them is caught in tubs and set aside to settle. In twenty-four hours in the bottom of the tub is a deposit of starch several inches thick. This is the well-known tapioca of commerce, extensively used for puddings and other delicate foods; good also for starching clothes. The clear juice above it, a deadly poison, is drawn off through underground tiles—that no chicken or other living creature may taste it. The damp pulp in the baskets is transferred to large concave trays of brass or copper placed over a slow fire, where it is constantly stirred until entirely dry. It is now ready for use, is as coarse as corn meal, but very white, and has a pleasant flavor, resembling popcorn. It cannot be made into loaves, as much moisture would make it too glutinous to bake. It is eaten dry or mixed with beans or other vegetables at the table, or it is dampened and salted and baked on a griddle in a hoe-cake half an inch thick. In this way it is very nice and sweet. It is a favorite breakfast dish made into a clear glutinous mush called

pirao (pronounced *pe-rong*). Brazilians are very fond of the dry farina and throw it into the mouth by a movement so dexterous that it does not powder the face.

This is the bread of Brazil. Though wheat bread is sold in the bakeshops of the cities, it is not used to any great extent in the rural regions.

There is another species of mandioca called *aipin* (pronounced *i-peen*), which cannot be converted into *farinha*. It matures in eight months and has no poisonous qualities. It is a staple article for the table, being baked like a potato, and its taste resembles that of a roasted chestnut.

TRAVELING BIRDS.

Cleaving the clouds with their moon-edged pinions,
High over city and vineyard and mart;
April to pilot them; May speeding after;
And each bird's compass his small red heart. —*Edwin Arnold.*

RIVER valleys, coast lines, and mountain chains are the ways followed by the migrating birds; and frequent observations have determined the fact that birds travel at great heights, many as much as a mile from the earth. This may be one of the reasons why the tiny creatures have such keen sight; for from this distance they can obtain a far-reaching view of the surrounding country and distinguish landmarks readily.

If the weather is stormy or foggy, then the birds are obliged to fly much lower; and, too, it is then that the lights along the coast attract them and such countless numbers perish by being beaten against the lighthouses, many more birds being killed in the fall season of migration than in the spring, when the weather is less stormy.

They fly in vast numbers, and often on still nights they can be heard calling to each other. A good idea of their number can be obtained by the use of a telescope, which, if focused on the moon, will often show the birds on a brilliant background so that they can readily be discerned. The motion of their wings can easily be seen in this way, and the immense numbers of them better realized.

A good way to form an idea of the distance covered each year by the birds as they migrate is to take a single bird and note its journey. The bobolink makes his winter start in August, rests awhile in the marshlands and then visits the rice belt of the Southern states, doing damage directly and indirectly each year to an amount covering several millions of dollars. Then he flies over Cuba, and there his name is *chambergo*. Next he lingers along the coast of Yucatan, then goes on south through Central America and the island of Jamaica, in which place they call him "butter-bird," on account of his great plumpness, the result of the rice-feeding, no doubt; and from this place he makes one continuous long journey for over four hundred miles to Brazil, where he spends the winter. Here he stays until early spring, and then, if no accident has come to him, he will again brighten our months of blossoms by his chipper presence and his delightful song.

One of the most curious things observed in the fall migration of birds is in this same bobolink. By some manner of means many of these birds have gone west, some as far as Utah, to spend their summers, and when the winter is coming they, too, take their flight south, but not by the direct way through Mexico, and then to Central America, as would seem most natural, but following their hereditary instincts they come back to the Atlantic coast and journey down it, along the whole way to Florida, then across to Cuba, and on with those from New Jersey and New England until the winter resting-place is reached. This bird gives a most conclusive and interesting illustration of the permanency of bird routes and the "hereditary habit" of the winged flocks.—*Bangor Commercial.*

HORNBLENDE.—A mineral species, placed by Dana in the augite section of the anhydrous silicates. In common use the name is limited, as it was formerly applied only to the dark crystalline minerals which are met with in long, slender prisms, either scattered in quartz, granite, etc., or generally disseminated throughout their mass. The color of the mineral is usually black or dark green, owing to the presence of much iron. It appears to have been produced under conditions of fusion and cooling which cannot be imitated in the laboratory, the crystals obtained artificially being of augite type.

MALACHITE.—One of the native carbonates of copper. It is sometimes crystallized, but more often occurs in concretionary masses of various shades of green, which are generally banded or arranged in such a manner that the mineral, which takes a fine polish, is much prized as an ornamental stone. Great quantities of it are found in the Siberian mines, and many beautiful objects are manufactured from it.

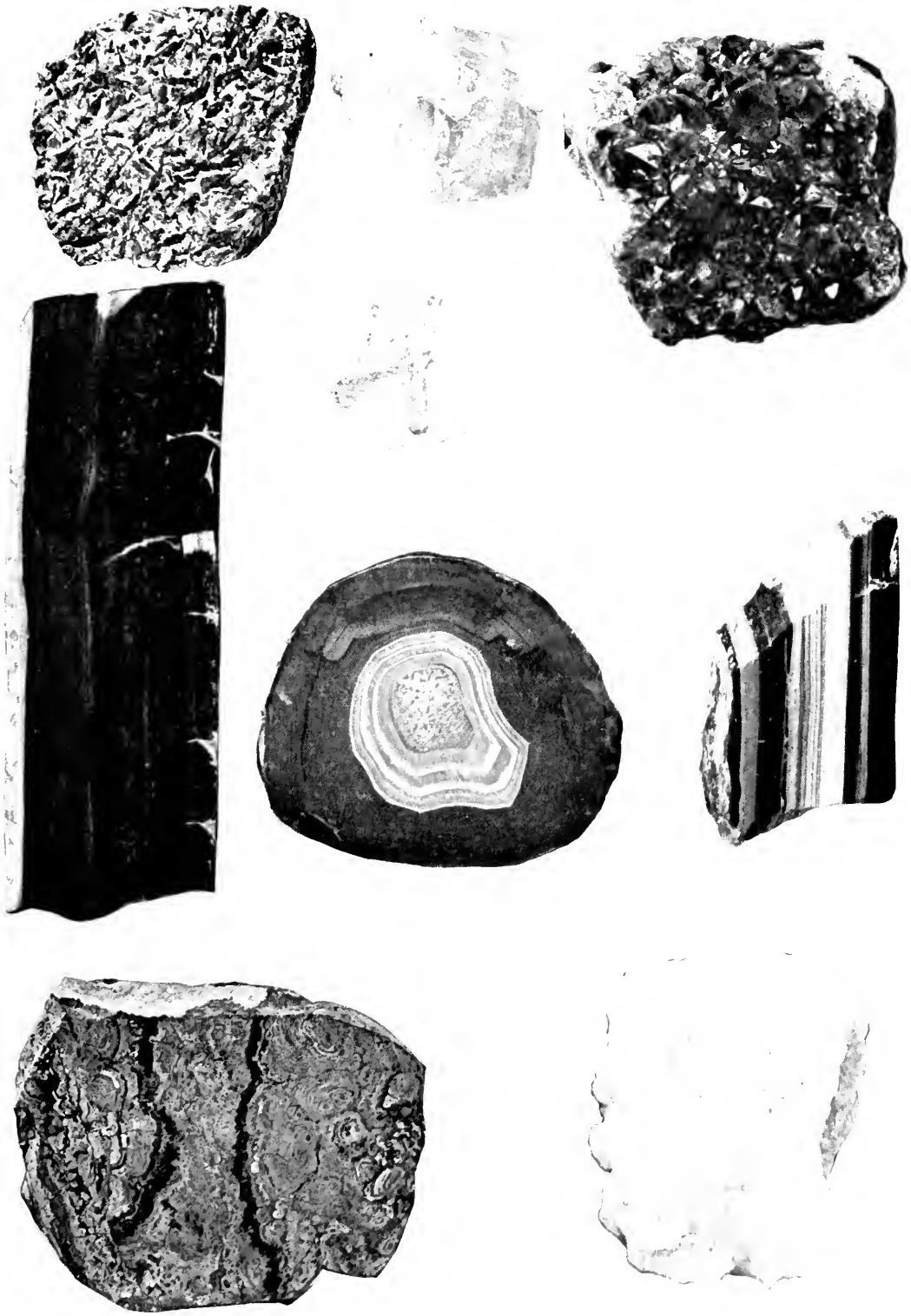
QUARTZ.—The most abundant of all minerals, existing as a constituent of many rocks, composing of itself the rock known as quartzite or quartz rock and some of the sandstones and pure sand, forming the chief portion of most mineral veins. In composition it is silica, and when uncontaminated with any foreign intermixture it appears in clear, transparent crystals like glass or ice. Pure quartz is largely employed in the manufacture of glass and is commonly obtained for this purpose in the form of sand. Quartz veins with few exceptions form the gangues in which gold is found.

TOURMALINE.—A name applied to a group of double silicates, composed of many other minerals. The color of tourmalines varies with their composition. The red, called rubellite, are manganese tourmaline containing lithium and manganese, with little or no iron; the violet, blue and green contain iron, and the black are either iron or magnesium-iron tourmalines. Sometimes the crystals are red at one extremity and green at the other, or green internally and red externally, or *vice versa*. Pink crystals are found in the island of Elba. Tourmalines are not often used in jewelry, although they form beautiful gems and bear a high price. A magnificent group of pink tourmalines, nearly a foot square, was given by the king of Burmah to Col. Sykes, while commissioner to his court. The tourmaline appears to have been brought to Europe from Ceylon by the Dutch about the end of the seventeenth century, and was exhibited as a curiosity on account of its pyro-electric properties.

AGATE.—Of the quartz family, and is one of the modifications in which silica presents itself nearly in a state of purity. Agates are distinguished from the other varieties by the veins of different shades of color which traverse the stone in parallel concentric layers, often so thin as to number fifty or more to an inch. Externally the agates are rough and exhibit no appearance of their beautiful, veined structure, which is exposed on breaking them, and still more perfectly after polishing. Though the varieties of agate are mostly very common minerals in this country as well as in the old world, those localities only are of interest which have long been famous for their production and which still furnish all the agates required by commerce.

AMETHYST.—So named because it was supposed by the ancient Persians that cups made of it would prevent the liquor they contained from intoxicating. The stone consists of crystallized quartz of a purple or blue violet color, probably derived from a compound of iron and soda. The color is not always diffused through it, and is less brilliant by candlelight.

SERPENTINE.—Serpentine differs in composition from the other marbles. It is a soft mineral of different shades of green, of waxy luster, and susceptible of a high polish. It is better



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MINERALS.

HORNBLENDT. ROSE QUARTZ. AMETHYST.

PINK TOURMALINE RUBELLITE

CROCIDOLITE. AGATE SERPENTINE.

MALACHITE SULPHUR.

adapted to ornamental work within doors than to be exposed to the action of the weather.

SULPHUR.—An elementary substance belonging to the class of metalloids. It has been known from the earliest times as the product of volcanoes, and as a natural mineral deposit in clay and marl formations. It also exists in primitive rocks, as granite and mica.

ACCIDENTS TO BIRDS.

GUY STEALEY.

STRANGE accidents happen to birds as well as to people, and some of them are as unexplainable as those that fall to our lot. I remember finding a meadow lark suspended from a barbed-wire fence several years ago, dead, its throat pierced by one of the sharp barbs. The bird had apparently attempted to fly between the wires and, miscalculating the distance, had dashed against the barb.

Another curious case which came under my notice was that of a small water bird. While walking along the bank of the river flowing through our place, I discovered the little fellow dangling from a willow, his head firmly wedged in one of the forks. He had been there some time, and how he ever got caught in that fashion is a mystery.

But the strangest mishap of all I ever witnessed occurred last summer. I was picking peas in the garden when my attention was attracted by the fluttering and half choked cries of a bird a little distance from me. Hastening to the place I found a brown field bird hanging from a pea vine. Around its neck was a pea clinger, which formed a perfect noose. As nearly everyone knows, pea clingers form into all imaginable shapes. The bird was feeding under the vines and, being frightened by my approach and in trying to escape, had thrust its head through the clinger with the above result. I soon freed it and saw it fly away but little the worse for the adventure.

To the Editor of BIRDS AND ALL NATURE:

I find your periodical most interesting and instructive, as it brings one into closer relation with all forms of life.

Better than a knowledge of Hebrew, Greek and Latin is it to know what the birds, the trees, and flowers all say, what the winds and waves, the clouds and constellations all tell us of coming events.

There is a world of observation, thought and enjoyment for those who study nature in all her varying moods that is denied those who, having eyes see not and having ears hear not.

In looking over BIRDS AND ALL NATURE I have noticed with pleasure some articles from the pen of Caroline Crowninshield Bascom that have particularly pleased me. Her interpretations of what her pet cats and birds have to say, their manifestations of intelligence, and the sentiments of affection, or envy, jealousy, and malice; their obedience and their moralities under her judicious training. A woman who can train a cat to live in harmony with a bird, to see each other caressed in turn by a beloved mistress, should be on the county school board as a successful educator. For boys and girls can be more easily trained than those in the lower forms of life. I trust Miss Bascom will not try to harmonize the cat with rats and mice, lest those natural-born thieves increase to such an extent that every municipality will be compelled to have traps and police in every nook and corner, in every cellar and garret of all our private and public buildings. There is a limit, dear Miss Bascom, to peace and good will on earth.

ELIZABETH CADY STANTON.

New York, July 1, 1899.

THE INFLUENCE OF PICTURES.

J. P. M'CASKEY.

IF IT is a very good thing to hang attractive pictures on the walls of the home, then it is doubly so thus to ornament the walls of the schoolroom. "In the emptiest room," says Ruskin, "the mind wanders most, for it gets restless like a bird for want of a perch, and casts about for any possible means of getting out and away. Bare walls are not a proper part of the means of education; blank plaster about and above them is not suggestive to pupils." The landscape makes a bright opening through the dead wall like a window; flowers and ferns are suggestive of the garden, the lane, the field, the woods, the purling stream; of songbirds in the air or among the branches, and blue sky overhead. Animals suggest a life with which we should be more or less familiar. The portrait speaks the man, what we know of him, suggesting trains of thought that may be most interesting and profitable.

A mother wondered why her three brave lads had all gone to sea from an inland home. She was speaking, in her loneliness, with a friend who had called upon her, and she could not suggest any reason why they should all have adopted the sea-faring life when none of their friends or relatives had been sailors. The man observed a picture of a full-rigged ship hanging above the mantel. It was perhaps the only picture in the room, at least the only one at all conspicuous. A thought struck him. "How long has that picture been hanging there?" he asked. "Oh, it has been there ever since the boys were little children." "It was that," he said, "that sent your boys away. The sea grew upon their imagination until they longed for it, and sought it, and so they are gone."

So a striking or attractive picture, in the schoolroom as in the home, may sink deep into the heart of the child, and mean far more to him than much of the work which the school program usually imposes. He may forget the name and lose all recollection of the personality of the teacher and of most of his schoolmates, but the striking picture is a picture still. That he will always remember. In our experience, as we grow older, if we are at all observant, we know more and more the value of these things—how great a factor in education they may become!

Men wonder sometimes how they can expend a modest sum of money to good purpose in giving pleasure and profit to others. Get some pictures of good faces, and flowers, and landscapes, and other proper subjects, and put them upon the walls of your nearest schoolhouse, or of some other in which you may be interested. When you have done this for one school you may want to do it for a second, or you will suggest to some other generous heart the like gift of enduring value. What chance have boys and girls with a dead-alive teacher in a school-house whose blank walls are eloquent of poverty? Oh, the weariness of it!

Real, genuine, helpful, beautiful art is now brought within reach of the million. The arts of chromo-lithography and half-tone engraving are putting exquisite pictures, at low cost, wherever there is taste to appreciate and enjoy them. In our homes they are everywhere. Why not everywhere also upon school-room walls bare of these choice educational influences? To many a child good pictures come like the ministrations of the angels. We feel this, we know it; and for the years remaining to us shall do what we can to make school-life better for the pictures on the wall.

THE SEA-CHILDREN.

COLE YOUNG RICE.

"Oh, mother, I lay
A-dreaming one day
By the wreck of the Alberdeen,
And I heard a singing
Under the sea
Of children swinging—
Their hair was green!—
In seaweed swings, and they called to me—
Oh, mother, they called to me"—

"Hush, hush thee, my child!
Thy prattle is wild,
For the children that dwell in the sea
Are the fishes swimming
Amid white shells
Whose pearly hymning
But echoed to thee
The strangled songs of the sinking swells—
My child, 'twas the song of the swells."

"And, mother, they said
"Come to us!—oh, dread
Not the waves tho' they fret and foam;
They're far, far over
Us while we play
Beneath the cover
Of our sea-home,
All day, all day o'er the beds of the bay!'
Oh, mother, the beds of the bay!"

"Hush, hush thee, my child!"—
But strangely he smiled
As he gazed at the weird-lit waves.
For he heard a singing—
"Come to us, come!"
He saw them swinging
In crystal caves,
And cried, "I'm coming! I'm"—ah, how numb
His death-dewy lips—how numb!

NATURE STUDY IN THE PUBLIC SCHOOLS.

AT THE Shaw banquet in St. Louis the subject for the evening was "Horticultural Education," and a good deal was said as to the introduction of the study in the public schools.

On the question of its interfering with other school work, Prof. Jackman of Chicago said: "The intimation has been thrown out here to-night that perhaps the child's study of nature might interfere with something else in the schools. I can assure such objectors that it will interfere with some of the things they are taught. It will interfere with some of the dull routine that you and I can recollect, which we passed through when we were in these schools. The children have waited all too long for such an interference."

State Superintendent of Schools Kirk, said: "It is my firm conviction that a large part of what we now call 'geography' should be eliminated from the school curriculum. Much of it is so worthless or misleading as to retard education and exhaust the children's energies without any definite purpose. Children should learn about the country they live in, rather than the remote regions of Asia and the Arctic Zone."

One speaker declared that the recreation time can be restfully utilized for nature-study work. Memory is good but observation is better, and teachers are asking for specimens of fruits, nuts, grains, grasses, woods, leaves, twigs, buds, and flowers.

BIRDS AND ORNITHOLOGISTS.

BIRDS has entered upon a new year with the satisfaction of having pleased its readers as well as having rendered actual service to the cause of education, ornithological literature and art. Nature with her usual prodigality has scattered thousands of rare and attractive birds throughout the world, and of these the editor of BIRDS selects the most interesting species, the loveliest forms and the richest plumage for preservation by means of magnificent illustrations, obtained through the expensive process of color photography. A unique treatment of text makes the magazine interesting and instructive to old and young alike. The people of this locality are noted for being lovers of birds and students of nature, and it has given the three greatest naturalists the world has ever known. This is the native heath of Audubon and Robert Dale Owen. Mr. S. G. Evans, the well-known dry goods merchant of this city, has a very fine and complete set of Audubon's birds. All this fills our eyes to think what the world lost in the death of William Hamilton Gibson. He made all life seem related to our lives, all being to appear one substance, all to be worthy of interest, sympathy, love, and reverence. There are strange and beautiful stories told of his power to attract and handle the shyest creatures. Once, it is said, he went to a public library in Brooklyn to make a sketch of some rare butterfly, and had found a book of plates from which he was studying his subject, when, lo! there floated into the great room one of the very specimens he desired to picture, fluttered down upon the open page, and at last rested with throbbing wings beside its own portrait. On one election day, Mr. Gibson went to vote, and as he was studying his ticket, there came in at the open door, no one knew whence, a stray pigeon, which flew at once to him and perched upon his shoulder. He caressed it in his tender fashion, and murmured to it, and then it flew away, no one knew whither. Once, too, as he sat upon his veranda at The Sumacs, his country home in Connecticut, describing to a visitor the peculiar markings upon the wings of a certain song-bird, he suddenly arose, stepped to a bush upon the lawn, and coaxed into his hand the very bird of which he was talking, and which he brought to show to his astonished guest. This sympathy with the world of life outside of man fills his text and his illustrations to overflowing.—*Evansville (Ind.) Courier.*

ACCORDANCE OF NATURE.

For Nature beats in perfect tune,
And rounds with rhyme her every rune,
Whether she work in land or sea,
Or hide underground her alchemy.
Thou canst not wave thy staff in air,
Or dip thy paddle in the lake,
But it carves the bow of beauty there,
And the ripples in rhymes the oar forsake.
The wood is wiser far than thou;
The wood and wave each other know.
Not unrelated, unaffied,
But to each thought and thing allied,
Is perfect Nature's every part,
Rooted in the mighty heart.

—*Emerson.*

O painter of the fruit and flowers,
We thank thee for thy wise design,
Whereby these human hands of ours
In Nature's garden work with thine.
And thanks that from our daily need
The joy of a simple faith is born.
That he who smites the summer weed
May trust thee for the autumn corn.
Give fools their gold and knaves their power,
Let fortune's bubbles rise and fall,
Who sows a field or trains a flower
Or plants a tree is more than all.
For he who blesses most is blest,
And God and man shall have his worth
Who toils to leave as a bequest
An added beauty to the earth.

—*Whittier.*

CHICAGO:
A. W. MUMFORD, PUBLISHER

WATER LILIES.

THE WATER LILY.

THIS is the name of an aquatic plant of the genus *Nymphæa*, distinguished for its usually very fragrant flowers and large, floating leaves; applied also to the yellow pond lily of the genus *Nuphar*. The species alba has a large flower filled with petals, so as almost to appear double; it raises itself out of the water and expands about seven o'clock in the morning, and closes again, reposing upon the surface, about four in the afternoon. The roots have an astringent, bitter taste. They are used in Ireland and in the island of Jura to dye a dark brown or chestnut color. Swine are said to eat it, goats not to be fond of it, kine and horses to refuse it. The flowers, the herb, and the root were formerly used in medicine, but are all now obsolete.

The lotus resembles our common white species in the form of the flower and leaves, but the latter are toothed about the edge. It is a native of the hot parts of the East Indies, Africa, and America, is very common in parks, lakes, and rivers in Jamaica and grows in vast quantities on the plains of lower Egypt, near Cairo, during the time they are under water. It flowers there about the middle of September and ripens toward the 12th of October. The Arabians call it *nuphar*. The ancient Egyptians made a bread of the seed of the lotus dried and ground.

All the species of water lilies grow well in large pots of water with a few inches of rich soil at the bottom. They are propagated by dividing the root, and some sorts which produce bulbs are increased by the offshoots from these. Mr. Kent, who cultivated these plants to great perfection, found that the bulbous-rooted nymphæa, if limited in their growth for want of water, or from cold or excessive heat, were apt to form bulbous roots and cease growing for the season. Hence the necessity of water and heat to make them flower freely.

The plant known especially in this country as the water lily, frequently as pond lily and sometimes as water nymph, was dedicated by the Greeks to the water nymphs. The fruit, which ripens under water, is berry-like, pulpy and thin, and each of its numerous seeds is enveloped in a thin sac. Of about twenty species two are found in the United States. Our common species has almost circular leaves, which often cover a broad surface of water on the margins of lakes and ponds, forming what are known as lily pads. The flowers are often over five inches across, of the purest white, and have a most agreeable sweet scent. In some localities the flowers are tinged with pink, and they are found, though rarely, with the petals bright pink throughout. The leaves also vary in size and sometimes are crimson on the under side. The root stalk, as large as one's arm and several feet long, is blackish outside and marked with scars left by the leaves and flower-stems; it is whitish within. Though the plant often grows in water several feet deep, the leaf and flower accommodate themselves to the depth, and they may sometimes be found where there are but a few inches of water.

At a place called Dutchman's Slough, we are informed by Mr. George Northrup, about half a mile above the outlet of Calumet Lake, south of Chicago, grow great quantities of water lilies, which are gathered every season for the Chicago market.

THE WHITE SWAN.

THIS magnificent bird is well known from being kept in a half-domesticated condition throughout many parts of Europe, whence it has been carried to other countries. In England, according to Newton, it was more abundant formerly than at present, the young being highly esteemed for the table. It was under special enactments for its preservation, being regarded as a "bird royal," which no subject could possess without license from the crown, the granting of which license was accompanied by the condition that every bird in the "game," the old legal term, of swans should bear a distinct mark of ownership on the bill. Originally this ownership was conferred on the larger freeholders only, but it was gradually extended, so that in the reign of Elizabeth upwards of nine hundred distinct swan marks, being those of private persons or corporations, were recognized by the royal swanherd, whose jurisdiction extended over the whole kingdom. At the present time the Queen's companies of Dyers and Vintners still maintain their swans on the Thames. The largest swanery in England is that belonging to Lord Ilchester.

It has been stated that the swan was introduced into England in the reign of Richard Cœur de Lion; but it is now so perfectly naturalized that birds having the full power of flight remain in the country. There is no evidence to show that its numbers are ever increased by immigration from abroad, though it is known to breed as a wild bird in the extreme south of Sweden, whence it may be traced in a south-easterly direction to the valley of the Danube.

The nest of the swan is a large mass of aquatic plants, is often two feet high and six feet in diameter. The eggs are from five to nine in number, of a grayish-olive color. The young are hatched in five to six weeks, and when hatched are clothed in sooty-gray down, which is succeeded by feathers of dark soot-gray. This suit is gradually replaced by white; but the cygnets are more than a year old before they lose all trace of color and become wholly white.

The swan of North America is considerably larger than that of the old world. The first species is the trumpeter, so-called, of which the bill is wholly black, and the second (*Cygnus columbianus*, or *americanus*) has the colored patches on the bill of less extent and deepening almost into scarlet.

Fossil remains of more than one species of swan have been found.

Our picture presents this stately bird swimming among water lilies, a sight that may be seen in summer in some of our American parks, notably the Central Park of New York City. Chicago and Cincinnati have some fine specimens. For portrait and sketch of the black swan, see Vol. III, pp. 66, 67.

NEBRASKA'S MANY BIRDS.

NEBRASKA is distinctively the bird center of the United States. It contains more species than any other state in the Union, and ornithologists who have studied its feathered possessions have classified 417 distinct species that may be seen within its boundaries. Of these 225 species breed here and the remainder are migrants who drop in on us at certain seasons and then pass on to their breeding-grounds. The natural features of Nebraska are largely responsible for this remarkable variety of feathered population. It includes a diversity of country that offers attractions for hundreds of songsters. For instance, the mocking-bird and the cardinal grosbeak, who are distinctive Southern birds, frequently appear in the southern corner of the state, and in the west we have a large number of what are usually regarded as mountain birds, but which come down from the foothills at intervals to the kingdom of Quivera.—*Omaha Bee.*

LURLALINE.

Old Irish Air.

There was a little water sprite, her name was Lurlaline;
Amid the water lilies white sometimes she might be seen.
She was a fairy child, Lurline, could sit secure and cool,
Upon those lily leaves so green you see in some lone pool.

There would she sit the summer day, singing a song so bright;
You never heard the song, you say, and don't believe it quite?
But that perhaps is just because when you quite near her stood,
You did not notice where she was, or listen as you should.

It happened in the month of June, the happy summer time.
She always sang a lovelier tune and wove a lovelier rhyme,
And you, too, like to Lurlaline, a lovelier song would sing,
If only you knew what they mean, the flowers and ev'ry thing.

If you were like a water sprite—the water sprites know well
The wondrous things of day and night, and all they have to tell;
They know and love the creatures wild, and all the flowers that grow;
They live with them and love them well, God's hidden pets they know.

And now if you want more to know what Amodine saw there,
You first must love all things below, in water, earth, and air;
You first must love all things that move among the trees and flowers,
And then you shall have more to love in shining fairy bowers.

A CONTRIBUTION TO CHILD-STUDY LITERATURE.

IT HAS been a blessed thing for the child and for humanity that the former has at last attracted our attention in a way to force upon us the conviction that it is time we found out what to do with him. People of scientific bent think this can be done by measurement and test experiments. Many fond and utterly unscientific mammas think it can be done by an all-absorbing deference to the child's whims; by setting the child on a pedestal and pouring ointments over him and bringing him sweetmeats and nectar on silver platters. I am not sure but it was this latter conduct on the part of the parent that called the attention of teachers to the need of a thorough study of the child and his requirements. For nothing else is so detrimental to the child's development as this growing tendency to pamper him.

The old method of treating the child was to ignore him; to let him be seen and not heard; to think that because he was young he could run errands all day, eat what was left at table, sleep in the coldest bed at night, and be thrust into the corner as an undesirable piece of furniture. Now the custom is exactly the reverse. In most well-to-do families the child is the central figure, and the parents stand around to minister to him. Nothing is too rich for him, and he becomes the darling, terror, and tyrant of the household.

As between the old boxing-glove method and this modern kid-glove method of handling the child the former is preferable—the hardier ones survive; but no character is proof against the seductive enervation of pampering.

These facts in regard to the development of youth have not escaped the notice of that keenest of observers, Rudyard Kipling. In "Captains Courageous" he has given us his opinion as to the best means of rescuing boys and girls who threaten to become utterly worthless, and of transforming them into useful men and women.—*Child-Study Monthly.*

THE YELLOW PERCH.

(Perca fluviatilis.)

THIS is a fresh-water fish and is generally distributed over Europe, northern Asia, and North America, and so well known as to have been, it is said, selected for the type of an entire family of spiny-rayed fishes, the *percidæ*, which is represented in European fresh waters by several other fishes such as the pope and the pike-perch. It inhabits rivers as well as lakes, and thrives best in waters of a depth of not less than three feet; in large, deep lakes it frequently descends to depths of fifty fathoms and more. It occurs in Scandinavia as far north as the 69th parallel, but does not extend to Iceland or any of the islands north of Europe. In the Alps it ascends to an altitude of four thousand feet.

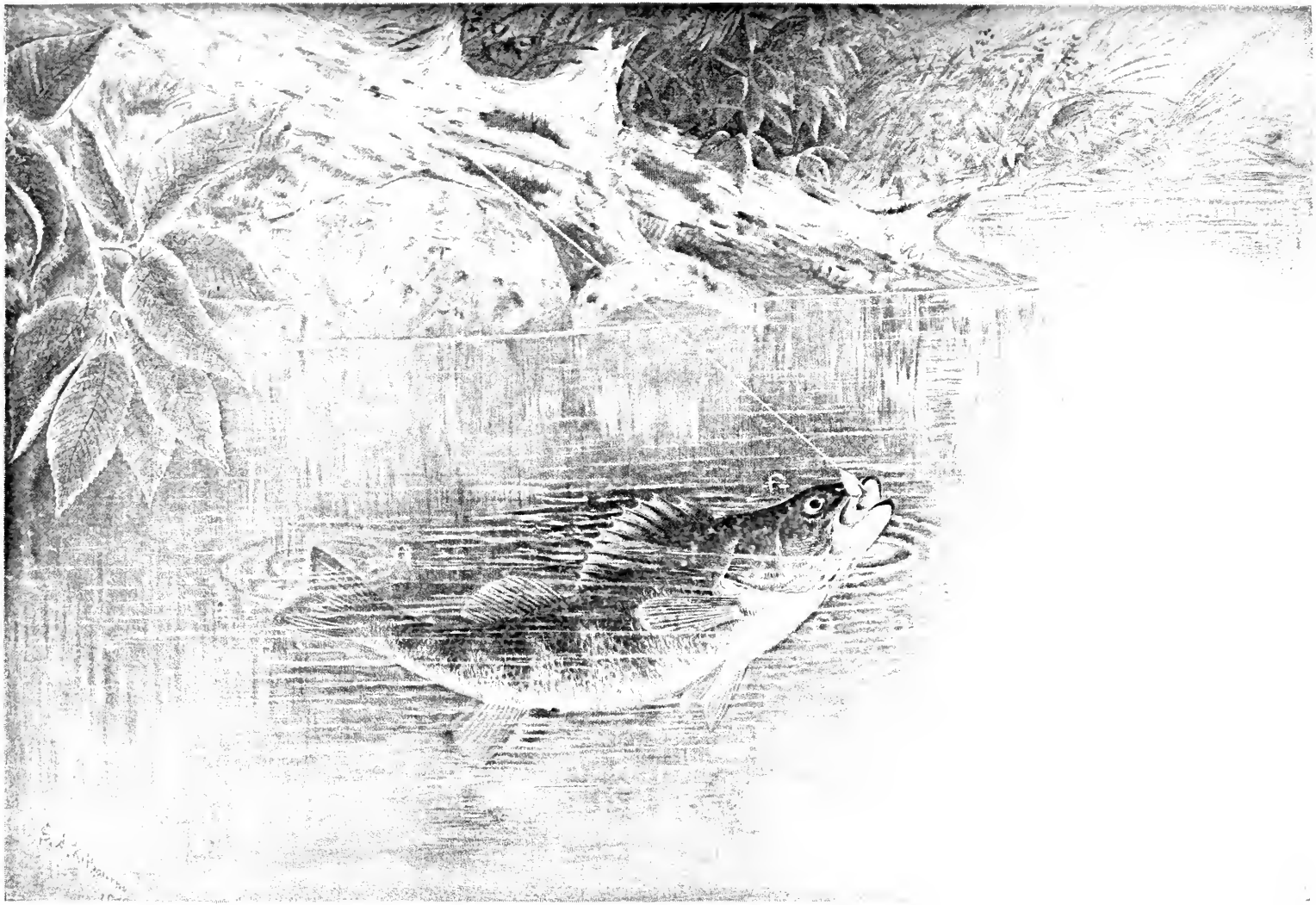
The shape of the body of the perch is well proportioned, but many variations occur, some specimens being very high-backed, others low and long-bodied. Sometimes such variations are local, and Agassiz and other naturalists at one time thought it possible to distinguish two species of the common perch of Europe; but it can be separated specifically from the North American form. The brilliant colors of the perch render it easily recognizable even at a distance. A rich greenish-brown, with golden reflections, covers the back and sides, which are crossed with five or seven bands. A large black spot covers the membrane between the last spines of the dorsal fin, and the lower parts are bright vermillion. In the large, peaty lakes of North Germany a beautiful variety is not uncommon, in which the golden tinge prevails, as in a gold-fish.

The perch is carnivorous and voracious. It wanders about in small shoals within a certain district, playing havoc among small fishes, and is therefore objectionable in waters where more valuable fry is cultivated. Perch of three pounds in weight are often caught; one of five would now be regarded as an extraordinary specimen, though in rare instances we read of individuals exceeding even that weight. An old fisherman, Mr. George Northrup, a man of rare intelligence, tells us that of thousands of perch caught by him he never took one that weighed above three pounds.

Perch are good, wholesome food and highly esteemed in inland countries where marine fish can be obtained only with difficulty. The nearly allied pike-perch is one of the best European food fishes. It is very prolific, begins to spawn when three years old, in April or May, depositing the ova on water plants.

MOUNTING OF BIRDS.

THE mounting of birds and the small animals of the field and forest is an art which is possessed by few people, yet which is not difficult and which especially appeals to the lover of nature. It is an art which it is well worth while popularizing, for it can be made the vehicle for the expression of a great deal of beauty, while preserving and making use, in the interests of scientific study, of materials which otherwise would be irretrievably lost. There has been need for some time of an authoritative work on the subject, something which would enable the amateur to mount birds and animals and which would be full and complete as to the information it conveyed. This want has been met by Mr. John Rowley, the chief of the Department of Taxidermy in the American Museum of Natural History, who has written a convenient volume of something over two hundred pages on "The Art of Taxidermy," which has just been published by the Appletons. In the foreword with which the author introduces the book he says that the name "taxidermy" was formerly applied to the trade of most inartistically upholstering a skin, but that of late years it has made wonderful strides.



BIRDS IN TOWN.

ELLA F. MOSBY.

WRENS are friendly to man. The little house wren in summer, and the Carolina wren in winter, give us a merry roundelay for all sorts of weather. Bewick's wren, Mr. Torrey says, "greatly prefers the town to woods and meadows," and even the winter wrenkin, dear little saucy brownie that he is, vouchsafes us a glimpse of himself now and then in the city. As for the bigger kinsfolk, the mocking-bird and catbird, they love the shrubbery of our lawns, and gardens, and sing close at hand. Nor are the thrushes, shy as they are in the breeding season, hard to discover during the migrations. A Swainson's thrush will sit for an hour or so, almost within touch, his big liquid eyes regarding his human neighbors placidly.

Strange to say, I have seen but few swallows or sparrows in town, except the chipping or "door-step" sparrow and the purple martin which belongs to the swallow tribe, though the misnamed chimney swallow does *not*. The song of the martin, "like musical laughter rippling through the throat," and the "giggling twitter" of the chimney dweller, often seem to drop to us out of the air as they dart overhead. Even pewees and cuckoos visit us after their broods are reared, the wistful cry of the first and the rattling call of the latter, sounding oddly from some tall tree close by the crowded street. At this time too, the grackles perch upon the roofs, and nighthawks and whippoorwills are heard overhead in the dusky twilights.

One would not naturally expect to find game birds or birds of prey in a city, yet the Virginia quail frequently sends forth his ringing "bob white!" from any low roof or fence in the spring or early fall; and more than once long-billed water-birds have been caught by the street lamps at night. The eerie, tremulous cry of the little screech-owl sounds from the apple tree, and in winter he flies with a soft thud against the window pane, attracted by the light shining through the snow. Some owls choose a belfry tower as their favorite shelter, and live there year after year.

Our most glorious bird-day is when the orioles appear in flashing black and gold with ringing whistle, or their orchard cousins in ruddy chestnut tints, alternately singing and scolding, *chack! chack!* and little later, come the scarlet and summer tanagers to the parks and public gardens, lighting up the tall trees with their splendid color, and making the neighborhood ring with their *chip-chur* and *chicky-tuck!* as if in call and answer. One day I saw these, and not far away, the crested cardinal, glowing like a tropical flower, and the red-headed woodpeckers close by, and some redstarts glittering and flitting from bough to bough, truly a study in red!

As for the smaller birds, humming birds, kinglets, vireos, and warblers, the trees of any city yard will be a frequented hostelry for all during their wonderful journeys, and for many as a summer home. Those that love the tree tops are seen all the better by human inhabitants of upper stories, and some of our most charming bird-books give us the experiences of a busy woman in a New York flat, or of another in a Chicago back yard, and of more than one invalid, watching these free, joyous lives with unenvious delight. A good glass, either opera-glass or field-glass, will open many a pretty bit of house-weaving, and brood-rearing to an observer shut in by walls and pavements, and bring many a pleasant acquaintance. At this very moment, a slender grey catbird glides through the boughs close by my upper window, with a low *chuck, chuck!* as I glance at him. He knows I am a friend, but would fain enjoin silence, for a black cat prowls below.

THE OVENBIRD—GOLDEN-CROWNED THRUSH.

NELLY HART WOODWORTH.

A MARVELOUS choral is the rare ecstasy song of the ovenbird (see Vol. III, 126–7). It was first recorded, at a comparatively recent date, by that versatile writer—poet, essayist, naturalist—Mr. John Burroughs. After speaking of the bird's easy, gliding walk, it being one of the few birds that are *walkers*, not *hoppers*, he says its other lark trait, namely, singing in the air, seems not to have been observed by any naturalist. Yet it is a well-established characteristic, and may be verified by any person who will spend a half-hour in the woods where this bird abounds on some June afternoon or evening. I hear it frequently after sundown when the ecstatic singer can hardly be distinguished against the sky. Mounting by easy flights to the top of the tallest tree, he launches into the air, with a sort of suspended, hovering flight, and bursts into a perfect ecstasy of song—clear, ringing, copious, rivaling the goldfinch's in vivacity and the linnet's in melody. Its descent after the song is finished is rapid, and precisely like that of the titlark when it sweeps down from its course to alight on the ground.

The same writer speaks of waking up in the night, just in time to hear a golden-crowned thrush, the ovenbird, sing in a tree near by. It sang as loud and cheerily as at midday. My first acquaintance with this rare overture was at the close of a hot day in July, as I was walking with a naturalist. A splendor floated in the air like a musical cloud as strange notes of gladness rang through the twilight with the clearness of a silver bugle. It came again, a clear, sweet, outpouring song, which I recklessly attributed to several goldfinches singing, as they often do, in concert. The trained ear of the naturalist was not so easily deceived, and when my attention was called to the more gushing character of the melody I wondered that it could have escaped notice. It was a very irrigation of song, the bursting of some cloud overhead that scattered melodious fragments all about, a mating-choral unheard, probably, after the nesting season is over.

Entering the woods in early summer this bird is sure to shake out its ordinary, rattling chorus — "Teacher, *Teacher*, TEACHER," the notes delivered with tremendous force and distinctness and the emphasis increasing—a vibrant, crescendo chant as unlike the brilliant ecstasy song as can be imagined.

The ovenbird is also called the golden-crowned thrush, for no conceivable reason unless it is that the bird is *not* a thrush, but classed with the warblers. Or is it that its white breast, thickly spotted with dusky, resembles the thrush's? There is a peculiar delicacy in the texture of its olive-green robes, as fine as if woven in kings' houses, while, set deep in hues of the raven's wing, it wears that regal appurtenance—a crown of gold.

While watching from a rocky height a pair of hermit thrushes that were housekeeping in a hemlock beneath, an ovenbird flew from a maple bough to a high clump of ferns near by. In its beak was a quantity of dry grass, bulky material that interfered sadly with both walking and flight. The small burden-bearer managed, however, to progress slowly, moving its head from side to side to disentangle the grasses and lifting its little feet in the daintiest manner, until it disappeared where the ferns were thickest. Pretty soon it came in sight again, sauntered about with diverting nonchalance, and was off, alighting upon the same bough to drop down into the same corner of the thicket. This behavior was not without an inference; it was an advertisement of future hopes too plainly written to escape notice; I might have been stone blind and seen straight into the future! The

nest must have been within a circle of a few feet, but with rank greenery above and underfoot the accumulated leafage of the ages, soft and penetrative as if placed layer by layer for the bird's special accommodation, any square foot might have held the treasure and kept the secret of possession.

Soon after a farmer told me of a strange nest, a curiously covered house with a low door, within which the sitting bird could be seen. The bird's flight as it left the nest first attracted his attention, just in time to prevent his foot from crushing through the roof. He had never heard of oven-birds or of roofed-over nests, and was so interested in this new page of natural history that "once a day when he went for the cows he went round that way to see how things were getting on there."

"Every time I went," he said, "I expected to find that the cattle had spoiled it!"

After describing his interesting tenants he offered to share the pleasure of their acquaintance, saying most kindly, "I wouldn't mind leaving the hayfield any time to take you there! I've done my share of haying, I guess; the boys don't want me to work so hard; come up to-morrow and I'll go with you!"

I was there with to-morrow and was, if possible, more amazed at the adaptation of the "oven" to its surroundings than with the structure itself.

The bird was sitting and not at all disposed to leave on our account; she merely drew in her pretty head, cuddled closer to the ground, and waited. Both house and tenant were so thoroughly blended in color with the environing leafage that, when pointed out, it was difficult for the eye to locate them. Possibly the brave little housekeeper divined the situation; or did she presume upon a previous acquaintance with the friendly farmer? The proprietor of the establishment, a little man-milliner with a bow of orange ribbon in his bonnet, sang through the fragrant morning as if glad of an opportunity of speaking to a gracious audience, interlarding his song with rushing over to his family—*vault*, I was going to say, for being sunken a bit in the ground and dark within, it suggested a mausoleum. A tiny ledge of slate, tilted vertically, made a strong wall upon one side of the small estate; young beeches, kept down by browsing cattle, grew where the rear-gates should have been, and a maple twig partially screened the entrance. Evergreen ferns crowded between the "oven" and the wall, their leaves interlaced, above the roof, with others opposite, the tips of two being caught down and interwoven with the roofing. The nest was made of dry leaves, lapped and overlapped, padded and felted in one compact arch—a veritable arch of triumph! Upon July 15th six creamy-white eggs, dotted with brown and lilac, lay safe within, these being duly replaced by a round half-dozen "little ovens," whose mouths were always open. Indeed, more food was shoved into those open-mouthed storehouses than would have supplied a village bakeshop, and still there was room for more. Warm rains soon gave the nest an unyielding texture; so matted and felted that the full weight of the hand left no impression, and I questioned whether the foot, set plumply down, would have crushed it out of shape entirely.

When the young birds had flown I brought home the nest as a unique souvenir of summer. Removed from the picturesque setting it was no longer interesting; its charm was that of environment; its beauty the marvel of adaptation.

So surely does Nature equip each bird with an individuality that distinguishes it from all others! Not only have they common rules followed in obedience to the law of instinct, but each species has special gifts developed according to the law of its nature, a law of harmony so delicately enforced that the law itself is not perceptible.

INSECT LIFE UNDERGROUND.

L. O. HOWARD, PH. D.,
Entomologist U. S. Department of Agriculture, and Curator Department of Insects, U. S. National Museum.

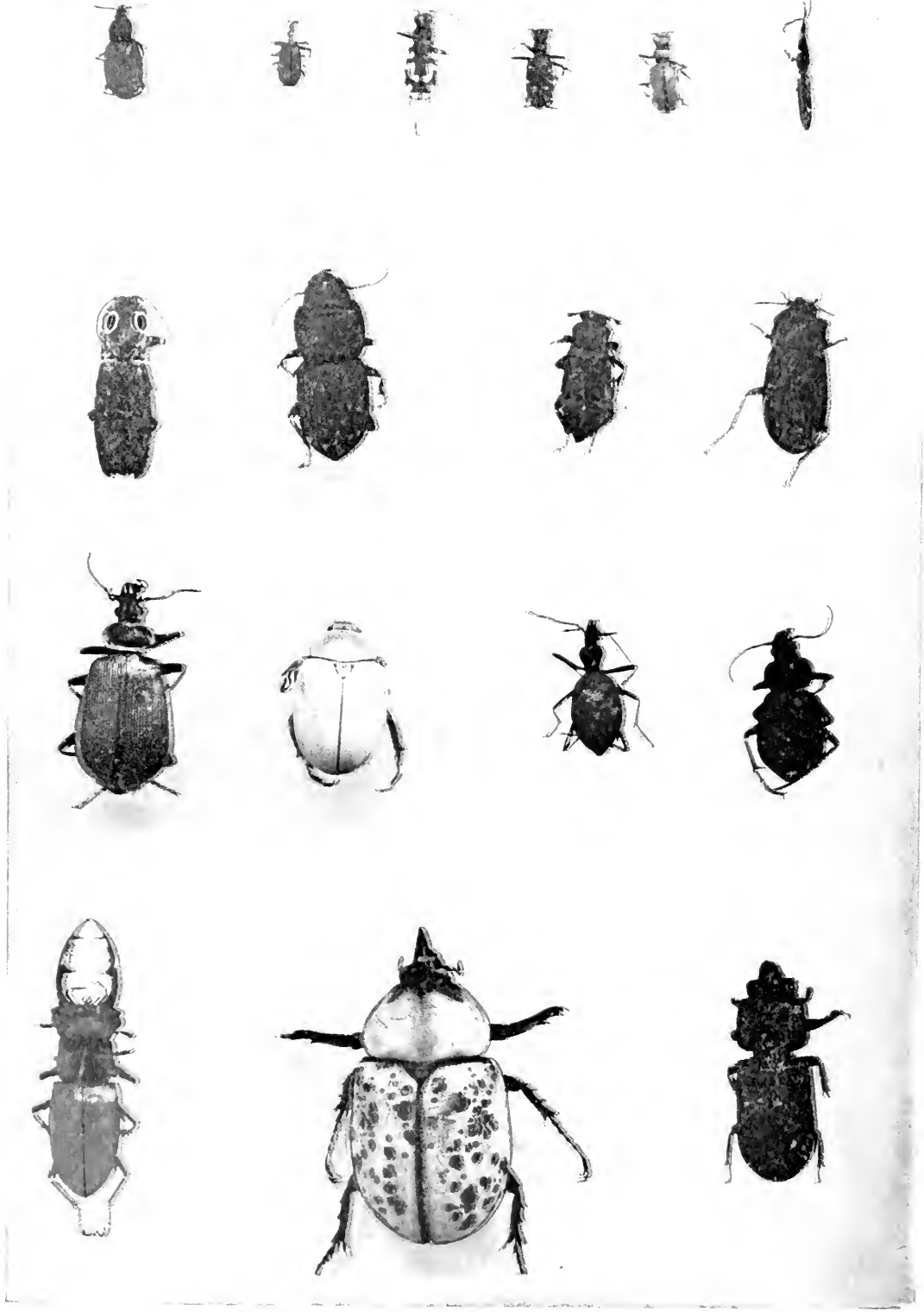
THERE is an old German child's story of a little girl who being told that if she could find a place to hide her first silver piece where no eye could see her, and then dance round it three times, she would have her wish. She sought everywhere for such a place, but always some bird or squirrel or mouse or insect was near by, and even when she dug beneath the ground, there too were little crawling creatures watching her.

It may be said that this story was meant to show that animal life is found almost everywhere, and certainly beneath the surface of the ground there are hundreds of kinds of insects working steadily away at their different occupations; for whatever disagreeable things you may find to say about insects, you can never justly call them lazy. The scriptures recognized this fact in the well-known command to the sluggard, and the old nursery rhyme about the "busy bee" emphasizes the same characteristic.

The truest underground insects are those which pass their entire lives beneath the surface of the earth; which are born there, live and grow and die without seeing the light of day. Such, for example, are the true cave insects, a number of forms of which are found in the great caverns in different parts of the world. Some of these insects feed upon the vegetable molds and low forms of plant life found in caves; others feed on dead animal matter and still others upon living insects. Nearly all are of pale colors and are blind or nearly so, for they have no use for eyes in the darkness. All are supposed to be descendants of above-ground forms, which through many generations of life in the darkness have lost their color and their power of sight. The genealogy of these true cave forms may be guessed at with some certainty, for we know insects which are only partly transformed in structure from above-ground forms to true cave species. Such are certain beetles which live in the catacombs of Paris, and certain other insects which have been found in the old and deep burrows of the land tortoise in Florida.

But we do not have to go to caves to find many other true underground insects. Rich, loose soil abounds in such creatures which live upon the decaying vegetation (soil humus or vegetable mold) or upon one another. The most abundant in numbers of individuals are the little spring-tails or bristle-tails, minute creatures seldom more than a sixteenth of an inch in length and which frequently swarm in the ground in such numbers that the earth seems fairly alive. These little creatures are by no means confined to the surface soil, but have been found in great armies at a depth of six feet or more in stiff clay, which they have penetrated by following the deeper rootlets of trees. Certain of these little insects have also become so accustomed to this lightless life that they have lost their eyes.

Other true underground insects are found in the nests of ants, where they fill many different functions. They may be grouped, however as follows: 1. Species which are fed by the ants and from which the ants derive a benefit by eating a certain secretion of the insect. 2. Species which are treated with indifference by the ants and which feed upon the bodies of dead ants and other animal and vegetable debris to be found in ants' nests. The ants are certainly not hostile to these insects and evidently gain some unknown benefit from their presence. 3. Species which live among the ants for the purpose of killing and feeding upon them. The first true ants' nest insect was only discovered and studied at the beginning of this century, but since that time hundreds of other species have been found, and a mere catalogue of their names fills a book of over 200 pages.



CHICAGO:
A. W. MUMFORD, PUBLISHER.

(CHLAENIUS SERICEUS.) (ALAUS GARGOPS.) CALOSOMA SCRUTATOR.

(LIBIA GRANDIS.) (PASMACHUS MARGINATUS.) COTALPA LANIGERA.

(CICINDELLA REPANDA.)

(CICINDELLA GUTTETA.)

(NECROPHORUS ORBICOLLIS.)

CYCHRUS ANGUSTICOLLIE.

(CICINDELLA LECONTEI.)

(BRENTHUS MANTIS.)

(DICAELUS PURPURATUS.)

CALOSOMA CALIDUM.

Such insects are called "myrmecophilous species" or "ant lovers." The man who has done the most in the study of these interesting creatures is Dr. Wasmann, a Jesuit priest, who lives in Holland, and who has devoted many years to this work, and a difficult task it has been! If one digs into an ant-hill the inhabitants are at once alarmed and the greatest confusion results, so that it is necessary to study them in artificial nests in glass jars, or in some other way.

Although the most of these "ant-loving" insects are strictly subterranean species, living their whole lives underground, the ants, among which they live, do most of their foraging above ground, and thus may be taken as typical of a second group of underground insects—those which have their homes below ground for protection or concealment, but which themselves live, at least part of the time, above ground. Volumes have been written about the wonderful habits of ants, of their community life, of the division of labor among them, of their slave-making customs, of their courage, patriotism, and indefatigable industry, of their highly developed instinct, which, in fact, becomes real intelligence; so that almost everyone knows the main facts about these wonderful little insects, and we can spend our time to better advantage on those underground creatures about which there is less general information. It will suffice to say that most ants have their nests, consisting of tunnels and chambers, underground; that there their queen lays her eggs and the young are carefully tended by workers until they have reached the adult stage, and there the food is stored for use in the winter months. There is a curious kind of ant in the southwestern states and Mexico called the honey ant. Certain individuals in a colony of these honey ants have enormously distended stomachs and are fed by the other ants with a kind of grape sugar, or honey, during the summer, as they hang suspended by their legs from the roof of an underground chamber. When winter comes the other ants are fed by these honey-bearers, which give out the stored-up honey from their mouths drop by drop.

There is an interesting class of underground insects which, in their early stages, hide in especially dug pits and lie in wait for their prey, but which, when full grown, live above ground. Such are the ant-lions and the tiger-beetles. The young ant lion is a heavy-bodied, clumsy-looking creature, with very long and sharp jaws, which digs for itself a funnel-shaped pit in loose, dry sand, using its flat head and jaws as a spade in digging. Then it hides itself at the bottom of the pit, its body completely covered with the sand, and waits until some unlucky little insect comes along and stumbles over the edge of the hollow. The side of the hole is made at such an angle that the sand slips down with the weight of even an ant and carries it towards the open jaws of the ant-lion. Every struggle which the poor creature makes to escape causes the sand to slide down faster, and the ant-lion at the bottom jerks up a shower of sand with its head, which hastens the miniature avalanche until the poor victim is within reach of the powerful jaws and is devoured. The adult ant-lion is a beautiful, gauzy-winged creature, not at all like its blood-thirsty larva.

The young tiger-beetle, or "doodle bug," as it is called in the South, digs a straight burrow in hard soil, such a hole as would be made by pushing a small lead pencil into the ground. This creature, like the young ant-lion, has a clumsy body and powerful jaws, and on its back are two projections armed with hooks which help it to climb up and down in its burrow. It waits for its prey at the mouth of its hole, which it closes with its head, thus making a sort of trap-door. The little insect which steps upon this trap-door doesn't have time to say its prayers before it is devoured by the voracious "doodle." Should a large, strong insect walk over the burrow, the tiger-beetle larva retreats precipitately to the bottom of its hole, which is sometimes eighteen inches below the surface of the ground.

There are many other insects which,

when young, live below ground, and become above-ground flying creatures, when full grown, which have not the carnivorous tastes of the forms we have just mentioned. Many of these species live on the roots of plants and others upon the vegetable mold of rich soils. The large white grubs so often found in the soil of grass lands belong to both of these classes. They are the larvæ, or young, of several kinds of the clumsy beetles known as scarabs. The larvæ of the common brown May-beetles, for example, are root-feeders, living mainly on grass-roots, and they are sometimes so abundant and destructive as to destroy valuable lawns. The roots are sometimes so uniformly eaten off by these white grubs that the sod may be rolled up like a roll of carpet. The white grubs of the beautiful large green beetles, known as June-beetles, or fig-eaters, in the South (they do not occur in the more northern states), although they look almost precisely like the May-beetle larvæ, are not injurious and feed only upon the vegetable mold of the soil. The wire-worms, which are the young of the click-beetles, or "snapping-bugs," feed upon the roots of plants; there are plant lice which live underground and suck the sap from plant roots, like the famous grape-vine phylloxera; there are caterpillars which live almost entirely underground and feed upon living roots; there are maggots which have the same habit; and there are even bark lice or scale insects which live attached to rootlets in the same way that the other species live above ground on the limbs and twigs of trees.

Other insects living above ground all their lives hide their eggs underground. Most grasshoppers, for example, do this, and many of the closely related crickets not only hide their eggs in this way, but live underground themselves in the day time, and come forth at night to feed, or to collect grass leaves, which they carry into their burrows and eat at leisure. Other insects also hide below ground during the day and feed only at night. The full grown May-beetles do this, and the cut-worms also. The cut-worms are soft-bodied caterpillars and are greedily eaten by birds and carnivorous insects, so it is essential to their safety that they conceal themselves as much as possible. There is an interesting cut-worm which occasionally becomes so numerous that it has to migrate in great armies in search of food, and these great masses of caterpillars hurry on, driven by hunger, by day as well as by night, followed by flocks of birds and other enemies until the majority of them are destroyed. This cut-worm is generally called the "army worm."

Other caterpillars, while living above ground and feeding on the leaves of plants, instead of spinning cocoons for their protection when they transform to the helpless chrysalis or pupal condition, burrow beneath the surface of the ground and there transform without a cocoon. Hundreds of species do this and sometimes these brown pupæ are so abundant that they are turned up in numbers with every spadeful of earth.

We are now able to say that the insects found beneath the surface of the earth are as follows:

1. Insects which live underground during their whole lives, feeding (*a*) on roots and rootlets; (*b*) on dead and decaying vegetable matter; (*c*) on other insects.

2. Insects which live in the nests of ants.

3. Insects which have their nests underground, but which get their food elsewhere.

4. Insects which live underground only in their younger stages of life.

5. Insects which hide their eggs or pupæ underground.

6. Carnivorous insects, and insects which feed on decaying animal matter, which occasionally burrow underground in search of food.

I hope it will be clear from what we have said that insects must take an important part in the changes in the character of the soil which are constantly going on, quite as important indeed as do the earthworms about which Darwin wrote.

BIRDS AND ALL NATURE.

ILLUSTRATED BY COLOR PHOTOGRAPHY.

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FORESTS.

JOHN M. COULTER, PH.D.

Head Professor of Botany, University of Chicago.

FORESTS have always been admired, and in ancient times they were often considered sacred, the special dwelling-places of gods and various strange beings. We can easily understand how forests thus affected men There is a solemnity about them, a quiet grandeur, which is very impressive, and the rustling of their branches and leaves has that mysterious sound which caused the ancients to people them with spirits. We still recognize the feeling of awe that comes in the presence of forests, although we have long since ceased to explain it by peopling them with spirits.

Once forests covered all parts of the earth where plants could grow well, and no country had greater forests than North America. When America was discovered, there was a huge, unbroken forest from the Atlantic west to the prairies. Now much of this has been cut away, and we see only small patches of it. Men must use the forest, and still they must save it, and they are now trying to find out how they may do both.

Forests are sometimes almost entirely made up of one kind of tree, and then they are called "pure forests." Pine and beech forests are examples of this kind. More common with us, however, are the "mixed forests," made up of many kinds of trees, and nowhere in the world are there such mixed forests as in our Middle States, where beech, oak, hickory, maple, elm, poplar, gum, walnut, sycamore, and many others all grow together.

Probably the densest forests in the world are those in the Amazon region of South America. So dense are they that hardly a ray of light ever sifts through the dense foliage, and even at noon there is only a dim twilight beneath the trees. The tallest forests are the Eucalyptus forests of Australia, where the trees rise with slender trunks to the height of four or five hundred feet. But the largest trees in the world, when we consider both height and diameter, are the giant "redwoods" (Sequoias) of the Pacific coast. All concede, however, that the most extensive, the most varied, and the most beautiful forests of the world are those of the Atlantic and Middle States.

Perhaps it is well to understand how a tree lives, that we may know better what a forest means. The great roots spread through the soil, sometimes not far from the surface, at other times penetrating deeply. The young root tips are very sensitive to the presence of moisture, and turn towards it, no matter in what direction it may carry them. In penetrating the soil the sensitive root tips are turned in every direction by various influences of this kind, and as a result, when the root system becomes old, it looks like an inextricable tangle. All this tangle, however, but represents the many paths that the root tips followed in their search for the things which the soil contains.

Roots are doing two things for the tree:

They anchor it firmly in the soil, and also absorb material that is to help in the manufacture of food. It is the older roots that have long since stopped absorbing that are the chief anchors. How firm this anchorage must be we can, perhaps, imagine when we think of the strain produced by a great crown of leaves swaying back and forth in the wind. It is only a cyclone that seems to be able to overthrow a sound tree, and then it more commonly breaks its trunk than uproots it.

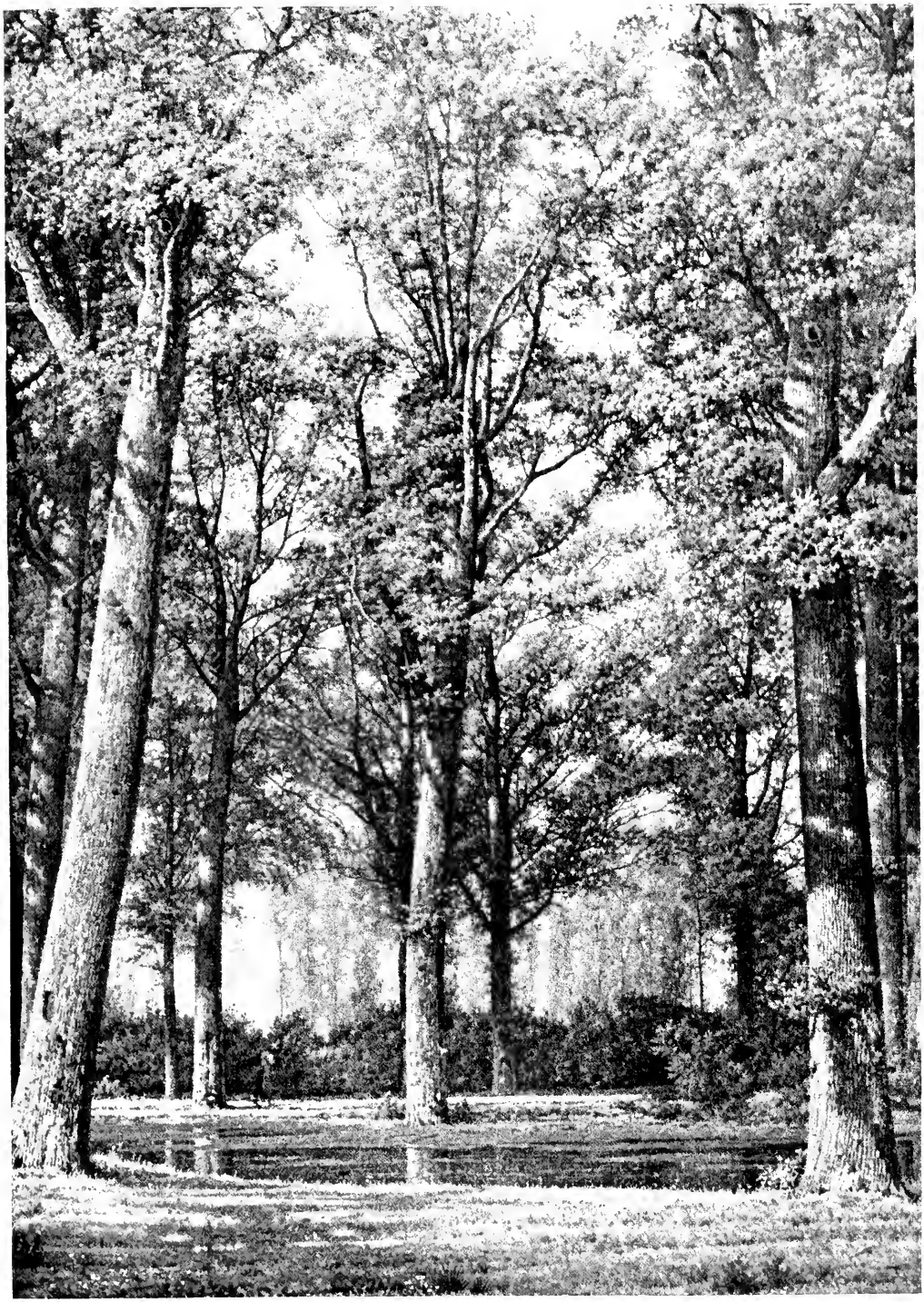
The very important work of absorbing is given over to the very young roots; in fact, chiefly to those of this year, for new rootlets must be put out each year. These roots can only absorb water, so that if they are to get anything from the soil it must be something that water will dissolve. In this way the water is used as the carrier of soil-material into the root. Just how this water carrying soil-material gets into the root is not easy to explain, for the root has no holes to let it in, and it must pass through living walls. That it does enter, however, every one knows. It is evident, therefore, that the root is supplying to the tree two kinds of raw material for food manufacture obtained from the soil, namely, water and soil-material dissolved in it.

But the tree does not obtain all its raw material from the soil. A very important material is taken from the air, the material commonly called "carbonic acid gas," the same material that we breathe out so abundantly from our lungs as one of our body wastes. This important material is taken out of the air into the plant chiefly by means of the leaves. Spread out as they are in the air, the leaves are in the most favorable position for doing this work.

But where and how are these three kinds of raw material manufactured into plant food? The leaves are specially constructed to be the chief seat of this food manufacture. The carbon gas is received directly into these manufactories from the air, but the water and the soil-material are down in the roots, and it is necessary for them to be carried to the leaves. As a consequence, a "current" of water containing soil-material ascends from the roots, through the stem, and is distributed through the branches to the leaves. This movement is generally known as the "ascent of sap." The path of this movement in the stem is through what is known as the "sap wood," and it is this very fact which gives to this region of the wood its peculiar character. Just how the sap ascends through the stem and reaches the leaves, no one knows. All of our explanations have proved unsatisfactory, and only those who are not fully acquainted with the facts claim to be able to explain it.

When the sap reaches the leaves, the water is no longer needed as a carrier of soil-material. Some of it is needed in the manufacture of food, but by far the greater part of it escapes from the leaves into the air by a process which may be called "plant evaporation." The amount of water thus brought from the soil and poured out into the air by active plants is very great; and when we consider a forest at work, we can hardly compute the vast amount of moisture which it is constantly contributing to the air during the growing season.

The three kinds of raw material thus brought together chiefly in the leaves are there manufactured into plant food. On account of this work the leaves have often been spoken of as the "stomachs" of the plant. This is a very incorrect and misleading illustration, for the work referred to is not digestion such as a stomach is concerned with, and, in fact, it is a process entirely unknown in animals, and found only in green plants. It is a wonderful process, which we do not at all understand, but it consists in taking this dead raw material from soil and air and manufacturing out of it living material. Not only does the food of the plant, and hence its life, depend upon this process, but all the life of the world, as we understand it, depends upon it. We know at least two prominent conditions of this pro-



CHICAGO:
A. W. MUMFORD, PUBLISHER

cess, for it seems evident that it cannot take place without light and the peculiar green substance which gives the characteristic color to leaves. With the help of light and this green coloring substance, known as "chlorophyll," the living substance in the leaves is able to do this marvelous work.

The food thus manufactured is distributed throughout the tree, either to be used wherever growth is going on, or to be stored up. While we may say that there is an "ascending current" of sap through the sap wood, it is an error to say that there is a "descending current." The movement of prepared food has no definite channel, but it is drawn in every direction wherever needed.

If we now consider the parts of a tree all together, we may be able to get some notion of the meaning of their positions. The roots must be related to the soil to secure anchorage and raw material for food manufacture. The leaves must be related to the air and light to secure more raw material and help in doing their important work of food manufacture. The stem is simply to carry the leaves well up into the air and sunshine, and has no meaning except as it is related to the work of the leaves. In thus widely separating the roots and the leaves, the stem must act as a channel of communication between them.

In the tree trunks with which we are familiar, everyone has observed the concentric rings of wood that appear in a cross-section. These are usually spoken of as "annual rings," with the idea that one ring is made each year. In consequence of this it is the habit to estimate the age of a tree by counting these rings. Not infrequently it happens, however, that more than one ring may be made in a year, as a ring represents a single season of growth, and there may be more than one season of growth during a single year. It is much better to call them "growth rings," and to recognize the fact that by counting them we may be overestimating the age of a tree.

One of the most noticeable things about the principal trees of our temperate climate is that they "shed" their leaves every year, being covered with foliage during the growing season and bare during the winter. This is known as the "deciduous" habit, and such trees are called deciduous trees, in distinction from "evergreen" trees. This is really a habit, brought about by the conditions in which trees of temperate climates must live. The leaves of such trees are broad and thin, fitted for very active work. When the winter comes, they would be entirely unable to endure it. The tree might protect them by giving them narrow forms and thick walls (as in pines), but it would be at the expense of activity during the growing season. It is more economical for the tree to make an entirely new set of leaves each year than to protect the old ones.

Perhaps the most noticeable feature in connection with the fall of the leaves is that so many of them take on a rich coloration. Our mixed American forest is the most brilliantly colored autumnal forest in the world, and there can be no landscapes richer in color than those which include such a forest. While all this should appeal to our sense of the beautiful, it should raise the question as to what it means in the life of the trees. We are not at all sure that we know, for we cannot as yet explain the conditions which cause the colors to be produced. We observe that they occur towards the end of the activity of the leaf, but that they are necessarily associated with cold, or drought, or certain outside conditions, is not at all clear. The colors are various shades of red and yellow, sometimes pure, sometimes mixed. It has been recently suggested that the red color is to serve as a protection. It is known that before the fall of the leaf the living substances are gradually withdrawn into the permanent parts of the tree, and that when these living parts cease to work they are peculiarly helpless. At this unprotected period the red appears, and this color absorbs enough heat from the light to raise the temperature, and so the needed pro-

tection against chill is afforded. This seems reasonable, but the whole subject of the meaning of plant colors is very obscure.

GEN. ROBERT E. LEE was a great lover of forest trees. He owned a large and beautiful forest in northern Virginia at the time of the War of the Rebellion. While the army of Virginia was encamped near Fredericksburg, he was gazing at the great forest trees that beautified a homestead near by, the property of his companion. This companion quotes him as saying on this occasion: "There is nothing in vegetable nature so grand as a tree. Grappling with its roots the granite foundations of the everlasting hills, it reaches its sturdy and gnarled trunk on high, spreads its branches to the heavens, casts its shadow on the sward; and the birds build their nests and sing amid its umbrageous branches."

THE BRAVE OLD OAK.

A song to the oak, the brave old oak,
Who hath ruled in the greenwood long;
Here's health and renown to his broad green crown,
And his fifty arms so strong.
There's fear in his frown when the sun goes down,
And the fire in the west fades out;
And he showeth his might, on a wild midnight,
When the storms through his branches shout.

Then here's to the oak, the brave old oak,
Who stands in his pride alone;
And still flourish he, a hale, green tree,
When a hundred years are gone.

In the days of old, when the spring with cold
Had brightened his branches gray,
Through the grass at his feet crept maidens sweet
To gather the dew of May;
And on that day, to the rebeck gay
They frolicked with lovesome swains;
They are gone, they are dead, in the churchyard laid,
But the tree, it still remains

Then here's to the oak, the brave old oak,
Who stands in his pride alone;
And still flourish he, a hale old tree,
When a hundred years are gone.

He saw the rare times when the Christmas chimes
Were a merry sound to hear,
When the squire's wide hall and the cottage small
Were filled with good English cheer.
Now gold hath the sway we all obey,
And a ruthless king is he;
But he never shall send our ancient friend
To be tossed on the stormy sea.

Then here's to the oak, the brave old oak,
Who stands in his pride alone;
And still flourish he, a hale, green tree,
When a hundred years are gone.

—*Henry Fothergill Chorley.*

"CHEEPER," A SPARROW BABY.

BY ANNE W. JACKSON.

ONE day in May, as I was hurrying along the street, my steps were arrested by the distressed chirping of a sparrow on the opposite sidewalk. Thinking that probably a young sparrow had fallen from the nest, I picked my way across the muddy road to the other side to see what I could do.

The poor little sparrow-mother was wildly hopping about and chirping in sore distress. And what a pitiful sight greeted my eyes! Upon the wet grass, under the very jaws of an evil-looking little black-and-tan dog, was a poor, draggled, shivering baby sparrow.

At sight of me the dog coolly picked up the baby and trotted off. I followed and he soon dropped it; but I couldn't succeed in driving him away. He still remained in sight, bold and impudent

I was in a sad dilemma. Of the two evils which confronted me, or rather the baby, which would prove the less?

The trees all about the place were tall ones, with no low branches. There was no hope of returning the baby to its nest. It was too weak from cold and fright, as well as too young, to fly. If I left it the dog would certainly return and devour it before its mother's eyes.

On the other hand, if I took it home with me it would probably die under my ignorant care. However, I decided on the latter course, so clasping it close in my hand, continued on my way.

Those who have a continual grudge against the English sparrow will say, "Why all this fuss over a miserable little nuisance of a sparrow?" and think the wisest thing would have been to leave it to its fate. But the superfluity of the English sparrow is not the question in a case like this. When something weak and helpless is thrown across our path, it simply remains for us to help and save it, if it is in our power.

On the way home I pondered a good deal over the question of how I should care for it and feed it, and what I could find to keep it in, as I had no bird-cage.

When I got Master Sparrow home, and had thoroughly warmed him and dried his little feathers (they were very few!) I put him into the best substitute for a bird-cage that I could find, and that was a large wire rat-trap!

The next question was, what to feed him. As I had seen sparrows picking at the cornmeal which we mixed and gave to the little chickens, I ventured to put some of it into his cage.

I watched him a good deal that day and didn't *see* him eat a morsel. But as he seemed stronger and more lively the next day, I concluded he was bashful and only ate when I wasn't looking.

Soon, however, he grew less afraid of me and would hop about and peck at his food when I was near. I began to vary his diet, too, and gave him what green slugs I could find on the rose-bushes, as well as minced earthworms. He ate the slugs eagerly and seemed to enjoy tugging at wriggling bits of earthworm.

He also began to develop quite a voice and "cheeped" so loudly that I named him "Cheeper."

I grew very fond of him and watched him grow and feather out with great pride and interest. As he became stronger he grew more eager to get out of his cage. It quite went to my heart to see him beating against the wires, and vainly striving for freedom. But I feared he couldn't take care of himself; and also that the other birds might not receive him well.

So I kept him seven days. I put his cage in the window several times where he could look out on the world and become acquainted with the colony of sparrows which inhabits the Virginia creeper covering the north side of our house. He would "cheep" very loudly on these occasions and try harder than ever to get out. His presence in the window made a great commotion among the other sparrows, who chirped excitedly and flew about, taking long looks at him. Two of them went so far as to alight on his cage.

On the seventh day, at noon, I took his cage to the window and set him free. He flew the length of the house and settled on a rosebush at the end of the porch, where he sat for some time, peering about, with his little head comically hoisting this side and that. Presently, when I came to the window to see if he were still there, I found he had flown away; and though I thought I could distinguish his particular "cheep" several times afterwards, I saw him no more that day. Nor did I expect to see him again.

I missed him a great deal and was surprised to find how fond of him I had grown. Imagine my surprise and delight when I went out next morning to feed the chickens to find little "Cheeper" there before me! He flew onto the fence when he saw me, but soon flew down again, and hopped about among the little chicks quite fearlessly. I was afraid the big chickens would step on him; and, sure enough, the Bantam rooster *did* walk right over him, but he just squawked and hopped away without any apparent resentment.

The next morning he was there again, when I went out. This time he followed a hen about, hopping along with her little chicks as though he thought himself one of them. He was such a fluffy little fellow, and he did look so tiny and cunning!

Poor little motherless baby, trying to find a mother in a big hen! That was the last time I saw him.

Only a despised little English sparrow! Yet, little "Cheeper," you had your mission in life. You made the heart of one bird-lover more tender by your helplessness, and your memory is dear to her.

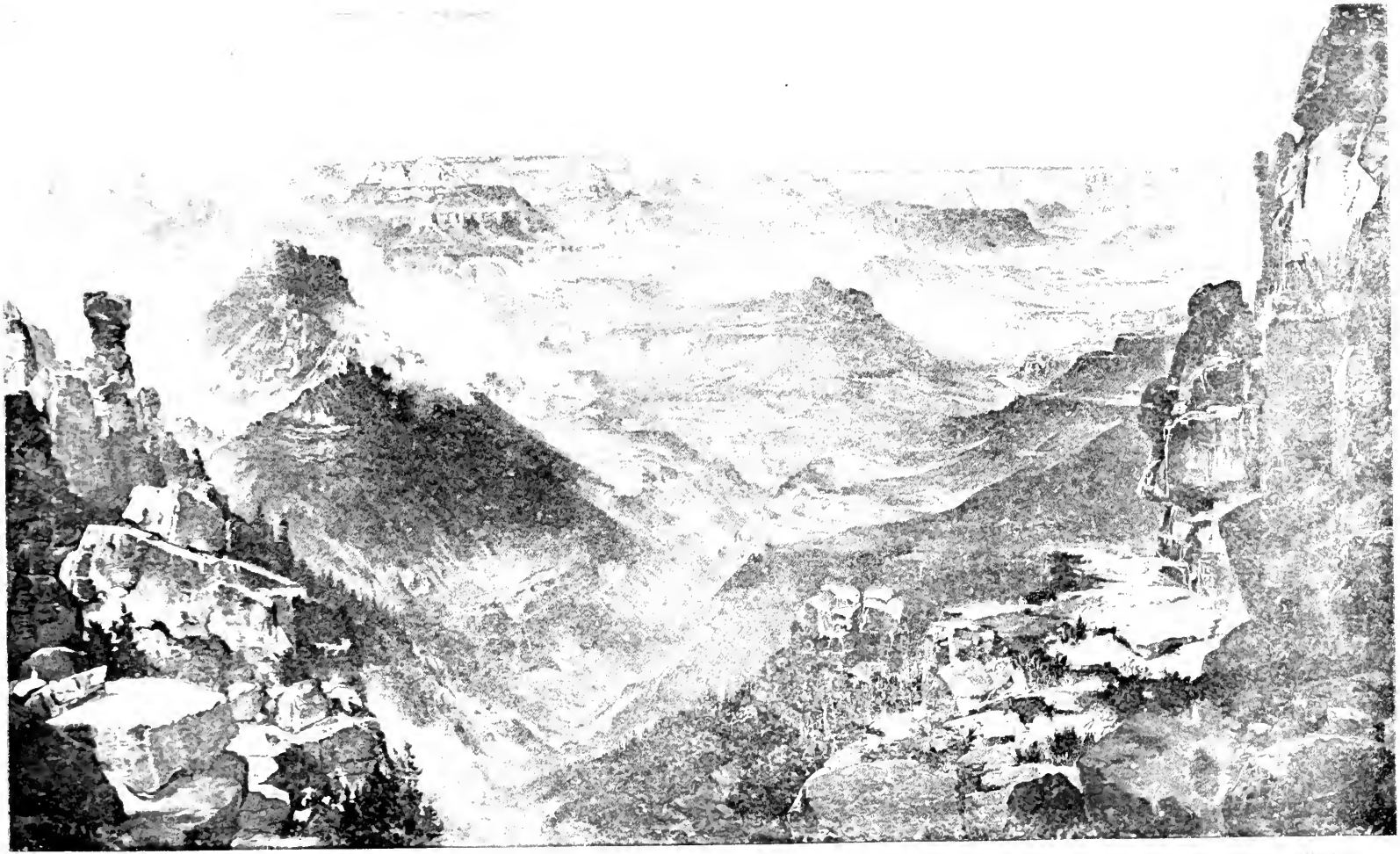
THE HERMIT THRUSH.

NELLY HART WOODWORTH.

Does the thrush drink wild honey? a nectar distilled
From the flowers of the field, that his message is filled
With such sweetness? O'er the twilight 'tis ringing—
June's divinest refrain, 'tis a soul that is singing,
Oh, so trustfully sweet, rapture blended with pain,
Rings the silver bell softly, I hear it again,
And the wood is enchanted, uncertain it seems,
As some moment of waking, the dreams, oh the dreams!

Does he bathe evermore in the miracle springs,
That his wings and his heart are in rhythm when he sings?
Tears moisten the harpstrings, they quiver with pain,
Then the triumph, the peace but the finest souls gain—
Earth's losses, its tears through the notes sweep along,
The longings of earth find a voice in the song,
Till outechoed by angels they find a release,
To be silenced henceforth, merged in infinite peace.

Will the spirit bird sing through the ages to come,
Or the soul take its flight and, still singing, go home,
And the world weep aghast when, the music withdrawn,
The lark still a-wing tells the rapture of dawn?



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GRAND CAÑON.

THE GRAND CAÑON OF THE COLORADO.

[From Major J. W. Powell's Report of the Exploration of the Cañons of the Colorado—1869.]

"FOR two years previous to the exploration, I had been making some geological studies among the heads of the cañons leading to the Colorado, and a desire to explore the Grand Cañon itself grew upon me. Early in the spring of 1869 a small party was organized for this purpose. Boats were built in Chicago, and transported by rail to the point where the Union Pacific Railroad crosses the Green River. With these we were to descend the Green into the Colorado, and the Colorado down to the foot of the Grand Cañon."

From the record of May 24, 1869, we quote the following:

"The good people of Green River City turn out to see us start—a party of ten men. We raise our little flag, push the boats from shore, and the swift current carries us down."

"Our boats are four in number. Three are built of oak, staunch and firm."

"We take with us rations deemed sufficient to last ten months, abundant supplies of clothing, also a large quantity of ammunition and two or three dozen traps."

On the 26th they go into camp at the foot of the Uintah Mountains, at the head of Flaming Gorge Cañon, the first to be explored.

We quote again: "The river is running to the south; the mountains have an easterly and westerly trend directly athwart its course, yet it glides on in a quiet way as if it thought a mountain range no formidable obstruction to its course. It enters the range by a flaring, brilliant-red gorge, that may be seen from the north a score of miles away."

"You must not think of a mountain range as a line of peaks standing on a plain, but as a broad platform many miles wide, from which mountains have been carved by the waters. You must conceive, too, that this plateau is cut by gulches and cañons in many directions, and that beautiful valleys are scattered about at different altitudes. The first series of cañons we are about to explore constitute a river channel through such a range of mountains. The cañon is cut nearly half-way through the range, then turns to the east, and is cut along the central line, or axis, gradually crossing it to the south. Keeping this direction for more than fifty miles, it then turns abruptly to a southwest course, and goes diagonally through the southern slope of the range.

* * * * *

"May 30.—This morning we are ready to enter the mysterious cañon, and start with some anxiety. The old mountaineers tell us it cannot be run; the Indians say, 'Water heap catch 'em;' but all are eager for the trial, and off we go."

"Entering Flaming Gorge, we quickly run through it on a swift current, and emerge into a little park. Half a mile below, the river wheels sharply to the left, and we turn into another cañon cut into the mountain. We enter the narrow passage. On either side the walls rapidly increase in altitude. On the left are overhanging ledges and cliffs five hundred, a thousand, fifteen hundred feet high.

"On the right the rocks are broken and ragged, and the water fills the channel from cliff to cliff. Now the river turns abruptly around a point to the right, and the waters plunge swiftly down among great rocks; and here we have our first experience with cañon rapids. I stand up on the deck of my boat to seek a way among the wave-beaten rocks. All untried as we are with such waters, the moments are filled with intense anxiety. Soon our boats reach the swift current; a stroke or two, now on this side, now on that, and we thread the narrow passage with exhilarating velocity, mounting the high waves, whose foaming crests dash

over us, and plunging into the troughs, until we reach the quiet water below; and then comes a feeling of great relief. Our first rapid run. Another mile and we come into the valley again.

"Let me explain this cañon. Where the river turns to the left above, it takes a course directly into the mountain, penetrating to its very heart, then wheels back upon itself, and runs into the valley from which it started, only half a mile below the point at which it entered; so the cañon is in the form of an elongated U. with the apex in the center of the mountain. We name it Horseshoe Cañon.

"Last spring, I had a conversation with an old Indian named Pa-ri-ats, who told me about one of his tribe attempting to run this cañon. 'The rocks,' he said, holding his hands above his head, his arms vertical, looking between them to the heavens—'the rocks h-e-a-p, h-e-a-p high; the water go h-oo-woogh, h-oo-woogh! water-pony (boat) h-e-a-p buck; water catch 'em; no see 'em Injun any more! no see 'em squaw any more! no see 'em pappoose any more!'

"June 7.—On a rock we find a pool of clear, cold water, caught from yesterday evening's shower. After a good drink we walk to the brink of the cañon, and look down to the water below. I can do this now, but it has taken several years of mountain climbing to cool my nerves, so that I can sit, with my feet over the edge, and calmly look down a precipice two thousand feet. And yet I cannot look on and see another do the same. I must either bid him come away or turn my head.

"This evening, as I write, the sun is going down, and the shadows are settling in the cañon. The vermilion gleams and roseate hues, blending with the green and gray tints, are slowly changing to somber brown above, and black shadows are creeping over them below; and now it is a dark portal to a region of gloom—the gateway through which we are to enter on our voyage of exploration to-morrow."

The 9th of June brought disaster to a boat containing three of the men, who were carried down the rapids, but all were rescued.

They pass the mouths of the Uintah and the White Rivers, with constantly changing scenes, making a tortuous journey through many dangerous rapids, much of the time between high, perpendicular walls.

On the 15th they pass around a great bend, five miles in length, and come back to a point one-quarter of a mile from where they started. Then they sweep around another great bend to the left, making a circuit of nine miles, and come back to one-third of a mile from where the bend started. The figure 8 properly describes the fourteen miles' journey. July 17 they arrive at the junction of the Grand and Green rivers, having traversed about eight hundred and four miles.

On the morning of July 19, the Major and a companion start to climb the left wall below the junction of the Grand and Green Rivers. They reach the summit of the rocks. The view is thus described: "And what a world of grandeur is spread before us! Below us is the cañon, through which the Colorado runs. We can trace its course for miles, as at points we catch glimpses of the river. From the northwest comes the Green, in a narrow, winding gorge. From the northeast comes the Grand, through a cañon that seems bottomless from where we stand. Away to the west are lines of cliff and ledges of rock—not such ledges as you may have seen, where the quarry-man splits his blocks, but ledges from which the gods might quarry mountains, that, rolled on the plain below, would stand a lofty range; and not such cliffs as you may have seen, where the swallow builds his nest, but cliffs where the soaring eagle is lost to view ere he reaches the summit. Between us and the distant cliffs are the strangely carved and pinnacled rocks of the *Toom-pin-wu-near Tu-weap*. On the summit of the opposite wall of the cañon are rock forms that we do not understand. Away to the east a group of eruptive mountains are seen—the Sierra La Sal. Their slopes are covered with pines, and deep gulches are flanked with great crags, and snow fields are seen near the summits. So the mountains are in uniform—green, gray, and silver. Wherever we look

there is but a wilderness of rocks; deep gorges, where the rivers are lost below cliffs and towers and pinnacles; and ten thousand strangely carved forms in every direction, and beyond them mountains blending with the clouds."

"Traveling as fast as I can run, I soon reach the foot of the stream, for the rain did not reach the lower end of the cañon, and the water is running down a bed of dry sand; and, although it comes in waves several feet high and fifteen or twenty feet in width, the sands soak it up, and it is lost. But wave follows wave, and rolls along, and is swallowed up; and still the floods come on from above. I find that I can travel faster than the stream; so I hasten to camp and tell the men there is a river coming down the cañon."

The exploring party next passes through Narrow Cañon, nine and a half miles long, Glen Cañon, one hundred and forty-nine miles in length; and Marble Cañon, sixty-five and one-half miles long. The depth of the last named is three thousand five hundred feet at the lower end. They emerge from Marble Cañon August 10, and find themselves separated from the Grand Cañon of the Colorado, the "Great Unknown," by the narrow valley of the Little Colorado.

The Grand Cañon is now entered and safely passed, a distance of two hundred and seventeen and one-half miles, terminating with the Grand Wash.

We are compelled to terminate this article abruptly for lack of space. It is proper to say that this journey has scarcely ever been equaled for daring and hardihood. Each time they descended a rapids, they were liable to come to a fall too great to shoot over, with walls so steep they could not be climbed, and rapids so swift as to prevent return.

The Grand Cañon, as one of the wonders of the world, is visited every summer by hundreds of tourists.

OPTIMUS.

BY REV. CHARLES COKE WOODS.

A glow-worm in the grass at night shed forth
Its feeble light, but darkness deepened fast;
The wee thing did its uttermost to banish night,
And that, forsooth, was truest toil, indeed,
Success in God's clear sight, though in man's view,
Obscured by things of sense, 'twas but defeat.

A fire-fly flashed its fitful light, while soft
The evening shadows fell, and clouds hid stars,
And veiled in black the gentle moon's bright face;
As if the night, like one afraid, would haste
To flee when lightning flashed from those small wings,
With courage high the insect gave its light,
Though all alone with none to proffer aid—
Nor sun, nor moon, nor star a single beam.

At last the dawn shot crimson up the sky;
The tiny toilers crawled away to rest,
And sweet, methinks, was their well-earned repose,
For each its place had filled, its task had done
In keeping with the great Creator's thought.

HOW THE EARTH WAS FORMED.

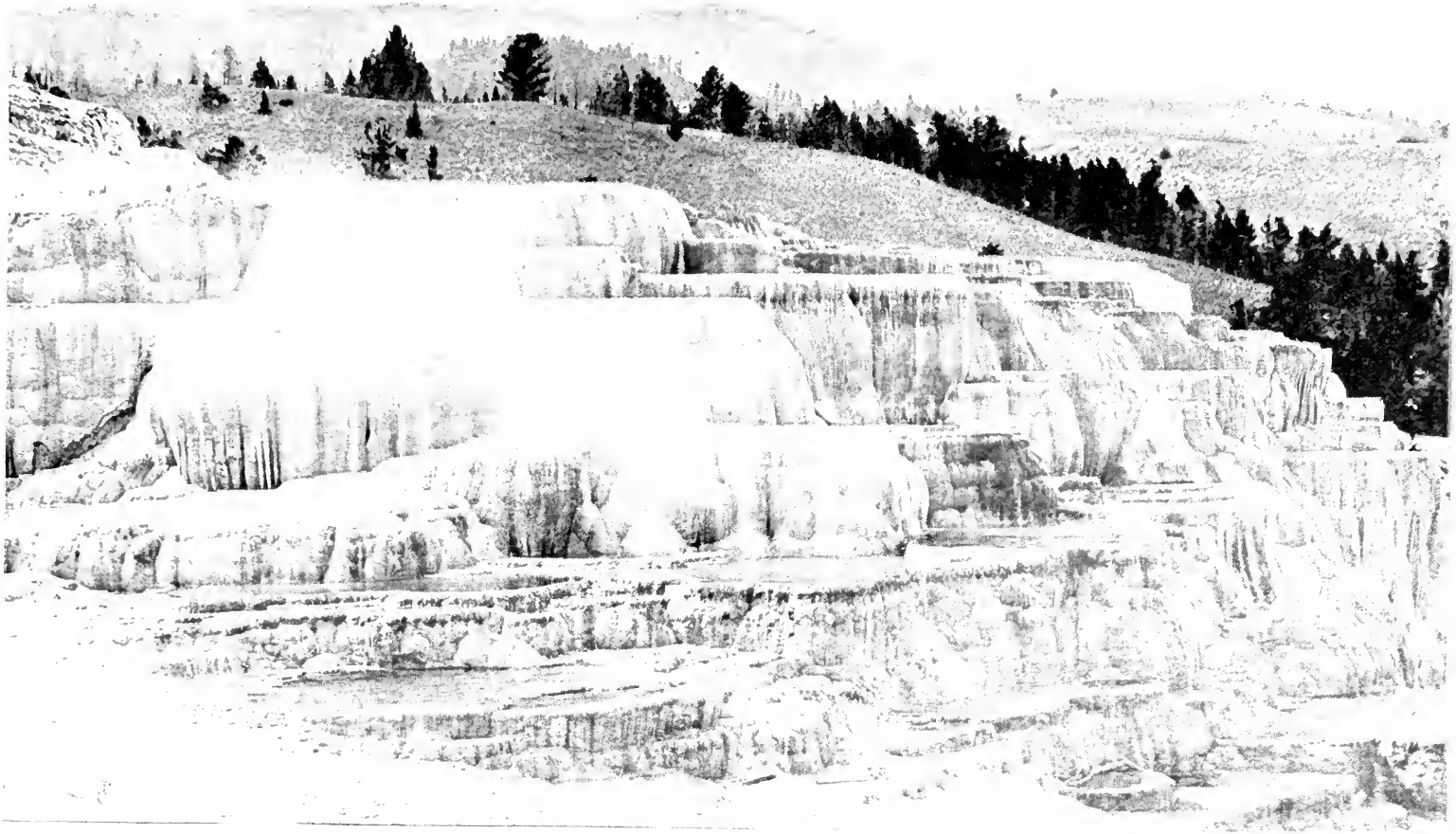
T. C. CHAMBERLIN,
Head Professor of Geology, University of Chicago.

JUST how the earth was formed at the outset is not certainly known. The most common view of men of science is that it was once in the form of a fiery gas. It is supposed that all the planets and satellites that now revolve around the sun were once a part of a common mass of gas in the form of a vast sphere which was very large and very hot. This gradually lost its heat and shrank as most bodies do when they cool. If it was not already whirling round at the outset it must have come to do so as it shrank, and as more and more of its heat was lost it rotated more and more rapidly. At length it came to whirl so fast that the outer part, which was moving fastest, could no longer be held down to the surface, and so it separated in the form of a ring around the equator of the great sphere.

The main mass kept on cooling and shrinking and whirling faster and faster and hence other rings separated. Each of these rings also kept on cooling and shrinking and is supposed to have parted at some point and gradually gathered together into a globe, but still in the form of fiery gas, even though it had lost much of its heat. But at last this globe of gas cooled so much that the main part of it became liquid. This was that part which afterwards became the solid part of the earth. It then had the form of lava. It was still too hot for the water to condense and hence it remained in the form of steam or vapor, forming a vast envelope all about the earth. There are supposed to have been many other vapors in the air at that stage, and it must have been very dense. But at length the globe of lava cooled so that the outer part crusted over, and this crust grew thicker and thicker as time went on. After a while it became cool enough to permit the water to condense on the surface and so the ocean began to be formed. The water grew in depth until nearly all the steam was condensed and many of the other vapors that had been in the air while it was so hot were condensed also. And this left the gases which cannot easily be condensed behind, and they formed the air much as it is to-day. And that is the way the atmosphere is commonly supposed to have come about.

But all this is theory. It cannot now be proved. But there are several great facts that fit in with it and make it seem as though it might be true. As wells and mines are sunk deep in the ground it is found that the earth grows warmer and warmer. Volcanoes pour out molten rock and this shows that it is very hot somewhere beneath them. Many of the mountains on the earth are really wrinkles in its crust, and it has been thought that these are caused by the cooling and shrinking of the globe. It is because these and other things fit in so well with the theory that most scientific men have come to accept it as probably true. It is known as the Nebular theory. But there are other ways of explaining all these things, and perhaps it may be proven that there are better ways.

Some scientists have supposed that the earth was formed by small masses or particles of matter gathered in from the heavens. On a clear night shooting stars may be seen quite often. These are little bits of stone or metallic matter shooting through space at high rates of speed, which strike the atmosphere and become hot. The earth also is moving at great speed—nearly nineteen miles per second. It is not strange then that when the little stranger collides with the earth it should "make the fire fly." Usually the outside is melted and carried away so fast that the little mass is entirely used up in a few seconds. It merely makes a little streak of light. But sometimes the



CHICAGO
A. W. MUMFORD, PUBLISHER

Photograph by F. J. Haynes, St. Paul.

TERRACED ROCKS, YELLOWSTONE PARK.

mass is large enough to stand the waste and still reach the ground. In such cases it is found to be mainly stony matter and iron. No substance has ever been found in any of them which is not found in the earth. Only a few of these shooting stars or meteorites will be seen in looking at any one point in the heavens. But the earth is very large and there are many such points, and when these are taken all together it is found that the number of these little bodies which fall in a day is very large. It is estimated at twenty millions. But still they are small and do not add very much to the size of the earth. But as they are being constantly swept up from space and are growing fewer and fewer, and as this has been going on for a very long time, it is reasonable to suppose they may once have been much more abundant and that the earth then grew much faster by reason of them. It is thought by some that the earth may have grown up entirely by gathering them in, the idea being that it was itself once only a little meteorite that succeeded in gathering the others in. It is commonly supposed, however, by those who hold to this view, that the earth was formed from some special cluster of these meteorites that gathered together. It has been thought that perhaps the gas of the rings mentioned before may have cooled down into little solid particles before they were collected together and that they built up the earth. This brings the two theories together in a measure. The planet Saturn, you know, has rings of this kind and they are made up of small solid bodies, and not of gas or liquid, as was once supposed.

If the earth was built up this way we must account for the heat in the interior, but this would come naturally enough. As the little bodies fell upon the surface they would strike hot. But unless they came fast they would cool off before others struck the same spot and the earth would not get very hot. But as they gradually built up the surface the matter below would be pressed together harder and harder because of the growing weight upon it, and this pressing together would make it hot. It is figured out that it would become very, very hot indeed, though this might not seem so at first thought, and that the volcanoes and mountains may all be explained in this way quite as well, and perhaps better, than in the other way. This is called the Accretion theory.

It may be that neither of these theories is right, and we will do well to hold them only as possible ways in which the earth may have been formed at the beginning. But, at any rate, the earth has been shaped over on the surface. In a certain sense its outer part has been remade. And this concerns us more than the question of its far-off origin, because our soils, ores, marbles, and precious stones, as well as our lands and seas, are all due to this reshaping. In the deepest parts of the earth which we can get at for study, we find that it is made up of rocks of the granite class; not always granite proper, but rocks like it. What is below this in the great heart of the earth we do not know, except that it is very dense and heavy. Rocks of the granite class are formed under great heat and pressure, or by the cooling of molten rock material. They may be called the basement rock or great floor, on which all the other rocks near the surface are laid. They underlie all the surface, but at different depths. In some places they have been crowded up by the pressure that came from the shrinking of the earth, of which we spoke before, and so have come to be actually at the surface, except that soil, clay, sand, or gravel may cover them. Under about one-fifth of the land these rocks lie just below the clays, gravels, sands, and soils that occupy the immediate surface. Sometimes they come out to the actual surface, and may be seen in ledges or bluffs. But usually the soils, sands, gravels, and clays cover them up more or less deeply, but even then they are often struck in sinking wells.

Under the other four-fifths of the land they lie much deeper, often several thousands of feet, and there are spread over them sandstones, shales, and limestones. These are the rocks we usually see in the quarries and cliffs of the interior states. The materials to form these were taken from the older rocks of the granite class by a process

which is now going on—so we know how it is done. This is the way in which it takes place: The air and the rains and the water in the ground act upon the rocks, and cause them to soften and fall to pieces, forming soils, or sand, or little rock fragments. This material is gradually washed away by rains and floods. This does not usually quite keep pace with the softening; so the surface is covered with soil and other loose material. But it is little by little washed away, and carried down to sea, where it settles on the bottom, and forms layers of mud or of sand. The mud afterwards hardens, and becomes a kind of rock known as shale. The sands become cemented by lime or iron, or some other substance, and form a sandstone. The lime in the rocks that softened and decayed is chiefly dissolved out by the carbonic acid in the waters of the ground, and is carried away to the sea in solution. This lime is then taken up by sea animals to form their shells, skeletons, teeth,and other hard parts. Afterwards the animals die, and these hard, limy parts usually crumble more or less and form a bed of lime material, and later this hardens into limestone.

Some of the lime is also separated from the waters by evaporation or by other changes. You have noticed that on the inside of a tea kettle there gathers a stony crust. This is made of the same material as limestone—indeed, it is limestone. It was dissolved in the water put in the tea kettle, but as the water was heated and partly changed into steam it could no longer hold all the lime, and some or all of it had to be deposited. So, in a similar way, seawater is dried up by the sun and air, and deposits lime, and so beds of limestone are formed. You will readily see from what has been said why shales, sandstones, and limestones take the form of beds lying upon each other.

Now, away back towards the beginning, when the ocean was first formed, and some part of the earth was pushed up so as to form land, this process began, and has been at work ever since. The surface of the land has been moistened by the air and moisture, and then has been washed away to the ocean and laid down in beds. When these grew thick, and were pressed by the weight of the newer beds that were laid down on them, they hardened into rock again. And this has gone on for a very, very long time, and the beds of sandstone, shale, and limestone so formed have come to be many thousand feet thick in some places. The land would all have been worn away down to the level of the sea if the earth had not kept shrinking and wrinkling, or pushing up in places.

At different times portions of what was once the ocean bottom have been lifted and have become land. If these beds are examined they will be found to contain shells and corals and other sea animals which were buried in them when they were forming, and thus it is known that they were laid down under the sea. It is found also that the lower beds contain kinds of life different from those above, and the lower beds were, of course, formed first. So, by studying the sea-shells and other relics in the beds, from the lowest ones up to the highest ones in the order in which they were formed, the various kinds of life that have lived in the sea from the beginning are found out. The life at the beginning was simpler than it is now, and quite different in many respects. There were gradual changes from time to time, and many strange creatures appeared that do not live at present.

RETURNING HOME.

GUY STEALEY.

I HAVE often wondered whether birds, like persons, do not grow to love some one locality better than all others, and if they do not return there year after year to make it their home. My belief is that they do. I have observed many cases that tend to confirm my views, and give a couple of them below.

One spring, six years ago, while my grandmother and I were out milking in the corral one evening, a pair of killdeer flew over our heads and, after circling around a few times, settled near us. We noticed then that the male had only one leg, the other being broken off near the knee. They skipped around in the way they have, stopping now and then to pick up a worm. All that summer they came nearly every night to catch the bugs and worms, which they often carried to the little fledglings in their nest by the lake.

Well, time passed on. Autumn came and went, and with it the killdeer and their young. The long winter wore away; then, on a bright spring morning, in precisely the same manner as before, our two friends, the killdeer, darted down in the corral again and went to feeding. The old fellow hopped about on his one leg as of yore, and seemed glad to see us again.

The next year it was the same way. They arrived at about the same time as on the two previous seasons, and hatched out their young as usual, down by the lake. They were quite tame by this time, and we began to regard them as pets.

The next spring, however, they failed to come, and you may be sure that we missed their clear, cheerful cries. We could not, of course, tell the cause of their non-appearance. One or both of them may have been killed or they may have died, as birds are liable to the same fate as we are; but one thing is certain, this pair came back here for three seasons.

Another summer, while passing near the river, a humming bird flew out of the bushes almost under my feet, and from its actions I felt certain it had a nest there. And sure enough, on stooping down and parting the leaves I found her nest, built on a single rose stem, projecting over the water. Two tiny birds reposed on their soft bed. Below this nest, on the same stem, and but a few inches apart, were two old ones. They were somewhat ragged, as was natural, from the war of the elements that had raged during one and two years. So, these humming birds must have made this their home for several summers.

THE PLANT PRODUCTS OF THE PHILIPPINE ISLANDS.

THE Department of Agriculture has recently issued a report on the plant products of the Philippine Islands, which is particularly interesting at the present time. The report deals with the agricultural resources of the islands as they now exist, and shows that although an agricultural country, the islands do not produce enough food for the consumption of the inhabitants. In order to supply the deficiency, it is the custom to draw upon rice-producing countries, such as Cochin China. About one-ninth of the area of the Philippine Islands, or 8,000,000 acres, is devoted to agriculture. When the natural fertility of the soil is considered and the large amount of rich land not yet cultivated, it can be assumed that with better agricultural methods the products of the islands could be increased tenfold. Rice forms one of the most important food products of the islands; more than a hundred varieties are grown; the annual production is about 36,000,000

bushels. This is, of course, far below the actual requirements of the population, even when supplemented by other vegetables and fruits. Maize, next to rice, is one of the mort important of the grain products of the Philippines, and the sweet potato follows maize in turn. Fruits grow in great abundance, bananas heading the list. Large quantities of sugar cane are grown, but owing to crude methods of manufacture, the sugar is inferior in quality and is sold for a low price. Cotton is not as valuable a product for the islands as it once was, owing to the successful competition of British fabrics. Formerly indigo also was one of the important products of the islands. Coffee plantations thrive well, but the coffee is not of the best quality and the plantations are not well managed. In most of the islands of the archipelago tobacco is grown and over one hundred million cigars are annually exported from Manila. The shipment of leaf tobacco averages about 20,400,000 pounds. The islands also furnish spices and medicinal plants are abundant, but most of them are little known.

HONEY BIRDS.

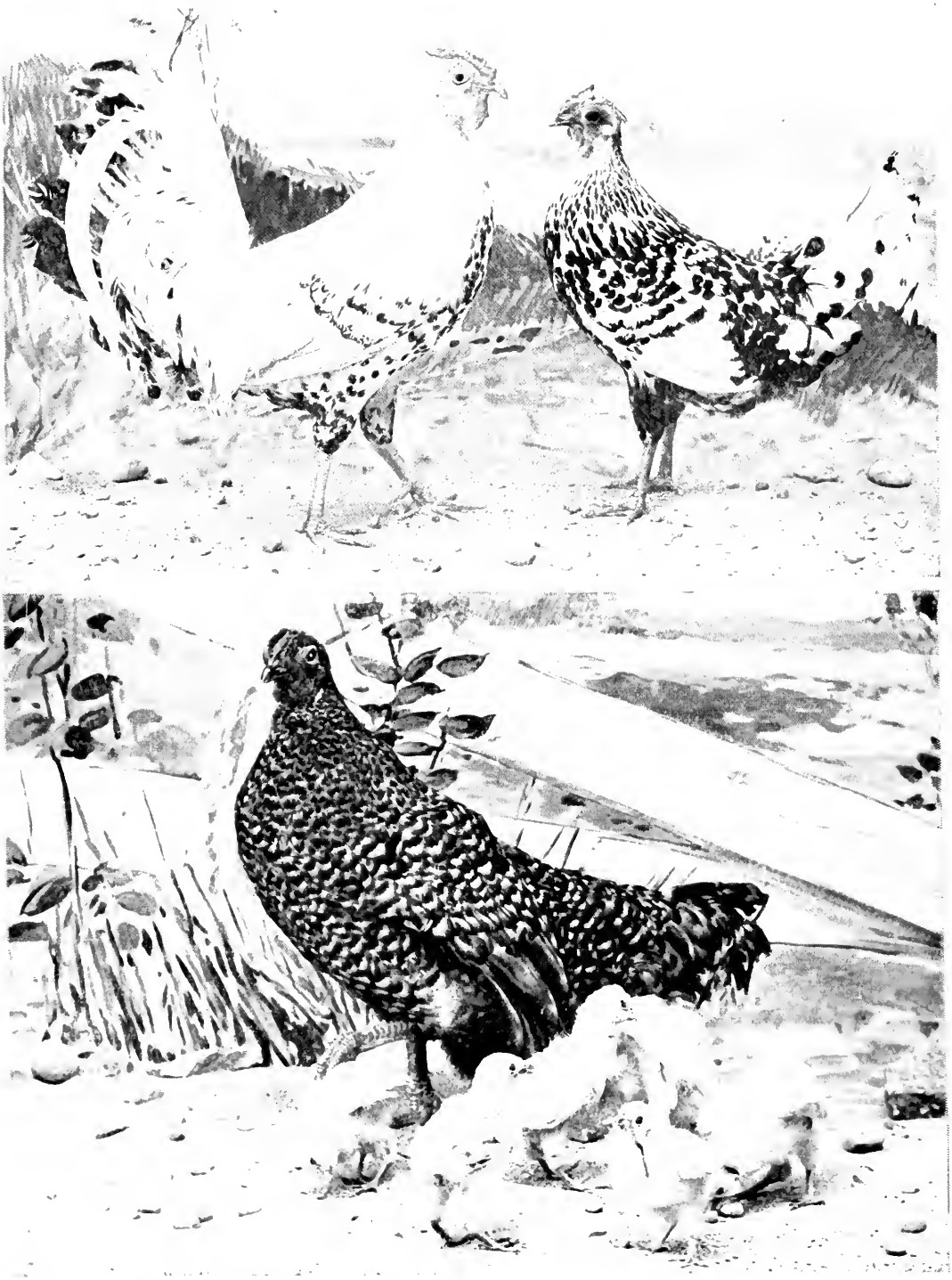
THERE are in Africa, Australia, and in South America certain birds, evidently not related ornithologically, that, because of their peculiar habits, are known as "honey birds," the special traits of which afford an interesting study in animal reasoning or instinct, as one may choose.

One of these, the species common to a large area in Central and South Africa, mentioned by many travelers, has been briefly described by that prince of realists, Dr. James Johnston of Brownstown, Jamaica, in his superb work, "Reality vs. Romance in South Central Africa," on page 106. He says: "Our daily meeting with the honey birds served to remove any skepticism I may have had in reference to this cunning little ceature. It is not much larger than a canary, and as soon as man makes his appearance hops from branch to branch, making repeated flights toward the traveler and then flying off in the direction in which it appears to wish attention attracted, with a sustained *chic-en, chic-en, chic-chur, chur*, returning again and again, until its opportunity is awarded by someone accepting its invitation to follow to the spot where is stored the —to it—inaccessible treasure. It makes a great fuss, flying round and round and round, leaving no doubt as to the whereabouts of its find. Sometimes there is no opening to be seen, when the native proceeds to tap upon the trunk with the head of his hatchet until he locates the hive. He then obtains the honey by making a fire at the root of the tree, and, under cover of the smoke, with his hatchet secures the prize. Then is revealed the reason for the excitement of our tiny guide, who now comes in for its share of the pickings."

Several explorers whose good fortunes have taken them well into the interior of the Australian bush have described the somewhat similar actions of a species of bird spoken of as being "nearly as large as a crow" and evidently quite distinct from the African species. In Haiti I have had opportunities of observing the like performances of a bird, shy and elusive for the most part and only at all approachable when the presence of honey renders it bold, which appeared to be closely related to our northern cedar bird. And, if an eye not specially trained in ornithology be not at fault, the same species is to be observed on the mainland, along the middle reaches of the Orinoco, in Venezuela.

October turned my maple's leaves to gold;
The most are gone now; here and there one lingers;
Soon these will slip from out the twig's weak hold,
Like coins between a dying miser's fingers.

—*T. B. Aldrich.*



ROOSTER AND HEN

CHICAGO:
A. W. MUMFORD, PUBLISHER.

SILVER-SPANGLED HAMBURG.—These fowls are among the most highly developed of all the spangled varieties. They are valued as egg producers and rank among the best. They are very impatient of confinement and are said to succeed best when they can have the run of a clean pasture or common. A large grass walk is recommended by the most successful breeders. Six-foot fences, where they are intended to be restricted to certain limits, will not be more than sufficient for the safe custody of these chickens. The hens, if young, lay nearly throughout the year, but the eggs, which are white, are small, weighing about 1½ ounces each. As they are such abundant layers they seldom want to sit. The chickens are healthy and strong requiring no unusual care. When first hatched they are cream-colored. They feather early and the barred character of the penciled birds quickly appears. In the rapidity of their movements they are said to rival even the active little Bantams.

It has been observed that both sexes of all the varieties continue to improve in appearance after each moult until they are 3 years old. Birds of 1 year old have never attained to their full beauty, this being especially apparent in the more ample development of the tail-feathers of the cock as he becomes older. At from five to six months old they are fit for table use, their meat white, tender, and well-flavored.

The Silver-Spangled Hamburg, or Silver Pheasant, as it is commonly called there, is a breed that has for generations been known in England. In Lancashire this variety had been brought to a very high standard of excellence years before poultry shows were thought of, and, as Wright observes, all our modern skill and careful breeding have been unable to improve upon the old breed of Mooneys, as they were called, which were absolutely perfect in point of feather. The spangling, so large, round, and rich in color, was really something to be wondered at and shows a skill and enthusiasm in breeding which has about it something of the marvelous.

PLYMOUTH ROCK HEN AND CHICKENS.—In March, 1873, Rev. H. H. Ramsdell thus describes the origin of this valued fowl:

"Some thirty years since John Giles, Esq., introduced a fowl into this vicinity—Putnam, Conn.—called the Black Java. Its plumage was black and glossy, its size large, pullets sometimes reaching 11 pounds in weight. It was an unusually hardy bird, with a dark, slate-colored, smooth leg and the bottom of the feet yellow. The hens proved good layers and of extra quality for the table. I sold a few of these birds to a Mr. Thayer of Pomfret, of whom Mr. George Clark of Woodstock, Conn., purchased some he supposed the same. Mr. Clark, passing Mr. Joseph Spaulding's yard one day, noticed his fine flock of Dominiques and proposed bringing a few of his Javas over to cross with them to increase the size. Mr. Spaulding accepted the offer, and when the chickens were grown rejected the black ones and those with double comb, reserving to breed from only the single-comb birds, which retained the Dominique color, or near it. One of the first products from the eggs of this cross was a hen which weighed 9¾ pounds. We soon had a fine flock of them. The fowls were spread around the neighborhood and were much sought after, but had as yet no name. A gentleman asked me what I called them. I said 'Plymouth Rock.' The name passed from one to another and they were soon generally known by that name."

The general characteristics of the cock are: Comb single, upright, and neatly arched, notched, or serrated; body large and deep; back broad and short; breast deep, broad, and full; thighs large and strong; size very large, ranging from nine to twelve pounds; general shape massive, but compact; carriage upright and commanding.

THE GRAND CAÑON OF THE COLORADO RIVER IN ARIZONA.

PRIN. WM. I. MARSHALL,
Lawndale School.

THE Colorado River is pre-eminently "The River of Cañons." Formed in eastern Utah by the junction of the Green River, rising in northwest Wyoming, and the Grand, which has its sources in the mountain rim which walls in the Middle Park of the State of Colorado, not a mile of the Colorado River is in the state of Colorado.

About two-fifths of its nearly 2,000 miles, reckoning from the sources of the Green, which is the main stream, flows through cañons, the series culminating in magnitude and grandeur in the Grand Cañon of the Colorado in Arizona. In 1875, the Government Printing Office at Washington printed in a finely illustrated quarto volume of 291 pages, under the modest and unpretentious title of "Exploration of the Colorado River of the West and Its Tributaries, Explored in 1869, 1870, 1871, and 1872 Under the Direction of the Secretary of the Smithsonian Institution," the fascinating and graphic story of one of the most perilous explorations ever undertaken by man, and one whose origin and successful outcome were due to the scientific enthusiasm, the great endurance, the fertility of resources and the dauntless courage of Maj. J. W. Powell. Few men with two arms would have dared to enter upon, or could successfully have completed the task, and he had left his good right arm on a battle-field of our civil war.

In 1882, the United States Geological Survey, of which Maj. Powell was then director, printed Vol. II of its Monographs, being the "Tertiary History of the Grand Cañon District, by Capt. C. E. Dutton, U. S. A.," a sumptuous quarto of 264 pages, with maps and splendid illustrations.

These two books are, and must ever remain the great authorities on "The River of Cañons," and I shall only write briefly of the route to and scenic splendors of the Grand Cañon.

It is accessible from various points along the Santa Fe Railway, but most easily at present by a stage ride of seventy-three miles, at an elevation above the sea varying from 6,866 to nearly 9,000 feet, from Flagstaff, Arizona—a beautifully situated mountain town at the southern base of the San Francisco Peaks, a cluster of volcanic mountains, the loftiest of which rises nearly 13,000 feet above the sea, and some 6,000 feet above Flagstaff.

At Flagstaff is the famous Lowell Astronomical Observatory, and about it are many points of much interest, especially Walnut Creek Cañon, with its extensive ruins of the cliff dwellers' houses built midway up the face of the almost vertical cliffs.

The first and last thirds of the stage ride to the Cañon are through the great Conconino Forest of long leaved pines —much scattered and with no underbrush—but commonly with splendid grass and unnumbered wild flowers covering all the open spaces between them.

The middle third is over a more desert region, but not destitute of grass, and with stunted pines and cedars growing on most of the ridges and hills along the way.

For the past two years there has been little rain and the route last July was much more dusty than when I went over it first in 1895, and deemed it one of the most enjoyable stage rides I had ever taken; but rains late in July made it much pleasanter when I returned in August, this year, for a third visit.

Along the whole seventy-three miles there is no lake, pond, river, creek, brook, rivulet, or rill, no running water except springs at two points many miles apart which have been piped into troughs for stock.

This absence of water over so wide

an expanse seems at first wholly incompatible with the splendid forests of stately pines, with some aspens and scrubby oaks interspersed, and the luxuriant grass and innumerable flowers.

They are kept alive by the moisture of the heavy snows of winter, and the coolness of the nights in the warmer months, checking the evaporation, and by occasional rains in summer, mostly in July and August.

We are promised a branch railroad in the near future from the main line of the Santa Fe to the Cañon.

All previous observations of cañons fail utterly to give any adequate ideas of the immensity and the splendor of this, "the sublimest spectacle on earth." No narrow crack in the earth's crust is this cañon, but a vast chasm 217 miles long, from five to twelve miles wide and from 5,000 to 6,000 feet deep, with a great river rolling tumultuously along its bottom, miles away from us as the crow flies, and nearly a mile below us vertically.

As there are very few places where it is possible to climb down to the river, one might perish from thirst while wandering along the brink of this cañon, and having in plain view at many points one of the greatest rivers of the west coast of America.

It is the only cañon on earth vast enough to have scores of mountains within it.

It is a double cañon, *i. e.* a cañon within a cañon.

The outer cañon is from 2,000 to 3,000 feet deep, and from five to twelve miles wide.

Its general direction is east and west, but the mighty river, which in ancient geologic ages eroded this vast abyss, curved, like all rivers, now this way and now that, so that each wall is recessed in mighty amphitheaters, between which comparatively narrow promontories or points run out from one to six miles into the cañon.

From the base of the mighty palisade which forms the walls of the outer cañon stretches a plateau 5, 8, 10, or 12 miles wide, to the equally lofty palisade which forms the opposite wall of the outer cañon, and somewhere near the middle of this plateau is sunk the inner cañon, another 2,000 to 3,000 feet deep, with a width at the top varying from one-half to three-fourths of a mile, and in its somber depths rolls the ever turbid Colorado, ceaselessly at its endless labor of cutting down the mountains and sweeping their ruins to the sea.

Scattered all over this plateau are the remains of what were once long promontories like the points on which we now walk or ride far out towards the middle of the cañon, but which have weathered so that they are now lines of hills and mountains.

Real mountains many of them are, for from their bases on the plateau, 2,000 to 3,000 feet above the bottom of the inner cañon, they rise 1,500 to 2,500 feet, nearly or quite to the level of the tops of the cliffs bounding the outer cañon.

Nearly all the length of the cañon is through sandstones, and limestones, and shales, resplendent with the colors which add so much to the beauty of Rocky Mountain scenery.

The almost uniform horizontality of stratification of these rocks demonstrates that the erosion of the cañon was little aided or affected by any violent upheavals or disturbances of the rocks.

We see clearly about twenty-five miles each way along the cañon, and somewhat indistinctly probably another twenty-five or thirty miles each way, and everywhere is the same indescribable splendor of color and of beauty of form.

It is a new "Holy City," and whether viewed from above, by a ride or walk along the edge of the cañon, or from the multitudinous turns and loops of the trail by which one can descend on horseback to the plateau and ride across to the edge of the inner cañon, whence a path enables us to safely climb on foot down to the river's edge, everywhere we seem to be gazing on the ruins of cities, palaces, towers, and temples, such as might have been builded by the gnomes and genii of the "Arabian Nights."

Speaking of these weather-sculptured buttes or mountains of bare and splendidly colored rock which stand within the outer cañon, Dutton says:

"Some of these are gorgeous pagodas, sculptured in the usual fashion, and ending in sharp finials at the summit. Others are the cloister buttes with wing-walls and gables, panels and alcoves. All are quarried out upon a superlative scale of magnitude, and every one of them is a marvel. The great number and intricacy of these objects confuse the senses and do not permit the eye to rest. The mind wanders incessantly from one to another and cannot master the multitude of things crowded at once upon its attention. There are scores of these structures, any one of which, if it could be placed by itself upon some distant plain, would be regarded as one of the great wonders of the world," and of the colors he says:

"The color-effects are rich and wonderful. They are due to the inherent colors of the rocks, modified by the atmosphere. Like any other great series of strata in the Plateau Province, the carboniferous has its own range of characteristic colors, which might serve to distinguish it even if we had no other criterion. The summit strata are pale-gray, with a faint yellowish cast. Beneath them the cross-bedded sandstone appears, showing a mottled surface of pale-pinkish hue. Underneath this member are nearly 1,000 feet of the Lower Aubrey sandstones, displaying an intensely brilliant red, which is somewhat masked by the talus shot down from the gray, cherty limestones at the summit. Beneath the Lower Aubrey is the face of the Red Wall limestone, from 2,000 to 3,000 feet high. It has a strong red tone, but a very peculiar one. Most of the red strata of the west have the brownish or vermilion tones, but these are rather purplish-red, as if the pigment had been treated to a dash of blue. It is not quite certain that this may not arise in part from the intervention of the blue haze, and probably it is rendered more conspicuous by this cause; but, on the whole, the purplish cast seems to be inherent. This is the dominant color-mass of the cañon, for the expanse of rock surface displayed is more than half in the Red Wall group. It is less brilliant than the fiery-red of the Aubrey sandstones, but is still quite strong and rich. Beneath are the deep-browns of the lower carboniferous.

"The dark iron-black of the hornblendic schists revealed in the lower gorge makes but little impression upon the boundless expanse of bright colors above."

OIL WELLS.

OIL IS found in Pennsylvania in oil-bearing sand-rocks, which are considered as the reservoirs in which the distilled product has found a permanent lodgment. The depth of the oil-sand or sand-rock in this state is from 800 to 1,900 feet. There are often several strata, one above the other, containing oil.

It is the uniform experience that the lightest oils are found in the lowest sandstones, while the heaviest oils are drawn from the shallowest wells; and as we approach the surface where it is gathered from the pools dug to the depth of only a few feet, it becomes sticky, semi-fluid, and finally a solid asphalt.

Man made no attempt to bore a deep hole through soil and rock, hundreds of feet down, to reach oil, until the summer of 1859. The first oil company was formed in 1854, with Mr. George H. Bissell at its head, which bored the first oil well in the summer of 1859 under the direction of E. L. Drake. It was about the middle of June that "Uncle Billy Smith" and his two sons arrived in Titusville, on Oil Creek, Pa., the scene of operations.

"The pipe was successfully driven to the rock, thirty-six feet, and about the middle of August the drill was started. The drillers averaged about three feet a day, making slight 'indications' all the way down. Saturday afternoon,

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OIL WELL.

CHICAGO :
A. W. MUMFORD, PUBLISHER.

August 28, 1859, as Mr. Smith and his boys were about to quit for the day, the drill dropped into one of those crevices, common alike in oil and salt borings, a distance of about six inches, making a total depth of the whole well sixty-nine and one-half feet. They withdrew the tools, and all went home till Monday morning. On Sunday afternoon, however, 'Uncle Billy' went down to reconnoiter, and peering in he could see a fluid within eight or ten feet of the surface. He plugged one end of a bit of rain-water spout and let it down with a string, and drew it up filled with petroleum.

"That night the news reached the village, and Drake when he came down next morning bright and early found the old man and his boys proudly guarding the spot, with several barrels of petroleum standing about. The pump was at once adjusted, and the well commenced producing at the rate of about twenty-five barrels a day. The news spread like a prairie fire, and the village was wild with excitement. The country people round about came pouring in to see the wonderful well. Mr. Watson jumped on a horse and hurried straightway to secure a lease of the spring on the McClintock farm, near the mouth of the creek. Mr. Bissell, who had made arrangements to be informed of the result by telegraph, bought up all the Pennsylvania oil-stock it was possible to get hold of, and four days afterwards was at the well."

This memorable strike ushered in the petroleum era. It now only remained to develop this "bonanza." The condition of things on Oil Creek in 1865 is given as follows: "The surface of the whole country was saturated with oil from the leaking barrels, the overflow and enormous wastage from the wells before they could be got under control, and from the leakage and bursting of tanks. The peculiar odor of petroleum pervaded everything; the air for miles was fairly saturated with it; nothing else was thought of; nothing else was talked about. Land was sold at thousands of dollars per acre. Fortunes were made and lost in a day. Oil companies with high-sounding names were organized almost without number, absorbing millions of money; many companies were formed without the shadow of a basis for operations, and many persons who were as covetous as they were ignorant, were drawn into the maelstrom of speculative excitement and hopelessly ruined. No parallel in the history of speculation in this country can be found, excepting, perhaps, that which occurred during the 'California gold fever' of 184c."

The Pennsylvania oil region and the Russian oil region are the two greatest centers of petroleum in the world. The latter has its center at Baku, on the Caspian Sea. The following interesting state of affairs at Baku in 1872 is given by Major Marsh:

"The afternoon was devoted to the great natural wonders of Baku, petroleum and the everlasting fires. At Surakhani the whole country is saturated with petroleum; on making a hole in the ground the gas escapes, on lighting which it burns for a very long while, one of the few spots on earth where this phenomenon can be seen. When there is no wind the flame is dull and small, but in a gale it roars and leaps up eight or ten feet. There are two naphtha refining establishments at Surakhani, the furnaces of which are entirely heated by the natural gas, which is collected as it rises out of the ground in an iron tank and led off by pipes. At night the whole place is lighted in the same manner, by ordinary gas burners attached to the walls. On returning home in the evening we saw the silent waste, lit up by various fires, each surrounded by a group of wild Tartars cooking their food by its heat.

"We shall have occasion further on to furnish more particular information respecting the enormous yield of the wells around Baku, and therefore in this connection only incidentally allude to the statement of the geographer, who notices the 'seven hundred oil wells' which have all been drilled, none of which shows any signs of exhaustion, and says that 'immense loss is caused by the ignorance of those engaged in the trade. Thus a well at

Balakhani, yielding 36 571 barrels of naphtha daily, ran waste for four weeks before reservoirs could be prepared to receive the oil.'"

A celebrated Russian scientist, after a visit to Baku in 1882, said: "Comparing results achieved in the two countries on one side and the average depth and total number of wells on the other, it may justly be stated that the natural petroleum wells of Baku, as far as our knowledge goes, have no parallel in the world."

The statement concerning the enormous yield from some of the wells of this district may well challenge our credulity. The following graphic description of the bursting forth of the great Droojba fountain is from an eyewitness and is given in the words of Mr. Charles Marvin: "In America there are over 25,000 petroleum wells; Baku possesses 400, but a single one of these 400 wells has thrown up as much oil in a day as nearly the whole of the 25,000 in America put together. This is very wonderful, but a more striking fact is that the copiousness of the well should have ruined its owners and broken the heart of the engineer who bored it after having yielded enough oil in four months to have realized in America at least one million sterling. In Pennsylvania that fountain would have made its owner's fortune. There is $50,000 worth of oil flowing out of the well every day. Here it has made the owner a bankrupt (on account of the damage done by the oil to surrounding property). These words were addressed to me by an American petroleum engineer as I stood alongside of the well that had burst the previous morning and out of which the oil was flowing twice as high as the Great Geyser in Iceland with a roar that could be heard several miles round. The fountain was a splendid spectacle and it was the largest ever known at Baku. When the first outburst took place the oil had knocked off the roof and part of the sides of the derrick, but there was a beam left at the top, against which the oil broke with a roar in its upward course and which served in a measure to check its velocity. The derrick itself was 70 feet high and the oil and the sand, after bursting through the roof and sides, flowed three times higher, forming a grayish-black fountain, the column clearly defined on the southern side, but merging into a cloud of spray thirty yards broad on the other. The strong southerly wind enabled us to approach within a few yards of the crater on the former side and to look down into the sandy basin from around about the bottom of the derrick, where the oil was bubbling and seething round the stalk of the oil-shoot like a geyser. The diameter of the tube up which the oil was rushing was 10 inches. On issuing from this the fountain formed a clearly defined stem about 18 inches thick and shot up to the top of the derrick, where, in striking against the beam, which was already half-worn through by friction, it got broadened out a little. Thus continuing its course more than 200 feet high, it curled over and fell in a dense cloud to the ground on the northern side, on a sand bank, over which the olive-colored oil ran in innumerable channels toward the lakes of petroleum that had been formed on the surface of the estate. Now and again the sand flowing up with the oil would obstruct the pipe or a stone would clog the course; then the column would sink for a few seconds lower than 200 feet, but rise directly afterward with a burst and a roar to 300 feet. . . . Some idea of the mass of matter thrown up from the well could be formed by a glance at the damage done on the south side in twenty-four hours; a vast shoal of sand was formed, which buried to the roof some magazines and shops and blocked to the height of six or seven feet all the neighboring derricks within a distance of 50 yards. . . . Standing on the top of the sand shoal we could see where the oil, after flowing through a score of channels from the ooze, formed in the distance or lower ground a whole series of oil lakes, some broad enough and deep enough in which to row a boat. Beyond this the oil could be seen flowing away in a broad channel toward the sea. This celebrated well, from the best estimates that could be made, gushed forth its oil treasure

at the rate of 2,000,000 gallons a day from a depth of 574 feet."

About the year 1858 oil was discovered in Berksville, Tenn., on the Cumberland River. It was called rock oil and was hawked about the streets as a sure cure for rheumatism. About 1866 there was a company formed to develop the petroleum then so-called. The transportation from Berksville to market was so dear that the company was unsuccessful. At Glasgow, twelve miles from Cave City, Ky., near the Mammoth Cave, there was a well, and a transportation trough was suggested by Mr. Geo. Northrup, which was never used. But the suggestion finally led up to the subsequent use of pipe lines for transporting the oil. The first oil used was at the head-waters of the Cumberland River. It was sold in a crude state and was not then used for illuminating purposes. A few years afterwards, when it was discovered in Pennsylvania, it was so used, although still in a comparatively crude condition. The price of oil was then about thirty-five cents a gallon at retail, or to the consumer. It has since been sold to the consumer at as low a price as seven cents a gallon.

The Standard Oil Company owned the first pipe lines that transported oil from the Pennsylvania oil fields to the seacoast. It was then and still is the only company that has furnished the best oil product. The American oil is said to be at least twenty-five per cent. superior to the Russian article. It is of a higher grade and commands, naturally, a higher price.

It is assumed that there must still be great quantities of oil in the rock formation of the earth. The substance is absorbed by the rocks where deposited and does not evaporate, therefore it would long ago have disappeared by absorption were it not that there must be vast areas of it still lying ready to be pumped to the surface.

The odor of the petroleum first discovered was similar to that of the cheap bituminous coal. In this respect there has been a great improvement, although there is yet room for the removal of what, to many, is a very unpleasant odor.

In the fall of 1865 the narrator, Mr. George Northrup, at that time a young Chicago business man, still living in that city, believing that vast fortunes could be made in the oil regions, caught the fever, and ascertaining that new fields were being developed in Glasgow, Ky., went there with $5,000 capital, intending to invest it, fancying that amount would be sufficient to buy oil land and develop the same. Arriving at Cave City, on the L. & N. Railway, he was lucky enough to get a seat on the stage coach that ran to Glasgow. The only public inn was filled to overflowing, and he was obliged, with others, to sleep on the office floor of the hotel. Two miles before reaching the town the odor from the wells in operation affected him to such a degree that he confesses that no bouquet of flowers ever seemed to him sweeter. After dining at the hotel he was approached by a score of speculators who inquired of him whether he desired to invest in oil territory, which was held at from $25,000 to $200,000 an acre. He said that he would investigate the next day, became disgusted and immediately disappeared. The principal objection to the territory was the absolute absence of transportation. It was then that he suggested the use of a trough for the transportation of the oil to Glasgow, a distance of twelve miles, since which time it has been carried by pipe from the oil fields of Pennsylvania to the Atlantic Ocean.

THE BADGE OF CRUELTY.

CELIA THAXTER.

IS it not possible to persuade the women of Boston—the city we are proud to consider a centre of refinement, reason and intelligence—to take a decided stand in the matter of the slaughter of birds, and protect them by refusing to wear them? We are fostering a grievous wrong out of pure thoughtlessness. A bit of ribbon, or a bunch of flowers, or any of the endless variety of materials used by the milliner would answer every purpose of decoration, without involving the sacrifice of bright and beautiful lives. But women do not know what they are doing when they buy and wear birds and feathers, or they never would do it. How should people brought up in cities know anything of the sacred lives of birds? What woman, whose head is bristling with their feathers, knows, for instance, the hymn of the song-sparrows, the sweet jargon of the blackbirds, the fairy fluting of the oriole, the lonely, lovely wooing-call of the sandpiper, the cheerful challenge of the chickadee, the wild, clear whistle of the curfew, the twittering of the swallows as they go circling in long curves through summer air, filling earth and heaven with tones of pure gladness, each bird a marvel of grace, beauty, and joy? God gave us these exquisite creatures for delight and solace, and we suffer them to be slain by thousands for our "adornment." When I take note of the headgear of my sex a kind of despair overwhelms me. I go mourning at heart in an endless funeral procession of slaughtered birds, many of whom are like dear friends to me. From infancy I have lived among them, have watched them with the most profound reverence and love, respected their rights, adored their beauty and their song, and I could no more injure a bird than I could hurt a child. No woman would if she knew it. The family life of most birds is a lesson to men and women. But how few people have had the privilege of watching that sweet life; of knowing how precious and sacred it is; how the little beings guard their nests with almost human wisdom and cherish their young with faithful, careful, self-sacrificing love! If women only knew these things there is not one in the length and breadth of the land, I am happy to believe, who would be cruel enough to encourage this massacre of the innocents by wearing any precious rifled plume of theirs upon her person.

Extract from Henry Ward Beecher's letter to Bonner on the death of the Auburn horse:

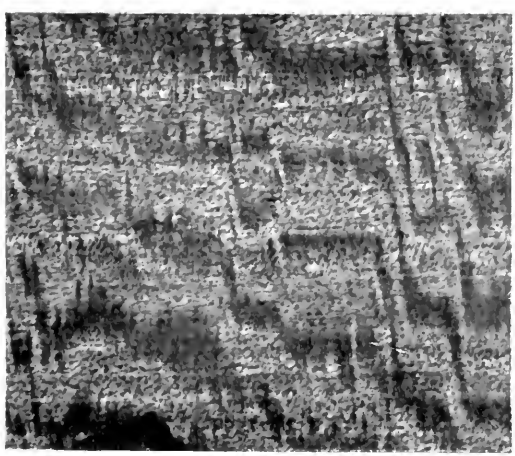
"Ought he not to have respect in death, especially as he has no chance hereafter? But are we so certain about that? Does not moral justice require that there should be some green pasture-land hereafter for good horses—say old family horses that have brought up a whole family of their master's children and never run away in their lives; doctors' horses that stand unhitched, hours, day and night, never gnawing the post or fence, while the work of intended humanity goes on; omnibus horses that are jerked and pulled, licked and kicked, ground up by inches on hard, sliding pavements, overloaded and abused; horses that died for their country on the field of battle, or wore out their constitutions in carrying noble generals through field and flood, without once flinching from the hardest duty; or *my* horse, old Charley, the first horse that I ever owned; of racing stock, large, raw-boned, too fiery for anybody's driving but my own, and as docile to my voice as my child was?"

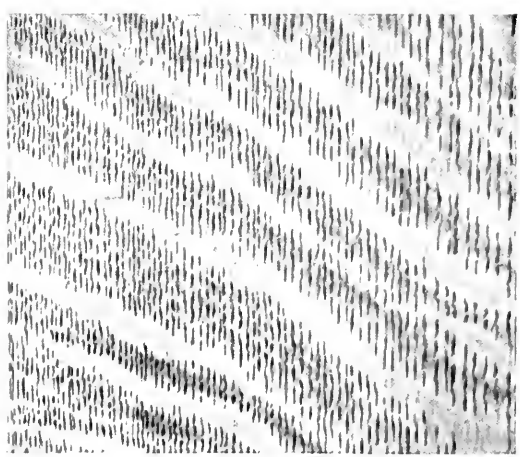
Hungarian Ash.

White Walnut.

Cherry.

Bird's-eye Maple.





CHICAGO
A. W. MUMFORD, PUBLISHER.

ASH.—This name is applied to four species of forest trees. Most of the species are indigenous in North America, and some are found in Europe and Asia. The majority of these trees are large, affecting shady and moist places, banks of rivers, or marshes. The wood is tough and elastic, and is used by wheelwrights, carriage-makers, and shipbuilders. The Hungarian species is a favorite with cabinet-makers.

CHERRY.—The common cherry tree (*Prunus cerasus*) is of Asiatic origin, and is said by Pliny to have been introduced into Italy by Lucullus about seventy years before Christ, and about 120 years after was introduced into Britain. It is extensively cultivated in the timber regions of Europe and America. There are now more than 300 varieties. The wood is of a reddish hue, hard and tough, and much used by the cabinet-maker; the gum is edible, and the fruit is eaten either fresh or dried, and is used for preserves. The cherry is best propagated by grafting with seedlings of the wild cherry.

MAHOGANY.—This wood is a native of South America, Honduras, and the West Indies Islands, and among the most valuable of tropical timber trees. It is a large, spreading tree, with pinnate, shining leaves. The trunk often exceeds fifty feet in height, and four to five feet in diameter. The flowers, three or four inches long, are small and greenish-yellow, and are succeeded by fruit of an oval form and the size of a turkey's egg. The wood is hard, heavy and close-grained, of a dark, rich brownish-red color, and susceptible of a high polish. The collection of mahogany for commerce is a most laborious business, often involving the construction of a road through a dense forest, upon which the wood may be transported to the nearest water-course. The natives make this wood serve many useful purposes, as canoes and handles for tools. The largest log ever cut in Honduras was seventeen feet long, fifty-seven inches broad, and sixty-four inches deep, measuring 5,421 feet of inch boards, and weighing upward of fifteen tons.

Mahogany is said to have been employed about the year 1595 in repairing some of Sir Walter Raleigh's ships, but it was not used for cabinet work until 1720, when a few planks from the West Indies were given to Dr. Gibbons of London. A man named Wollaston, employed to make some articles from this wood, discovered its rare qualities, and it was soon in high repute.

WHITE WALNUT.—Walnut (the nut of Jupiter) is the common name of large nut-bearing forest trees of the genus *Juglans*, which, with the hickories, make up the walnut family, in which the trees have a colorless juice, a strong scented bark, and compound leaves. Three species of the walnut are found in the United States. The wood is hard, fine-grained, and durable.

BIRD'S-EYE MAPLE.—This is one of about fifty species, which are distributed over North America, Europe, Northern Asia, Java, and the Himalayas. While the wood of some of these is perfectly straight-grained, that in other specimens presents marked and often elegant varieties. The bird's-eye maple has its fibers so singularly contorted as to produce numerous little knots which look like the eye of a bird. It is a variety much valued for cabinet work of various kinds and interior finishing, while the straight-grained wood is used for making lasts, buckets, tubs, and other articles. It is also employed in ship-building.

OAK.—The English name of trees of the genus *Quercus*. Oaks are found over nearly the whole northern hemisphere, except the extreme north; in the tropics along the Andes, and in the Moluccas. All oaks are readily recognized by their peculiar fruit, consisting of an acorn with a cup which never completely encloses the nut. Some of the oaks furnish valuable timber. Tannic and gallic acids are obtained from them and the bark of many is useful for tanning. The nuts not only supply human food but that of various animals.

The species vary so much that the genus is puzzling to botanists. The character of the wood is affected by the soil and locality in which the trees grow, lumbermen making distinctions not recognized by botanists. The white oak is long-lived, and specimens supposed to have been in existence before the settlement of the country are still standing. It is of slow growth, but does not cease to grow as it gets larger. The oak is much esteemed as an ornamental tree. The names of some of the varieties are: Post oak, burr oak, swamp oak, live oak, black oak, willow oak, scrub oak, scarlet oak, and California evergreen oak.

THAT ROOSTER.

BY ELANORA KINSLEY MARBLE.

HE was a noble looking fowl, that rooster, and challenged my admiration by his unusual proportions, glossy plumage, and proud, exultant air.

As I paused in my walk to view him his sharp eyes were instantly fastened upon mine and a note of warning issued from his handsome throat. Away scampered the hens and young chicks, but the rooster, advancing a pace or two, lifted one foot menacingly, as if to defy my taking one step further.

"Dear, dear!" I exclaimed, "you make a great fuss over nothing. I only stopped to admire you and your family. Be assured I meant you no harm."

"*Gluck, gluck, gluck,*" replied he angrily.

The spectacle of a champion standing on one leg and sending forth such a cry of defiance struck me as so ridiculous that I involuntarily burst into laughter.

Every fowl in the inclosure at the sound stood motionless.

"What was that?" questioned one motherly old hen of another.

It was a queer gibberish which she spoke, and most people would have failed to understand it, but to me —who had been listening to the voices of nature the whole day long, to whom the trees had whispered their secrets, the brooks had murmured their complaints, the birds had caroled their stories—to me the language of these feathered creatures was perfectly intelligible.

"I don't know, I'm sure," replied the other, "but somehow it sounded rather pleasant."

"Pleasant!" exclaimed a young white and buff hen, tossing her pretty head, "it appeared to me she was making fun of us."

"Will you be quiet, you cackling old hens?" roared Mr. Rooster, giving them a swift glance from one eye, while furtively watching me with the other. "What business is it of yours what the intentions of this intrusive person may be? I am the one to decide that question. What do females know about war, anyway, especially hens? If she means fight, why——"

"You'll run, no doubt, and hide behind your wives," I interrupted, feeling the old fellow to be a boaster. "I've a notion to scale the fence and see," I added mischievously.

He stepped back a pace or two in evident alarm.

"Never fear," I hastened to say. "Only cowardly hearts find pleasure in giving pain to innocent and defenseless creatures. My only object in stopping was to view your happy family and— and— in fact, Mr. Rooster, to interview yourself."

"Interview me?" he exclaimed. "Well, I never!" and filled with a sense of his importance the old fellow set up such a crowing that even a Jersey cow, munching grass by the wayside, paused to ruminate over what it might mean.

"A reporter," sneered the ill-natured young hen. "A woman reporter! How unnatural!"

"Louisa Mercedes," sharply cried the rooster, "how many times have I told you to bridle your tongue?"

"I'm not a horse," sulkily replied

Louisa, "and what's more, I think if you would bridle your vanity it would be much more to your advantage. You want to do all the talking—and eating, too," she added in an undertone.

"She's but a young thing," loftily said Mr. Rooster, "and I have to overlook much of her insolence, you know. Another year will find her less spirited, like Georgiana and Marthena and Sukey over there. But let us resume our conversation. About what do you want to interview me?"

First, I should like to know—why, do you intend to come out?" I interrupted as he moved nearer the fence.

"Oh, no; but it's just as well that the women folks don't hear all we have to say. They have such a disagreeable fashion of contradicting, you know, and such good memories, that when you're least expecting it up they'll drag some remark made months ago to clinch an argument against you. Females are such queer creatures—but I beg your pardon," he added apologetically, remembering my sex. "I forgot."

"How many wives have you?" I queried, beginning the interview.

"Well," marking with his claws in the sand as he named over Louisa Mercedes, Cassie, Maud, and a number of others. "I have, as near as I can figure it, about nine now."

"Now?" I repeated.

"Yes. I had more the first of the season, but the folks up at the house have the habit of coming through that door in the barn yonder when the minister comes to dinner and carrying off any member of my family which strikes their fancy. I don't know what they do with them, I am sure, but presently I hear a dreadful squawk or two in the woodshed, a flouncing around, and then all is still. It is very painful, I assure you," and Mr. Rooster, lifting one foot, pretended to wipe a tear from his sharp, dry eyes.

"You defend them, of course," I responded, endeavoring to appear solemn.

"Of course," swaggered the husband and father, "and sometimes I crow as loud as I can for an hour or so afterward."

"Crow?"

"Yes, to let the folks know *I'm* not conquered."

"Haven't you," I asked to hide my mirth, "a preference for some of your wives over others?"

Mr. Rooster gravely surveyed his household.

"No," he said reflectively, "no, I can't say that I have."

"But that white one," I said, "over yonder. She is so handsome."

"Maud, that white and silver Wyandotte, you mean. H'm, yes. She's *too* handsome. I have a great deal of trouble with her."

"Trouble—how?"

"Oh, in various ways," with a frown. "She is too pretty to work, she thinks, and spends half her time in preening her feathers, polishing her toe nails, or, what's worse, staring through the fence over yonder at that proud, long-legged Mr. Shanghai. He's a foreign bird, you know, and thinks himself a deal better than a common American Plymouth Rock. There's going to be trouble between us yet, mark my words."

"You have no trouble, I suppose with the older ones," I returned, suppressing a smile.

"No, not in that way, ma'am. They quarrel a good deal about their children, however. Sukey—that brown and white Leghorn over there—thinks her children are veritable little angels with wings, and Georgiana—an out-and-out Plymouth Rock like myself—says they are little demons, her own brood being the little angels, you perceive. Twenty times a day I have to chastise the whole lot, mothers and all. Indeed," with a sigh, "I have a notion to turn them all out some day, just to have peace. All, except Jennie, the black Langshan. She's old to be sure, but a great comfort to me."

"Of course, of course," sneered a voice behind him. "Precious little spunk has Jennie, scratching around from morning till night that she may turn up a bug or worm for a lazy old curmudgeon like you. So you intend to turn me out on the cold, cold world some day, do you? Hm! we'll see about that."

"That's Jane," grinned Mr. Rooster, without turning around, "I hope they

will choose her the next time they want one of my household, I really do."

"Oh, yes," sneered Jane, "you'll run away and squawk as you always do, and leave me to my fate."

"Run away," screamed Mr. Rooster making a dash for her, "I run away!"

"Fie, fie," I exclaimed, "you musn't show your valor by striking one of the weaker sex. You were intended to be her protector, you know."

I was here interrupted by a great commotion among the hens and chicks at the farther end of the enclosure.

"Only a quarrel, I presume," said he indifferently, "they can settle it among themselves, to-day."

"No, it seems to be something rather serious," I responded, and as I spoke a large cat succeeded in squeezing herself through the palings. Wildly ran the fowls about, cackling with fear.

"Hubby, hubby!" cried the hens.

"Papa, papa!" screamed the chicks.

"Run for your lives," admonished that hero, his knees knocking together, his comb and tail drooping, "run for your lives," and suiting the action to the word, away he scurried to the other side, and spreading his wings over the fence he flew, in his blind flight dropping at the feet of his hostile neighbor.

"Get out of here," screamed the young Shanghai, whom the handsome hen admired, "How dare you come over in my yard?"

"Give me time," meekly said my heroic Rooster, "give me time to gain my breath and I will."

"Now is my time," thought the young Shanghai, "the very chance I have been looking for," and straightway into the trembling Mr. Rooster he pitched.

From my standpoint I closely viewed the battle.

"Lo, the conquered braggart comes," I hummed, as a woebegone-looking object in a very little while dropped wearily over into our enclosure again.

"My poor dear," pityingly cried old Jennie. "Come, Sukey, let's lead him to the trough and bathe his wounded head."

I was about to depart, my heart wrung with compassion at the sight of his wounds, when, lifting his drooping head, with a ghastly wink of his uninjured eye, he said:

"Well!"

"Well!" I echoed in some surprise.

"Didn't I play that trick cleverly?" he asked with a sickly grin.

"Trick?"

"Yes, trick, you stupid! Couldn't you see the pretense I made of running away from the cat, just to get a chance of flying over the fence to get at that impudent Shanghai rooster?"

"But," I gasped, "you didn't whip him, you know."

"Didn't whip him!" he mimicked with brazen effrontery. "Why, how else, I'd like to know, could I have been torn up so? All I want now is a chance at that sneaking cat, and I'll make the fur fly, I warrant you."

Here the old deceiver, overcome with weakness and loss of blood, staggered, and would have fallen but for the support of the faithful Jennie and Sukey.

"Go away," hoarsely muttered the rooster, "go away; what do females know about war. They can't crow! Go away!"

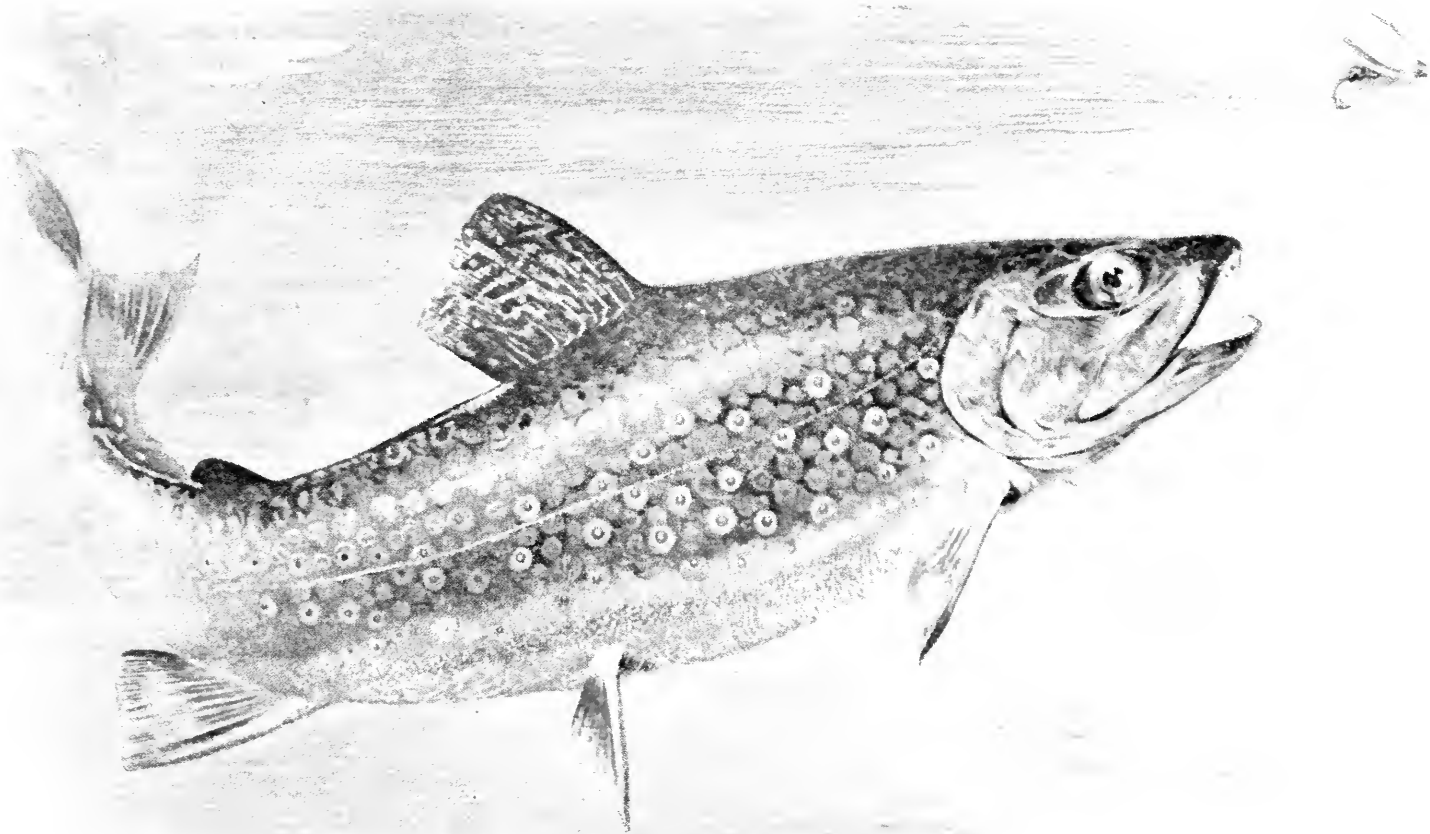
I bethought me here of one very important question.

"I hesitate," I said, "to disturb a suffering creature, but—"

"Call to-morrow, Miss Reporter," he muttered wearily, "call to-morrow."

"But," I persisted, "you may not be alive to-morrow, and I only desire to know why you roosters invariably crow at midnight?"

"Midnight!" he echoed faintly, catching but the last word. "Is that the reason it has grown so dark? Ah, that Shanghai over there will get ahead of me; that'll never do," and the dying old boaster, drawing himself up stiffly, a feeble "*cock-a-doodle*" rang out on the air, but the final "*doo*" stuck in his throat, a gasp, a shiver, a swaying to and fro, and the long, slender toes of Mr. Rooster were presently turned toward the sky.



BROOK TROUT.

A. W. MUMFORD, PUBLISHER.

BROOK TROUT.

Salmo fontinalis.

THIS well-known and greatly prized game fish is found between the parallels of latitude 50 degrees north and 36 degrees south, though in Labrador, in latitude 54 degrees, and in the Appalachian mountain ranges as far south as the northern border of Georgia and South Carolina, it has been taken in abundance. Northwestern Minnesota is its northern limit, and it is only occasionally caught west of the Mississippi River, except in a few of its tributaries. Specimens weighing seventeen pounds have been taken, the largest being found in the Nipigon River, in Ontario, and on the north shore of Lake Superior, where the seventeen-pound specimen referred to was caught. It is found in the large lakes and in the smallest ponds, the tiniest brooks and the largest rivers. The Nipigon River is forty-five miles in length and has a depth, in places, of from one hundred to two hundred feet.

Although a bold biter, the brook trout is wary, and usually requires all the skill of an experienced fisherman to capture it. The bait commonly used to entice it to bite is artificial or natural flies, minnows, crickets, grubs, grasshoppers, fish spawn, or the eyes or cut pieces of other trout. Its period of spawning is from September to the last of November, and it begins to reproduce its kind when about two years of age, when it measures some six inches in length. In the early summer the trout sports in rapids and swiftly running water, and in midsummer finds a retreat in deep, cool, and shaded pools. In August and September the females gather about the mouths of gravelly brooks, whither they resort to make their spawning beds.

With age the habits of the trout change. When young they associate in schools and play together constantly, usually choosing parts of the brook where the bottom is muddy, in which, if startled suddenly, they bury themselves for safety. This does not often occur, however, as they prefer any little projection that juts out over the water where they can hide until the danger is past. As they grow older they separate, and each one chooses his own particular hiding place, the larger trout taking the deepest holes and largest projections and leaving the smaller relations to shift for themselves. The older they grow the wiser and more wary they become, hence the necessity of considerable skill to land a wary old trout. Angle-worms are considered the best bait for trout, but in the spring, after the usual freshets, which wash vast numbers of worms and insects into the water, they bite better at the more tempting bait of a fly.

Practice alone will enable one to catch this wary beauty. One must know not only how to catch it but where to find it, and some knowledge of entomology is essential at the very beginning. It is desirable to have some acquaintance with the insects that live in the water, under the water, and over the water, and whose habits in great part influence the movements of the fish.

Miss Sara J. McBride, an accomplished naturalist of Mumford, New York, in an essay published some years ago in the *Forest and Stream*, taught the lesson of entomology we have referred to, as applied to the angler's purposes, in the following words:

"There is a large order of insects that live the first stages of life in water, where for weeks, months, in some instances years, they hide under stones; carve an abiding-place in submerged driftwood; feed on decaying vegetation in lazy, inert masses; burrow in the earth beneath the current; weave together

bits of wood, gravel, stones, and floating debris, forming retreats that surround them as they swim or daintily walk; spin of silken thread individual domiciles that they guard from intruders with the valor of soldiers, or bodily and singly dash out in the current, swimming with agile rapidity. These are all fish food. But it is only when they assume the perfect form, when they cast aside their aquatic nature, and with gossamer wings float in the air, that they are of interest to the fly-fisher—as he seeks to deceive the finny tribe with their imitations, made of feathers, tinsel, and mohair. Insects are enfeebled at all changes in their life, and at each successive moult, when the pupa case is broken, too weak to keep guard, they flutter and rest on the water an instant before flitting away. At this instant many are seized by the wary fish. Insects leave the water mornings and evenings, particularly the latter, rarely at midday, never during rain storms or heavy winds. It is at these times, when they are leaving the water, their imitations are used to most advantage. It is that insect floating off into a new element that the fish are watching and waiting to feed on. At other times you may cast with success your favorite 'brown hackle' with its golden ribs and steel backbone—the bland professor, the modest queen of the water, or the grizzly king with his gray locks and flaming sword. Things which resemble nothing in the heavens above, the earth beneath, or the waters under the earth—why fish take these, whether from curiosity, or by way of dessert, no one perhaps will ever know, not fully understanding the nature of the fish. But there is one thing we do know, that when the countless myriads of these tiny creatures are entering a new life in untried regions, the favorite flies will be thrown in vain. The fish will regard with contemplative indifference every other lure but a close imitation of that particular insect.

"One evening we sat on the bank of a creek, bug net in hand, watching the trout and the birds of the air feeding on a neuropterous insect that is constantly repeating the cycle of its life,

'As yet unknown to fame,
And guiltless of a Latin name.'

The stream was in eddying whirls of ripples from the constant 'leaping' of the trout. Now and then one bolder than the rest would dash out of the water its full length to seize its departing prey, which sometimes escaped to become a precious morsel in the mandibles of a watching bird. Many of these insects would float on with the current, never able to unfold their soft, creamy wings, and become easy victims. On the opposite bank was an angler. For an hour in patience he whipped the stream, now up, now down, with 'red hackles,' 'white hackles,' 'black hackles;' he changed fly after fly in vain. At length he folded his rod and passed away among the shadows of the night, without so much as a bite, without so much as a chance to tell of the big fish 'hooked' but lost.

"There are many aquatic insects double brooded, or under favorable circumstances, of a succession of broods. Imitations of such can be used throughout the summer months. There are many insects that do not breed in water, yet are successful baits. As a rule, insects that appear in large numbers, whether they belong to land or water, are the proper ones for imitation. Solitary specimens, although dear to the heart of an entomologist, are eyed by the fish with haughty indifference. Water is a great attraction for all insect tribes. The banks of streams constitute the favorite hunting-ground for insect collectors, where they compete with the fish, those practical entomologists, in collecting. Some insects come to drink, others in search of prey, for insects are cannibals, while very many are the sport of the winds. It is probably the bright sheen of the water that draws the fluttering moths into its depths. All nocturnal insects have a strange infatuation for glistening light. What the attraction is for some is beyond the

ken of mortals. A *Tipulidæ bibri marci*, or in piscatorial language, the hawthorn fly, an insect whose life is beneath the surface of the earth eleven months of the year, comes crawling, creeping out of the ground on warm June mornings appareled in new livery. After resting awhile on low herbage, all, as if guided by one impulse, fly to the nearest stream. We have kept those insects for weeks in confinement, and they would neither eat nor drink. But every morning for hours they congregate over streams. Keeping time with the ripple of the water, they hold a May dance; darting hither and thither, occasionally touching the water to go down the current, or else down the throat of a fish.

When these bright creatures are holding high carnival above, the trout positively refuse other enticement. The larvae of moths is a favorite fish food, and consequently successful bait. Hibernating larvae are drawn from their retreats in warm spring days, and continue the pilgrimage they commenced the previous fall. In their wild journeyings on and on before spinning the pupa shroud, they fall victims in attempting to cross streams.

Hairy caterpillars feeding on the trees are blown off by the winds, or their silken thread is broken, as they hang under the leaves in shelter from the rain. Imitations of those known to the American by the familiar term of hackles are to be used after winds or during rain storms; also that compromise between larvae and image known as the hackle fly. No bait has ever been used that has given as general satisfaction as this anomaly. It is a common remark that fish will not bite before rain. The reason is probably that food is never offered at such times. The natural instinct of the insect forbids its leaving the water or flying abroad if rain is threatening. The breathing-pores are situated on the outside of the body near the insertion of the wings. They are soon clogged and closed up by the water, and the down washed from their bodies; their wings draggle and become powerless, and they suffocate flying in midair. This is the reason winged insects on touching water drown so easily. Insects do not invariably appear at the same times. A cold spring will retard their development for months, while an unusually warm spring or summer will hasten their appearance. Insects in the water are the most affected by changes of temperature. Any guide for a fly-fisher would be almost useless unless this important point were remembered. English works can never become positive authorities for our climate. Insects which appear there in vast quantities are rare here, and *vice versa*. Some that are single-brooded there are doubled-brooded here. Some that appear there in one month visit us at another, while we have many alluring baits here that the classic waters of the British Isles would regard with bewildering amazement."

In fishing with worm for bait, good fishermen say, it is better to choose a still, cloudy day indicating rain, as the fish are then hungry for insects. An expert trout-fisher will begin at the head of a stream and fish down it, always keeping some distance from the bank to avoid alarming the fish.

The speckled beauty, as the brook trout is universally called, as a food fish is by many considered unsurpassed, the flesh being firm and well flavored. Others, however, regard it as only an occasional delicacy.

CUBA AND THE SPORTSMAN.

DEER, WILD BOAR, AND MANY SPECIES OF GAME BIRDS FOUND IN ABUNDANCE —WATERS TEEM WITH FISH.

WHILE Cuba offers such a haven to the invalid, it is a paradise to the sportsman, wild game and fish of all kinds being abundant.

Parties of gentlemen on horseback, with their pack of hounds, hunt the fleet-footed deer. It is a common thing for a small party to kill eight or ten deer in a day.

The wild boar is plentiful, and sometimes, if cornered, dangerous, especially the old master of the herd, called "un solitario," which will tear a dog to pieces or make a green hunter climb a tree; but a Cuban easily kills him with a machete. The island boar sometimes weighs 200 or 300 pounds and has huge tusks, often five or six inches in length. The meat of the female is much relished by the natives. Wild dogs and cats, wild cattle, horses, and jackasses abound. But the jutia, peculiar only to Cuba, which looks like a cross between a squirrel with a rat's tail and a rabbit, and which lives in the trees and feeds on nuts and leaves, is the great delight of the Cuban.

Fowls are in great numbers. Wild guinea hens and turkeys are found in flocks of from 25 to 100 The whistle of the quail and the flutter of the perdiz, or pheasant, are heard on all sides in the rural and mountain regions. Ducks in abundance come over from Florida in the winter and return with the spring. Wild pigeons, with their white tops and bodies of blue, larger somewhat than the domestic bird, offer, in hunting, the greatest sport to gentlemen who will be restrained within reason. In the early morning the pigeons generally go to feed on the mangle berries when ripe, and which grow by the sea or near some swampy place. I have known a party of three persons to kill 1,500 of the pigeons within a few hours. Robiches, tojosas, and guanaros are found in the thick woods.

Mocking-birds and blue-birds, orioles, turpials, negritos, parrots, and a thousand kinds of songsters and birds of brilliant plumage flit from tree to tree.

The naturalist Poey says there are 641 distinct species of fish in the Cuban waters. Among those that delight the sportsman are the red snapper, lista, manta, gallego, cubera, surela, and garfish. The sierra, which weighs from forty to sixty pounds, is extremely game, as is the ronco, so called because it snores when brought out of the water. For heavy sport, fishing for sharks, which are good for nothing, or the gusa, which weighs from 400 to 600 pounds and is excellent eating, offers abundant exercise. It is a daily occurrence to see schools of fish numbering from hundreds to many thousands, each fish weighing from one to four pounds, swimming around the bays and harbors waiting for a bait. Any American who enjoys good fishing can find his fondest dreams more than satisfied in Cuba.

Delicious shrimps, crabs, lobsters, oysters, and clams abound. The lobsters have no claws and weigh from two to eight pounds. They are caught at night in shallow places along the sandy beach, a torch, harpoon, and net being the necessary outfit. Some of the rivers abound in alligators, but few hunt them.—*Field and Stream.*

NIAGARA FALLS.

CHICAGO :
A. W. MUMFORD, PUBLISHER

NIAGARA FALLS.

NIAGARA FALLS, the grandest cataract in the world, belong in part to the state of New York. Here the water of the great lakes, west of Ontario, is poured over a precipitous cliff about 160 feet high in two immense sheets, called the American and Horseshoe falls, separated by Goat Island. These falls received the name Niagara from the aborigines, Ni-a-ga-ra meaning the "thunder of waters." The roar created by the fall can be heard, under favorable conditions, at a distance of fifteen miles. There are three distinct falls. The Horseshoe fall, so named on account of its crescent shape, is the largest, covering a distance of 2,000 feet and having a fall of 154 feet; the American fall, 660 feet, and the Central fall, 243 feet in width, each have a fall of 163 feet. The volume of water is perpetually the same, no amount of rain or snow making any apparent change. This is conceded to be the grandest natural feature in the world, providing a water power the limit of which is incalculable.

Many of our readers have visited the falls in the summer season and doubtless all of them have read descriptions of them, more or less disappointing; everyone is familiar with the numberless photographs and engravings that have been made of them. Of course, no adequate idea of them has ever been given to the imagination. The writer has seen them many times and must confess to a want of sympathy with that feeling of wonder and bewilderment which many people claim to experience when first beholding them. It would be interesting to compile a list, if it could be done, of exclamations made on first viewing Lake Erie, as it really is, tumbling over a gigantic cliff. Charles Dickens is reported to have been unable to utter a word for many seconds, and there does not appear to be an adjective of sufficient potentiality to hold the idea of its majesty. And yet there are falls greater than these in the world. Dr. Livingstone, alluding to Victoria Falls in Central Africa, declared that of all the wonders of the lands he had visited he had seen no such stupendous spectacle as they. The chasm into which a mile-wide sheet of water plunges has been plumbed to twice the depth of Niagara.

The Niagara River is the channel by which all the waters of the lakes flow toward the Gulf of St. Lawrence. It has a total descent of 330 feet. The interruption to navigation occasioned by the rapid descent of the Niagara River is overcome on the Canadian side by the Welland Canal; on the American side the communication between tide-water and the upper lakes was first effected by the Erie Canal. The river flows in a northerly direction with a swift current for the first two miles and then more gently, with a widening current, which divides as a portion passes on each side of Goat Island. As these unite below the island the stream spreads out, about two or three miles in width, and appears like a quiet lake studded with small, low islands. About sixteen miles from Lake Erie the river grows narrow and begins to descend with great velocity. This is the commencement of the rapids, which continue for about a mile, the water falling in this distance about fifty-two feet. The stream terminates below in a great cataract. At this point the river, making a curve from west to north, spreads out to an extreme width of 4,750 feet. Goat Island, which extends down to the brink of the cataract, occupies one-fourth of this space, leaving the river on the American side about 1,100 feet wide and on the Canadian side about double this width. A cave, called the Cave of the Winds, is formed behind the fall, into which, on the Canadian side, persons can enter and pass by a rough and slippery path toward Goat Island. As already stated, there are many cataracts which descend from greater heights.

The sublimity of Niagara is in the vast power displayed by a mighty current flowing down the long rapids and finally plunging in one uniform sheet into the abyss below. Dangerous as it appears, the river is here crossed by small row-boats. For seven miles below the falls the narrow gorge continues, varying in width from 200 to 400 yards. The river then emerges at Lewiston, N. Y., having descended 104 feet from the foot of the cataract. A suspension bridge was constructed in 1855 by Mr. Roebling, for the passage of railway trains, and eighteen feet below the railway it also sustains a carriage and foot track. From this bridge a fine view is had of the falls. Other bridges have since been built, among them a cantilever.

Geologists say that the gorge through which the Niagara River flows below the falls bears evidence of having been excavated by the river itself. Within the present century changes have taken place by the falling down of masses of rock, the effect of which has been to cause a slight recession of the cataract and extend the gorge to the same distance upward toward Lake Erie. Table Rock, once a striking feature of the falls, has wholly disappeared. Father Hennepin made a sketch of the falls in 1678, a facsimile of which shows that many striking features have disappeared. In 1750 the falls were visited by Kalm, a Swedish naturalist, whose description of Niagara was published in 1751. He alludes to a rock having fallen down a few years previous and indicates the spot in his sketch. Lyell estimates the retrocession of the falls to be about a foot a year.

Of late years the extraordinary power of the falls has been adapted to the production of electricity, which has been distributed to various cities and towns within a radius of 100 miles. Street cars and machinery of every kind are run by them, and, by new devices and more powerful dynamos, it is believed the field for the successful utilization of this great force is almost without limit.

HOW THE WOODPECKER KNOWS.

How does he know where to dig his hole,
The woodpecker there, on the elm tree bole?
How does he know what kind of a limb
To use for a drum, or to burrow in?
How does he find where the young grubs grow—
I'd like to know?

The woodpecker flew to a maple limb,
And drummed a tattoo that was fun for him.
"No breakfast here! It's too hard for that,"
He said, as down on his tail he sat.
Just listen to this: rrrrr rat-tat-tat.

Away to the pear tree out of sight,
With a cheery call and a jumping flight!
He hopped around till he found a stub,
Ah, here's the place to look for a grub!
'Tis moist and dead rrrrr rub-dub-dub.

To a branch of the apple tree Downy hied,
And hung by his toes on the under side.
'Twill be sunny here in this hollow trunk,
It's dry and soft, with a heart of punk,
Just the place for a nest!—rrrr runk-tunk-tunk.

"I see," said the boy, just a tap or two,
Then listen, as any bright boy might do.
You can tell ripe melons and garden stuff
In the very same way—it's easy enough."

—*Youth's Companion.*

BIRDS AND ALL NATURE.
ILLUSTRATED BY COLOR PHOTOGRAPHY.

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A RARE HUMMING BIRD.

HOW ONE OF THESE LITTLE FAIRY CREATURES WAS TAMED.

P. W. H.

INSTANCES are very rare where birds are familiar with human beings, and the humming birds especially are considered unapproachable, yet a naturalist tells how he succeeded in catching one in his hand. Several cases are on record of attempts to tame humming birds, but when placed in a cage they do not thrive, and soon die. The orange groves of southern California abound in these attractive creatures, and several can often be seen about the flowering bushes, seeking food or chasing each other in play. "Once, when living on the slopes of the Sierra Madre mountains, where they were very plentiful, I accomplished the feat of taking one in my hand," says the naturalist.

"I first noticed it in the garden, resting on a mustard stalk, and, thinking to see how near I could approach, I gradually moved toward it by pretending to be otherwise engaged, until I was within five feet of it. The bird looked at me calmly and I moved slowly nearer, whistling gently to attract its attention, as I began to think something was the matter with it. It bent its head upon one side, eyed me sharply, then flew to another stalk a few feet away, contemplating me as before. Again I approached, taking care not to alarm it, and this time I was almost within reaching distance before it flew away. The bird seemed to have a growing confidence in me, and I became more and more deliberate in my movements until I finally stood beside it, the little creature gazing at me with its head tipped upon one side as if questioning what I was about. I then withdrew and approached again, repeating this several times before I stretched out my hand to take it, at which it flew to another bush. But the next time it allowed me to grasp it, and I had caught a wild bird open-handed without even the use of salt!"

One of the curious features of humming birds is that they are never found in Europe, being exclusively American, ranging in this country from the extreme north to the tropics, adding to the beauty of field and grove, being veritable living gems. Nothing can approach the humming bird in its gorgeousness of decoration. It is especially rich in the metallic tints, seemingly splashed with red, blue, green, and other bronzes. Some appear to be decked in a coat of mail, others blazing in the sunlight with head-dresses and breast-plates that are dazzling to behold and defy description. The smallest of birds, they are one of the most beautiful of the many ornaments of our fields and gardens.

In some islands of the south Pacific birds have been found that had never seen a man before, and allowed themselves to be picked up, and even had to be pushed out of peoples' way, it is said, yet they must have been very unlike the birds that are generally known, or they would have been more timid, even if they had not learned the fear of man.

THE LADY'S SLIPPER.

WILLIAM KERR HIGLEY,
Secretary of The Chicago Academy of Sciences.

THIS interesting plant belongs to that remarkable family of orchids (*Orchidaceæ*) which includes over four hundred genera and five thousand species. They are especially noted for the great variety of shapes and colors of their flowers, many of them resembling beetles and other insects, monkey, snake, and lizard heads, as well as helmets and slippers, the latter giving rise to the name of the plant in our illustration. The variety, singular beauty, and delicate odor, as well as the peculiar arrangement of the parts of the flower, make many of the species of great financial value. This is also enhanced by the extreme care required in their cultivation, which must be accomplished in hothouses, for the majority of the more valuable forms are native only in the tropical forests. Many, too, are rarely found except as single individuals widely separated.

There are many parasitic species, and in the tropics a larger number attach themselves by their long roots to trees, but do not obtain their nourishment from them, while those belonging to temperate regions usually grow on the ground.

In the last sixty years the cultivation of orchids has become a passion in Europe and, to a great extent, in America.

It is said that "Linnæus, in the middle of the last century, knew but a dozen exotic orchids." To-day over three thousand are known to English and American horticulturists.

Though admired by all, the orchids are especially interesting to the scientist, for in their peculiar flowers is found an unusual arrangement to bring about cross-fertilization, so necessary to the best development of plant life. It is evident also, as shown by Dr. Charles Darwin, that this was not so in the earlier life of the family, but has been a gradual change, through centuries, by which the species have been better prepared to survive.

No other family of plants presents as much evidence of the provision in nature for the protection of species and their continuance by propagation.

Few of the orchids are of economic value to man. The most important ones, outside of a few used in medicine, are the vanillas, natives of tropical America and Africa.

The lady's slipper belongs to the genus *Cypripedium* (from two Greek words meaning *Venus* and *a buskin*, that is, Venus' slipper).

There are about forty species found in both temperate and tropical countries. The one used for our illustration is the "showy lady's slipper (*Cypripedium reginæ* or *spectabile*) and is a native of eastern North America from Canada nearly to the Gulf of Mexico. It grows to a height of from one to three feet, and is leafy to the top. It grows in swamps and wet woods, and in many localities where it is extensively gathered for ornamental purposes it is being rapidly exterminated.

Those living before the era of modern investigation knew little of the functions of the various parts of flowers. We find an excellent illustration of this ignorance in the following peculiar account of a South American lady's slipper, written by Dr. Erasmus Darwin, father of Dr. Charles Darwin, in the latter part of the last century.

In his notes on his poem, "The Economy of Vegetation," he says: "It has a large globular nectary * * * of a fleshy color, and an incision or depression much resembling the body of the large American spider * * * attached to divergent slender petals not unlike the legs of the same spider." He says that Linnæus claims this spider catches small birds as well as insects, and adds: "The similitude of this flower to this great spider seems to be a vegetable contrivance to prevent the humming-bird from plundering its honey."

A. W. MUMFORD, PUBLISHER, CHICAGO.

LADY'S SLIPPER.

JIM AND I.

BY ELANORA KINSLEY MARBLE.

WOULDN'T the little readers of BIRDS AND ALL NATURE enjoy a talk with a mother-bird? The father bird, it seems to me, has done all the talking hitherto. Because he is handsome and can sing is no reason why Jim, my mate, should write up the history of his family. It would have been a sorry attempt had he tried, I promise you, for though he is a Hartz Mountain Canary—pure yellow and white like the lower bird in the picture—he is not at all clever. My mistress says I have more sense in one of my little toes than Jim has in his whole body.

"You cute little thing," she exclaims when I kiss her, or take a hemp seed from off her finger, "you are the dearest and wisest little bird in the world."

Jim sometimes taunts me because I wear such sober colors—black and brown with green and yellow mixed—like the upper bird in the picture—but I retort that I am a Hartz Mountain bird, also, and have just as good German blood in my veins as he has. Neither of us ever saw the Hartz Mountains, of course, for we were born in Chicago, but our great grandmothers did, I am sure.

A good husband? No, I can't say that Jim is. He is too quarrelsome. My mistress says he is a bully, whatever that may mean. He has a fashion of standing by the seed cup and daring me to come and pick up a seed; the same with the drinking-water and the bathing-dish. Then again he is very gracious, and calls me pet names, and sings at the top of his voice every love song he knows. Sometimes I try to imitate him, when he flies into a rage and sharply bids me "shut up." I am too meek to return the compliment, even when I have grown weary of his music, but my mistress shakes her finger at him and calls him a "naughty, naughty bird."

She can't tame Jim, all she may do. Few canary birds will resist a hemp seed when offered on a finger. My mistress used to crack them between her teeth and coax and coax him to take one, but he never would. That's the reason she calls him stupid, for we love hemp seed just as you little folks love peanuts, you know. That's the way she tamed me, and that's the way you can tame your canary if you have one.

I have had a rather eventful history for a bird. In the first place—but let me begin at the beginning and tell you the circumstance just as it happened.

It was about four years ago, so far as I can recollect, that I caught my first glimpse of the world and tasted the sweets of freedom. One balmy morning in June, I escaped from my cage, and the window being open, out I joyously flew into the bright sunshine. I was a little dazzled at first and frightened. How immense the world seemed! How far away the tender blue sky over which the fleecy clouds sailed, that sky which I had thought a mere patch when seen from my cage in the window! How many houses there were, and how inviting the green trees and grass-plots! I fairly danced with joy, and chirped, "I'm free, I'm free," as I flew from place to place, my wings, never tiring, bearing me from tree to housetop and from housetop to tree.

Ah, that was a day never to be forgotten. How I escaped the dangers which lurk about the steps of the unwary and innocent has always been a marvel to me. The hostile sparrows, for instance, the green-eyed, sharp-clawed cat, the sling-shot of the cruel boy, the—but why linger over horrors which might, but did not happen?

In this way the morning passed joyfully, the pangs of hunger, as noon approached, however, advising me sharply it was near dinner time. From housetop to housetop I flew, from tree to tree, but nowhere could I find a little china cup filled with rape, hemp, and

canary seed, or a tiny glass vessel filled with water that I might slake my thirst.

What should I do? A bird brought up as I had been, I reflected, could never descend to work for a living, as the sparrows did, and other wild birds which I had met among the trees. Some of them ate insects—fact, I assure you—and one red-headed bird, wearing a coat of many gay colors, simply tapped and tapped on a tree with his hard bill whenever he wanted his dinner.

"Come in," said the bug, innocently, who was making his home between the bark and the tree, "come in."

Nobody appearing, the bug ventured out to see who his caller might be.

"Good morning," grinned the woodpecker, and then politely gobbled the poor bug up.

But I was not brought up that way. I could not eat bugs, neither could I rummage in the garbage boxes as the sparrows did. Oh, how unwise of me, and how ungrateful to run away from a home where my every need was faithfully served by a kind mistress. Like the prodigal I would return. Surely I would know the house, the very window from which I had fled. Yes, I would start at once, and off I flew in the direction which I thought I had come.

But, alas! how alike all the houses in that neighborhood seemed. Vainly did I fly down on many a window-sill and peer in. No mistress' face greeted me, no empty cage swung idly between the curtains. At length, faint from hunger and fatigue, I flew down and perched upon the railing of a porch where two ladies were sitting.

"You dear little thing," said one of the ladies—I want to say here that I am much smaller than the dark Hartz Mountain bird who sat for her picture —"I never saw a sparrow so tiny, or marked like you before."

"It's a canary, not a sparrow," said the other lady, "doubtless, somebody's lost pet," and she held out her hand, and chirped and talked to me very much like my lost mistress had done.

"Poor little wanderer," she at length said, as I looked at her, but made no effort to fly away, "I have an idea you came to us for food," and then she went into the house and shortly returned with a cage in the bottom of which she scattered seed, placing it upon the ground very close to me.

"Rape, hemp and canary," I chirped, "the seed I am used to," and down I at once flew, hopped into the cage, and, the next moment, was made prisoner.

Sorry?

Well, really I don't know. My period of freedom had been so brief, and attended with such anxiety and fear, that I hardly knew whether to laugh or cry. The next day, however, I knew that my lines had indeed fallen in pleasant places. My first mistress had been kind, but oh, how much more tender and thoughtful the new one proved to be!

"I was a helpless little creature," she said, "and upon her depended my entire comfort and happiness." Never for one day did she neglect me. Though my regular bill-of-fare was bird-seed, yet she varied it as she did her own. Cracker, lettuce, apples, grapes, cherries, sugar, and always in the summer, pepper-grass. If you little folks have a canary never fail, I beseech you, to give them of the latter all they want to eat. It costs nothing and may be gathered in any vacant lot fresh every day.

What pleasure so kind a mistress could find in keeping me in a little gilt cage, I could not see, for there were screens in the window, and even if there had not been I don't believe I should have cared to fly away. Something in my appearance one day suggested the thought to her, I am sure, for looking at me earnestly, she said:

"You are not happy, my birdie, I fear. Neither would I be, cooped up in a cage like that," and so she opened wide the door and out I flew, never to be a prisoner again—till, well, I will not speak of that just here, but keep it for the close.

What famous times we did have after that, to be sure. Whenever I felt lonesome down I'd fly upon the desk where my mistress sat writing. She would pretend not to see me till I had hopped upon the very sheet over which her pen was gliding.

"Why birdie!" she would then cry,

as though very much astonished, and off I'd fly, as she made a dash for me, to the window where I would hide behind the ruffle of the sash curtain.

"*Cheep, cheep*," I'd cry, just as you little folks cry "whoop," when all is ready, "*cheep, cheep.*"

"Where can my birdie be?" she would say after awhile, dropping her pen. "Where can she be?" and then she would look here and there, 'till presently approaching my hiding-place, out I'd fly, with a gurgle, into an adjoining room, where I'd again crouch behind the curtain. Between you and me I believe she knew all the time where I was hiding and only pretended to search for me here and there. Anyway it was capital fun, and I never tired of it, though mistress did.

"I can't play with you any more," she would say, "you quite tire me out," and then she would go to writing again and so our game of "hide and seek" would end for that day.

"Everything needs companionship," she said one morning to my master, "birds, children and men," and so that day he brought home a large wooden cage in which was as handsome a canary bird as you would want to see. That was Jim, and oh, how happy I was, when, a few days after, he asked me to be his mate. I said "yes," almost before he had got the song out of his mouth—I didn't know what a tyrant and bully he was till afterward, you know—and so we went pretty soon to housekeeping in the wooden cage.

My mistress understood what I wanted when she saw me picking up threads and pulling her chenille table cover to pieces, and so in one corner of the cage she put a nest made of wire and covered with a bit of muslin. Near by were little heaps of cotton-batting, wrapping-cord, and hair. Dear, dear, how busy I was for days! Jim, as I have said before, did nothing much but sing—and criticise. More than once I dragged all the furniture out of our wire home, because he thought I should have put the hair in first, and the cotton and strings in afterward. For a newly wedded couple, on their honeymoon so to speak, we did a vast amount of quarreling. The nest, however, was at last made cozy enough to suit us, and so one day I climbed in it and sat for quite a while. Then I called to Jim and I must say he seemed to be just as proud as I was of the little blue speckled egg which lay there so sung in the cotton. The next day but one I laid another, and then one every day till I had laid five. My, how I felt when I gathered them up close under me and sat down to brood. If all went well, after thirteen or fourteen days, we would have five dear birdlings. For fear the eggs might get chilled I left them only a few minutes at a time, hurriedly eating a few seeds, then back on the nest again. Jim could have helped me very much by brooding the eggs while I took exercise and my meals, but he was too selfish for that. All he did was to fly about and sing, bidding me to keep my spirits up. If it hadn't been for my mistress I should have fared badly, you may believe. She fed me crackers soaked in milk, cracked hemp seeds and placed them around the edge of the nest, besides other delicacies in the vegetable line too numerous to mention. When the birdlings were born Jim appeared to be very proud indeed. He couldn't sing long or loud enough, leaving me to feed the five gaping, pleading red mouths every day. Ah, no one knows better than a mother how much trouble and worry there is in bringing up a family. I'm sure I have had experience enough, for since that time I have had so many birdlings I can't count them. One season I had eighteen, three nests, and six in the nest each time. They were considered such fine birds that my mistress had no difficulty in selling them as soon as they learned to sing.

Now I am coming to a period the thought of which fills my heart with sorrow. For some reason that I am not able to tell you, my mistress concluded to part with me and Jim. She shed tears over it, I know, but nevertheless we felt ourselves being borne away one night, and in the morning, lo! we found ourselves in a large, bare room, on the floor of which was painted an immense ring or circle. I was sitting on six blue, speckled eggs at the

time, and didn't mind it so much, but Jim was very cross and restless, for the cage door was fastened and he bitterly resented imprisonment. Alas! from that time forth we never were to know freedom again; from that time forth we had to accustom ourselves to many, many changes.

About nine o'clock the door of the room opened and in came a little girl, followed by a little boy. Then more little girls and boys, till I counted, as well as I could, seventeen. All one family? Oh, no, I'm not talking about bird families now. As many as could crowded about the cage and stared at me with wide-open eyes. The cage was on a low table so they could peep into the nest. Oh, how frightened I was. One little chap thrust his finger through the bars, and down I flew, leaving my precious eggs exposed. That was what they wanted, and oh how they did exclaim! I went back pretty soon, however, for I began to understand that they did not mean to harm me or the eggs either. However, it was many days ere I got over the feeling of fright when stared at by so many eyes, but by the time the birdlings were hatched out I had grown quite used to it. Indeed I felt somewhat proud of the interest those wee tots took in my babies, my manner of feeding them never failing to call forth cries of wonder and praise.

"She just chews up the seeds and swallows 'em," said a little chap one day, "then when the baby birds cry for something to eat she brings it up and stuffs it down their long throats with her bill. My! it's ever so much better than a spoon."

The teacher laughed and patted the little fellow on the head.

"That is your first lesson in nature-study, Victor," said she, and then a lady at the piano struck up a march and off they all trooped two by two.

"Where do you suppose we are?" crossly said Jim, hopping excitedly from one perch to another, "it looks like a lunatic asylum to me."

Jim, as I have stated before, is a very stupid bird. The words "lesson" and "nature-study" held no meaning for him.

"It seems to me," I said, watching the little tots marching with an observing eye, "that we are in a kindergarten."

"A kindergarten," echoed Jim, "what's that?"

"Why," I explained, "a school where young children are taught to love everything and everybody. Surely we have nothing to fear."

And so it turned out to be, a kindergarten, in which, I am proud to say, for purposes of nature-study I have raised many and many a brood.

WHY AND WHEREFORE OF THE COLORS OF BIRDS' EGGS.

THE why and wherefore of the colors of birds' eggs, says Ernest Ingersoll, has been a favorite theme for speculation, from the quaint surmisings of Sir Thomas Browne to the solemn guesswork of Shufeldt, in his ten "biological laws explanatory of the variation in color of the shells of the eggs in class Aves."* Hewitson piously concludes that the beauty of these elegant and often exquisitely attractive objects is intended for the delight of human eyes; hence, as he says, eggs simply white are put out of sight in holes! He also sees in the larger number of eggs laid by game-birds a provision by a benevolent Providence for the joy of the sportsman and the delectation of the epicure. Next comes a man who assures us that the colors of eggs are due to the influence of their respective surroundings on the imagination of the hen birds—the old story of Jacob's little trick on Laban in the matter of young cattle. This school instances as an example the red blotches prevalent on the eggs of falcons, regarded by it as a record of the bloody experiences of the parents; but it does not explain why the equally rapacious owls produce pure white eggs, or the bloodthirsty skuas and shrikes lay greenish ones. Other equally fallacious theorizings might be noted.

FROM KŒHLER'S MEDICINAL-PFLANZEN.

TEA.

CHICAGO:
A. W. MUMFORD, PUBLISHER

TEA.

Camellia Thea Link.

DR. ALBERT SCHNEIDER,
Northwestern University School of Pharmacy.

The gentle fair on nervous tea relies,
Whilst gay good nature sparkles in her eyes.
—*Crabbe:* "Inebriety."

THE highly esteemed drink referred to in the above lines is made from the leaves and very young terminal branches of a shrub known as *Camellia Thea*. The shrub is spreading, usually two or three meters high, though it may attain a height of nine or ten meters. It has smooth, dark-green, alternate, irregularly serrate-dentate, lanceolate to obovate, blunt-pointed, simple leaves. The young leaves and branches are woolly owing to the presence of numerous hair-cells. The flowers are perfect, solitary or in twos and threes in the axils of the leaves. They are white and rather showy. Some authors state that they are fragrant, while others state that they are practically odorless. Stamens are numerous. The ovary is three-celled, with one seed in each cell, which is about the size of a cherry seed.

The tea-plant is no doubt a native of India, upper Assam, from whence it was early introduced into China, where it is now cultivated on an immense scale. It is, however, also extensively cultivated in various parts of India, in Japan, Java, Australia, Sicily, Corea, and other tropical and subtropical countries and islands. It is also cultivated to some extent in the southern United States, as in Carolina, Georgia, Mississippi, and California, but apparently without any great success. The plant is extensively grown in greenhouses and conservatories on account of its beauty.

According to a Japanese myth the tea plant originated as follows: A very pious follower of Buddha, Darma, vowed that he would pray without ceasing. He had prayed for some years when finally the Evil One overpowered him and he fell asleep. When he awoke he felt so chagrined and humiliated that he cut off both his eyelids and threw them from him. From the spot where they fell grew two plants endowed with the property of dispelling sleep. Chinese writers maintain that priests of Buddha introduced the plant from India. Some authorities are inclined to believe that the plant is a native of China; others, that it was brought from Corea to China about the ninth century.

Tea-drinking was supposed to have been discovered by a servant of Emperor Buttei, 150 B. C., but concerning this there is much uncertainty. It is said to have been in use in Japan as early as 729 of our era. The first definite information about tea-consumption in China dates from the year 1550, when a Persian merchant brought tea from that country to Venice. At a little later period we find tea mentioned in various letters and documents of travelers and merchants, yet it is evident that it was a costly and rare

article as late as 1660. In 1664 the East India Company presented the queen of England with two pounds of tea. In fact, it was not until the beginning of the eighteenth century and later that tea began to be used in different parts of Europe. During the latter part of the seventeenth century and the beginning of the eighteenth century tea-houses were established in various cities of Europe, especially in England. At the present time tea-houses, like coffee-houses, have become practically extinct in civilized countries, but that does not imply that tea-drinking and coffee-drinking are on the wane. Among the English and Slavs tea-parties are all the rage. The favorite Gesellschaft *Kaffee*, coffee-party, of German housewives indicates that they give coffee the preference. The biggest tea-party on record was doubtless the so-called Boston Tea Party, at which tea valued at £18,000 sterling was destroyed.

In spite of the tropical origin of the plant the largest quantities of tea are consumed in northern countries, notably in Russia and Asiatic Russia. Large quantities are consumed in England and the United States.

Most authorities are agreed that the different kinds of tea on the market are derived from the same species of plant. Some admit a variety *C. Thea var. viridis*. The following are the principal teas of the market and the manner of their preparation:

1. *Green Tea.* After collecting the leaves are allowed to lie for about two hours in warmed pans and stirred and then rolled upon small bamboo tables, whereupon they are further dried upon hurdles and again in heated pans for about one hour, accompanied by stirring. The leaves now assume a bluish-green color, which is frequently enhanced by adding Prussian blue or indigo. Of these green teas the most important are Gunpowder, Twankay, Hyson, Young Hyson, Hyson skin, Songla, Soulang, and Imperial.

2. *Black Tea.* The leaves are allowed to lie in heaps for a day, when they are thoroughly shaken and mixed. After another period of rest, two to three days, they are dried and rolled much as green tea. In the storing process the leaves undergo a fermentation which develops the aroma and the dark color. The following are the principal varieties: Campoe, Congou, Linki-sam, Padre Souchon (caravan tea), Pecoe, Souchong, and Bohe.

In some countries the teas are scented with jasmine flowers or orange flowers. This is, however, no longer extensively practiced. The essentially Chinese custom of coloring teas with Prussian blue, gypsum, and indigo is dying out, at least so far as the export trade is concerned, because intelligent civilized consumers are beginning to prefer the uncolored teas. Competent authorities maintain that there is not enough of the coloring substances added to be harmful. The workmen preparing the better qualities of tea are not permitted to eat fish, as the very enduring and penetrating fish-flavor would be transmitted to the tea in the thorough handling. It seems, however, that a more or less distinct fishy flavor is perceptible in many teas, even the better qualities.

Tea-dust consists of remnants from tea-chests, dust from the working tables upon which the leaves are rolled—in fact, tea-refuse of all kinds. It is certainly not a desirable article. Besides true tea there are leaves and other parts of a great variety of plants which have been used as tea. To enumerate and describe these would be impracticable in this paper. The following are a few of the more important: Paraguay tea, or maté, is highly esteemed in South America. The Coreans prepare tea from ginger. The poor Siberians use cabbage leaves. Teas are made from the leaves of a great variety of herbs which are supposed to have medicinal or stimulating properties similar to those of tea. Peppermint tea and chamomile tea are greatly esteemed in certain localities.

Concerning the adulteration of tea there seems to be considerable difference of opinion, some authorities maintaining that adulteration is common, while others maintain that it is very rare, indeed. There is, however, little doubt that used tea is frequently redried, rerolled, and resold as good

tea. Willow leaves, strawberry leaves, and mulberry leaves are said to be added occasionally.

Every housewife knows that *good* tea is expensive. Since the different teas are all from the same species of plant why should there be such a difference in price? The expensive teas consist of the very young leaves and terminal branches and are carefully dried and prepared under special supervision. The young leaves and branches have a more delicate flavor. To determine whether a sample of tea consists of young leaves or not soak it in water, carefully roll out the leaves, and measure them. If the majority of leaves measure an inch or more in length it is a poor quality. It must be remembered that even fair medium qualities are mixed; that is, they consist of mature and immature leaves. The best and most expensive teas are often sold at one hundred dollars per pound. They are never exported, but consumed by high Chinese officials. Imperial tea is prepared under the direct supervision of royal government officials.

Tea owes its stimulating properties to an active constituent known as thein, which is in all respects similar to caffein, the active constituent of coffee. The flavor which is developed by the drying process is due to several constituents. Besides these substances tea also contains considerable tannin. Tea consumed in moderate quantities is beneficial rather than otherwise. Its injurious properties are due to the tannin, which affects digestion. If consumed in large quantities for a long time the thein causes nervousness and the tannin causes various dyspeptic conditions. In China some chew the leaves treated with arsenic to improve the complexion. The whitening of the complexion is, however, due to the arsenic and not the tea.

Tea is prepared in different ways in different countries, nevertheless the preparation of a good cup of tea is comparatively simple, leaving out of consideration the many paraphernalia used by different nations and which really have no effect except that upon the imagination. The following is Emperor Kien Lung's (1680) recipe for making tea, and which is frequently found upon Chinese tea cups: "Over a moderate fire place a vessel with three feet, showing by its color and form that it has been much used; fill with clear water of melted snow and heat it until the water will turn a fish white or a lobster red. Pour this water into a cup containing the leaves of a select variety of tea; allow it to stand until the first rising vapors, which form a dense cloud, become gradually less and float over the surface as a faint mist. Drink this precious liquid slowly and thou wilt find it a powerful dissipator of the five sorrows which disturb our minds. The sweet and peaceful rest which we owe to this drink we may taste and feel, but may not describe." This recipe, although two hundred years old, has not been improved upon. Stated in a little simpler form the recipe would read: In a cup with good tea leaves pour clean boiling water and allow to stand five or six minutes; decant and drink slowly.

Tea leaves should never be infused for a long time for several reasons. The flavor dissipates and the objectionable tannin is more and more extracted, imparting to the tea astringency and a bitterness, which are not only disagreeable to the taste but also cause indigestion and constipation. After the tea is prepared as indicated it may be taken hot or cold, with or without sugar, with or without cream or milk. Iced tea, with a little lemon juice added, is a delicious drink for hot weather It is cooling besides having a tendency to check excessive perspiration. Tea has also been found valuable as a wash for inflammation of the eyes.

In conclusion, I wish to refer the reader to an article in the July number of the *Cosmopolitan* on "Tea-drinking in many lands," by Laura B. Starr, in which are related many interesting customs relative to the use and preparation of tea.

Explanation of plate: *A*, flowering branch, nearly natural size; 1, flower in section; 2, stamen; 3, ovary in transverse section; 4, pistil; 5 and 6, fruit, with seed; 7, seed; 8, seed in sections.

THE TOWHEE; CHEWINK.

(*Pipilo erythrophthalmus.*)

BY LYNDS JONES.

THE home of my childhood and early youth nestles in one of the gems of woodland which are so characteristic of the rolling prairies of central Iowa. This hundred-acre grove covers five main hills, with their valleys and the lesser runs which divide each of the five hills into two, three, or four lesser hills. The hills radiate in a semicircle to the north and west from the height on which the old home stands, rolling away to the creek which bathes their feet. Here are tall, heavy woods, without underbrush, covering the north slopes; lower, more open woods with patches of plum, and wild crab apple trees, with some hazel brush on all lower slopes of the hills; and finally a liberal fringe of low, brushy trees—hawthorn, plum and crab apple trees—and dense hazel brush on the uplands and on lower lands away from the creek. This dense growth also fringes the county road which extends from end to end of the grove, and it was from this roadside that towhee first heralded his arrival from the south, during the bright days of late March or early April. Later, when the frost had left the ground, and his mate was growing anxious to be selecting a nesting-place, he might be seen on the topmost twig of one of the taller small trees in every brushy place on every hillside. I have sometimes wondered if the towhee household did not have some disagreement about the family name, for the male, from his elevated perch loudly calls *towhee-e-e-e*, while his spouse on the ground below no less vigorously reiterates *che-wink*. But if danger seems to threaten his lordship quickly descends to join his mate in earnest warning that this small bit of earth belongs by right of discovery to che-wink. How earnestly both birds emphasize their claim by the nervous fluff of the short, stiff wings and the quick spreading of the long tail, as if the large patches of white at its end would startle the intruder away. But the male bird does not always confine himself to the iteration of the name he seems to love so well. Instead of the single first syllable there may be two or even three, no two in the same pitch. It has been a surprise to me that persons unfamiliar with the towhee's song do not realize that the two parts proceed from the same bird. To them the first part seems to resemble some part of the wood thrush's song and the last part—the *he-e-e-e*—the rattle of downy woodpecker. My ear persistently renders the whole song, *towhee-e-e-e*, or *towhe-hee-e-e-e-e*, or *O towhe-he-e-e-e-e-e*. Others render it *chuck burr pilla-will-a-will*. But towhee is not limited to this variety of vocalization. Besides the abbreviation of his *che-wink* alarm note to *swink*, or even *wink*, and a *chuck, chuck*, when the nest is threatened, he sometimes sings a rarely beautiful ditty which is totally unlike any of his other performances. I have heard it only shortly after his arrival from the south, before his mate had joined him, and have tried in vain to describe it. The bird moves slowly and sedately about among the fallen leaves in a soliloquy over the happenings of the long journey just ended, with apparently no thought of the absent mate. The manner of its utterance indicates that this is the bird's private song, egotistic if you please, while his tree-top rendition is evidently his altruistic performance.

The ordinary song and call and alarm notes are well rendered in the local names bestowed upon the bird: Towhee, chewink, joreet, joree, charee, pink-pink, and wink-wink. His chestnut-colored sides and lowly habits have given him the names of ground robin and swamp robin, and his red iris, red-eyed towhee.

Nesting begins about the first of May in northern Ohio. The nest is almost always placed on the ground, often in a slight depression made by the birds, rarely in a bush up to seven feet from the ground. It is made of

A. W. MUMFORD, PUBLISHER, CHICAGO.

TOWHEE.
½ Life-size.

material easily accessible in the region of the nest, of dry leaves for a foundation upon which plant stems, dry grass, grape-vine bark, or like material is arranged, and the whole lined with fine rootlets. The material will vary somewhat with locality and situation of the nest, as a matter of course. Rarely the nest may be covered, with the entrance in the side, but it is usually not covered. The nest site is preferably some distance from a road or footpath, often in moderately deep woods where there is little underbrush, but more often in the shrubbery fringing the woods, either on a hill-top or side hill or bottom land. Here at Oberlin, Ohio, I have found more nests in the low second growth near swampy places than elsewhere.

The nest complement is from three to five eggs, usually four. The egg seems to be a rather rounded ovate, running to nearly spherical on the one hand to elongate oval on the other The ground color is white, not seldom tinged with pink or blue, with sprinkling of reddish-brown dots, spots, and blotches. It is a common experience to find eggs of the parasitic cowbird in nests of towhee. Twice I have found nests on which the mother towhee was serenely sitting with four eggs of the cowbird beneath her and none of her own. Two eggs of the cowbird and two or three of the towhee in a nest are common. Sometimes the parasitic eggs so closely resemble those of the parent that it is not easy to distinguish between them, but often the difference is very marked.

The towhee is a fairly common inhabitant of the whole region east of the Rocky Mountains and north to the northern border of the United States, breeding everywhere north of northern Alabama.

WEE BABIES.

ELLA F. MOSBY.

THE past summer I saw the most charming baby-bird of my life. He was so tiny and silvery, his upper feathers such a lovely olive-green and the under plumage such soft white, and over the bright, innocent little eyes a beautiful curving line like an eyebrow. I did not at first recognize him, but the next day I saw two, probably of the same flock, hunting very industriously over an old tree, and I knew they were the young red eyed vireos. Their feathers were all new and fresh, and that made them look so silvery and the tints seem so clear.

The same summer I became very well acquainted with a different set of bird-babies. They were still younger, for their feathers had a soft, downy look, and fluffed out so that they really looked larger than their tiny parents. They were silver gray, the little blue-gray gnat-catchers, and nothing could be more charming than the way they twinkled about the bushes, or turned somersaults in the air to catch flying insects on the wing. Their little songs, as low as whispers, their call-notes "like a banjo-string" *ting!* and even their low scoldings, were very pretty, and seemed to belong to them perfectly. Someone, who did not know birds very well called them little wrens, and they really had a good many of the restless movements and alert attitudes of these birds, but their habits are totally different. For instance, their life begins in a lichened cup high up among the top boughs and it is only in the late summer, when birds break their rules and go as they please for a brief holiday time before the migration, that you will see the gnat-catchers come down to the low bushes. I can hardly believe it myself, but I once saw a young one picking away on the ground.

One charm about the tiny birds, gnat-catchers, chebecks, vireos, kinglets, and the like, is that they are not usually so shy as large, handsome birds, and I have often had them almost within touch, singing, feeding, preening their feathers, in the loveliest and most confiding way.

WISH-TON-WISH.

EMMA M. GREENLEAF.

ONE bright May morning Wish-ton-wish sat on the mound in front of his family burrow. Wish-ton-wish was a lively young prairie-dog and he wanted to talk with someone.

Presently Madam Talky came out of her burrow and ran up to the top of her mound.

"Good-morning," called out Wish-ton-wish; but Madam Talky did not even turn her head his way. I dare say she thought to herself, "Humph! A chit of a fellow like that isn't worth my time."

Now Wish-ton-wish was an only boy in a family where there were five other children, so that he had come to believe, as only sons often do, that he was wise enough to talk with a very Solomon of prairie-dogs. The silence of Madam Talky didn't hurt his feelings in the least. Presently he called out again and this time with greater tact: "How are your charming daughters this morning?"

O, you should have seen the change in Mrs. Talky. She turned her whole face toward Wish-ton-wish now and fairly beamed upon him.

"Very well, indeed, thank you," she answered; "you must call to see us."

And this time I dare say she thought to herself, "Why, I can hardly realize that the young fellow is about grown up; how fine he looks, too; his family must have great confidence in him to let him be sentinel when he is so young."

Wish-ton-wish thanked her politely for the invitation, and said that perhaps he might call that afternoon.

"Have you heard that Mr. Grizzle Prairie Dog has been found?" asked Madam Talky.

"No, where?" said Wish-ton-wish.

"O, in a very strange place," madam answered.

"It was Mr. Talky that found him. At least we feel pretty sure that he did. It was this way: Mr. Talky often has attacks of dyspepsia, and last night he ate so much timothy hay for his supper that he had to run back and forth in our burrows for exercise, ever so long before he went to bed. He put his head out at the end of the longest burrow to see if the moon was full and there stood two boys with a gun and a dead hawk. He heard them say they wanted the hawk for a 'collection.' Then one of them said, 'Wish we could have shot it before it caught that prairie-dog.' Mr. Talky was so dreadfully startled that he whirled round and fairly flew back through the burrow to his nest, but we feel sure it was Mr. Grizzle that the hawk had caught."

"How many enemies our race has!" said Wish-ton-wish with a sigh. "Have you told Mrs. Grizzle the sad news?"

"Yes, I told her before sunrise this morning; but she's got used to it now and doesn't feel so bad. He had been missing two days, you know. I saw her going after clover with Mr. Reddy Prairie Dog. You remember Mrs. Reddy was eaten up by a coyote last week."

"Dear me, dear me," sighed Wish-ton-wish again, "how many enemies our race has!"

Just then there came a warning yelp from a sentinel some distance away. Madam Talky and Wish-ton-wish and every other prairie-dog in sight echoed the yelp and then each one of them leaped into his burrow like a flash.

They must have turned a double-quick somersault, for, like another flash there were the little heads and bright eyes looking out at the very openings where their tails had vanished an instant before. Scores of curious little faces were peering out and their owners were anxious to know what made the first prairie-dog call out, "Danger, danger!"

Again came several quick calls from the distant sentinel; then all the little animals disappeared into their burrows.

No, not quite all of them. Way over on Last street there was an exciting scene. Mr. Silence Prairie Dog sat upright in front of his door fairly shaking all over with anger. His body shook, his tail shook, his head shook, and he yelped and barked—turned and popped into his burrow—turned again and popped out of his burrow in the same instant, and acted like one going crazy.

No wonder! Crawling slowly along through the short, dry grass, came a large rattlesnake. Nearer and nearer it glided to the door of the burrow. When it was almost there, Mr. Silence Prairie Dog keeled into his house, the snake slid after him, and then silence fell.

That night the village heard the rest of the story—how Mr. and Mrs. Silence Prairie Dog bit at the rattlesnake with their sharp teeth and scratched at him with their sharp claws, but could not drive him out of their nest where lay two baby prairie dogs. These two he ate for his dinner and then lay down in the deep, soft, warm nest of dried grass. How Mother Silence crept back after a long time and found the greedy old snake lying dead. Yes, truly; killed by the fierce bites of Mr. and Mrs. Silence.

Now all these sad affairs made young Wish-ton-wish quite blue.

Besides, when he went that afternoon to call on the Talky misses, he found that the plumpest one had gone after timothy with another young fellow. All at once he made up his mind that life was a failure and that he would run away from home.

When the prairie-dog folk found out that he was gone they were very sorry. They felt sure he had been eaten by some bird of prey or by a sly coyote.

"He was so wise and so handsome and so brave," said his mother; "there was no young fellow in the village who could be named in the same day with Wish-ton-wish."

Most everybody praised him now that he was dead, or now that they thought he was. I wonder if it isn't rather a poor plan to wait until people are dead or far away before we say the kind things that might have made them happy when they were near?

"We must not neglect our duties even in sorrow," said the father. "It is going to rain. Let us go out and put our mound into good order so that the water may not run into our burrows." They worked with a will, and found out, as everyone always does, that nothing helps sorrow and trouble so quickly as hard work.

When morning came the very first one to be out of a burrow was Wish-ton-wish's mother. Perhaps she had not slept any all night.

She went up to the top of the mound, then stood still with astonishment and joy; for there, on the other side of it, was Wish-ton-wish, hard at work. He was patting and smoothing the sides and making them even after the rain.

"O, where have you been all night, Wish-ton-wish?" cried his mother.

"I went over to the next village; I thought they might not have so many troubles as we have and perhaps I'd stay. But they have even more, mother; they have snakes and hawks and owls and coyotes and *men*, for yesterday some *men* came there with a great tank of water and poured five barrels into one burrow. They said they were making an 'experiment.' Of course they couldn't drown anybody because the burrows run down and up in every direction. So I thought I'd come home again."

"My son," said his mother, "you have learned a wise lesson. It is of no use to run away from trouble, hoping to find a place where there isn't any. Trouble comes everywhere; and so does happiness."

"Yes, mother; I believe it," said Wish-ton-wish, and he looked with soft eyes over toward the burrow of the plumpest Miss Talky.

THE BEE AND THE FLOWER.

MRS. G. T. DRENNAN.

VIRGIL, in his "Pastorals," beautifully alludes to the industry of the bee in culling its sweets from the flower. Perhaps we do not definitely know more of the mystery of the flower's secreting the nectar, and of the bee's making the honey, than was known in ancient times. There are differences of opinion on the subject. Darwin considers the honey secreted by the nectary to be the natural food with which the stamens and pistils are nourished. Others assert that the only use of honey with which flowers are supplied is to tempt insects, which, in procuring it, scatter the dust of the anthers and fertilize the flowers, and even carry the pollen from barren to fertile flowers. Linnæus considered the nectary a separate organ from the corolla; and every part of the flower which was neither stamen, pistil, calyx, nor corolla, he called a nectary; but what he called nectaries are at present regarded as modifications of some part of the flower; in some cases a prolongation of the petals, and in others an inner row of petals, or modified stamens adhering to the corolla. The term disk is now applied to whatever appendages appear between the stamen and pistil, formerly called nectaries. The form of the honey sac, or nectary, differs with different flowers. In the lily it is a mere cavity, or gland. In the honeysuckle a golden fluid is secreted at the end of the tube, without the sac. Few things in nature can be more beautiful than the nectary and the honey drops in the crown imperial. Each one is a shallow cup and pearly white. From each cup hangs a shining drop, like a tear. The tint of the cup gives the drop its hue and each one looks a splendid pearl fastened in the crown of each of the flowers of the crown imperial which, hanging down, only display the pearly honey drops when we look up into the flower. The buttercup is one of the most interesting flowers that secrete nectar. It belongs to the *Ranunculus*, or crowfoot family, which numbers many wild and some of the choicest of cultivated flowers. The nectar-cups are under the petals, and the mission of the flowers seems to be to feed the bees. It is well known that beyond the realm of romance and poetry the buttercup is a plant abhorred by the cow that gives the milk that makes the butter. The lovely yellow color of the buttercup no doubt suggested the name. Apiarists know that certain kinds of flowers make certain grades of honey. They know also that while the bee makes its honey from the flower, it will also make honey from sugar and molasses. The drainings of molasses casks are given the bee for winter food, and it is one of the unsolved mysteries how the bee makes its honey. The nectar in the flower is not honey. The bee makes the honey from what is abstracted from the flower, and also preserves life and makes honey from sweets that are given it for food. Buckwheat is an example of dark, rich honey and white clover and raspberry blooms of clear, translucent honey. Also the fact is, that abstracting the nectar in no wise impairs the beauty nor the fruitfulness of the flower. Instance the rich, productive buckwheat, how profusely it yields its flower; and raspberries ripen sweet and juicy from vines that have had the bees hovering over the snowy blooms from the time they open till the berries form. Honey bees are not always safe in their selection of flowers to feed upon, for Xenophon, in his "Retreat of the Ten Thousand," describes the honey of Trebizond as having produced the effect of temporary madness, or drunkenness, upon the whole army. Mr. Abbott, writing from the same country in 1833, says he witnessed the same effects of honey upon those partaking of it as Xenophon describes.

This would indicate that the honey undergoes some chemical change in the making, as the bees, in these instances, were not injured by the flowers, yet the honey they made from them was injurious to man.

CANARIES.
Life size

A. W. MUMFORD, PUBLISHER, CHICAGO

THE CANARY.

(*Serinus canarius.*)

C. C. M.

THIS favorite singer and cage bird is a native of the Canary Islands, Madeiras, Azores and other small islands near the western coast of Africa. The islands are in the latitude of Florida and the climate may be said to be of a tropical character, though varied by lofty mountains. The canary in its native habitat is chiefly found in the mountainous districts, often several thousand feet above the level of the sea. The wild birds mate about the latter part of March. The nest is built in the tall trees of the evergreen species, frequently in the tops of these trees, and never less than eight or ten feet from the ground. We have seen it stated that they build on the ground, but this has been found to be an error.

The first canaries known to Europeans were brought from there by a merchant ship trading with the Canary Islands as a part of her cargo, several thousand of these birds having been trapped in the hope that they could be sold for a good price as song-birds. The ship was wrecked near the coast of Italy, but by the thoughtfulness of a sailor the cage containing the birds was opened and the birds liberated. They flew at once to the nearest point of land, which happened to be the island of Elba. The climate was so propitious that the canaries multiplied rapidly. In a very short time their superiority as songsters attracted attention and their domestication followed. The shipwreck referred to occurred early in the sixteenth century. The Italians were the first to breed these birds, and they were by them shipped to Russia, Germany, Belgium, and England. They were first described in an English book on natural history in 1610. The rage for breeding the canary with home birds became curiously popular and resulted in a curious intermixture of colors. In Italy they were bred with the citril and serin; in Germany with the linnet, green finch, and siskin. Mr. C. N. Page says, in his "Feathered Pets," a very valuable book for bird fanciers, that in an English book published in 1709 there are twenty-eight varieties of canaries mentioned, comprising nearly all those known at the present time and some which have become extinct. The climate has also had much to do with the change of color in these birds. The canary, which in its native home at Teneriffe is almost brown, becomes yellow and sometimes nearly white after being bred a few years in France, and it has been observed by naturalists that the winter fur of animals and feathers of birds become thicker and lighter in color in proportion to the coldness of the climate which they inhabit.

In England and Germany canary societies have existed for upwards of a century, and annual shows or exhibitions are held with prizes offered for the best birds.

Of the many varieties of canaries the most popular in the United States is the German. It is smaller than the English canary and is a much finer singer, being bred and trained for song and not for size. They are called Hartz Mountain canaries, and experts consider them the most satisfactory bird for the people. They are bred by the peasants in ordinary living-rooms high up among the Hartz Mountains of Germany. These birds are even more hardy than the American-bred canaries. They are brilliant singers. We had one for five years, and while its voice was wonderfully clear, full, and musical, it was too loud and was not admired

by our neighbors. The shrill and piercing note of some of this species renders them somewhat objectionable as house pets. The birds are happy in the cage, require very little care, and if properly attended to are said to be free from diseases. Most of the Hartz Mountain canaries are somewhat mottled with dark, greenish-brown, though many of the birds are clear yellow, and few have crests. In the canary-breeding section of Germany, almost every family keeps a few cages of these birds, or has a room devoted to their breeding. The German people are very fond of birds and there are many of them in the United States who have many cages of rare specimens.

Milwaukee supplies the United States with the bulk of the Hartz Mountain canaries, and there is no great crime in the deception, for the Milwaukee bird is really an improvement on the imported article, having just as fine a voice and being much hardier.

Experience has shown that the imported singer loses the power of transmitting his voice to the young after passing through an American winter. This is the case also, it is said, with Tyrolean singers who come to this country, their voices losing the peculiar yodling quality when they have been here a year. The native canary is hardier than the imported one, and, with proper training, is every bit as good a singer.

Before they are mated the hen birds are kept in separate cages in the music room, carefully fed and made to listen to the music of the singers and the machine used in training their voices. In this way the hen is enabled to transmit the best musical quality to her offspring. The music-room is a large one, with a south exposure, and is kept with the same scrupulous neatness as the breeding-room. In the corner of this room is the bird organ, and with it the little birds are given their vocal training.

When the machine is started the notes emitted are wonderfully like the song of the untutored canary. These notes are known to bird-trainers by the term *pfeiffen*. Gradually the whistle strikes onto a different line. It is an improvement over the *pfeiffen*, and is called the *klingel rolle*. A higher step still is called the *klingel*, and a still higher step *hohl klingel*. Lastly comes what is called *hol rollen*, and a bird whose voice has been developed up to that point is worth $50 in the market any day.

In this country there are only three importers of canaries. Each of these firms employs "bird-pickers" who travel over the mountains in Germany and gather together a supply of birds which are selected from the stocks of the small breeders.

There are several varieties of English canaries. The Norwich is a general favorite. It takes its name from the city of Norwich, where for generations it has been bred and cultivated. It has a brilliant, deep, reddish-yellow plumage. It is regarded as the most beautiful of all the canaries. Its color is frequently so dark that it is called the red canary. This color is produced artificially by feeding them during the moulting season a large amount of cayenne pepper mixed with hard boiled egg and cracker crumbs.

Canaries have many pretty ways and can be taught many pretty tricks. One that belonged to the writer had been deprived of its feet. Its wing feathers never grew out, hence it could not fly or perch and was obliged to stump about on the floor like an old veteran on his crutch. But it was healthy and vigorous, and so pugnacious that on our return, after the day's absence, it would fly at us, or try to, poor thing, and peck our outstretched fingers, even while taking offered hemp seed greedily. The bird watched and waited for our coming and we became so much attached to it that its death was a real loss.

> The little birds can fill our hearts
> As full as larger creatures' arts.

The nest of the canary is a pretty, neatly formed structure of any soft material it can find. Five bluish eggs are usually laid, and three or four broods are raised between February and September, though the female will sometimes persist in building until much later.

THE PAROQUET.

"I AM SO SORRY," wrote a little girl from Tarrytown, N. Y., to the editor of BIRDS AND ALL NATURE, "not to find in your magazine any more the bird-talks to the little folks. I used to read them with so much interest. Are there to be no more of them?"

Other little folks have written to the editor in much the same strain, so that this month the paroquet will speak for himself.

"From my photograph," he says, "you will notice that I am fond of gay dress, green, blue, yellow, orange-chrome, and red being my favorite colors. From my brilliant coat you would judge me to be a tropical bird, but I'm not. I was born and raised in the United States, as was my family, therefore I am an American citizen.

"In appearance I greatly resemble my cousin, the glib-tongued parrot, but for some reason, though my tongue is thick and short like his, and my bill as charmingly curved, I cannot talk—that is, not to be understood by the human family, I mean, for among ourselves we keep up a very lively conversation, in very loud tones—a mark we think, as do some other folk, of good breeding. On the other hand there are people unreasonable enough not to like it, and they say we 'scream' and that our notes are 'ear-splitting' and that, though we are beautiful to look upon and extremely docile, our voices render us undesirable as cage birds or pets. The idea! As though we do not consider that very fortunate!—for a cage is a prison, no matter if the bars are gilded. For my part I prefer to be free even if I do have to hustle for a living and, between you and me, I think that a bird that can screech and doesn't screech when shut up in a little cage doesn't deserve to live. He ought to be killed and stuffed and set up in a museum for people to gape at. Don't you think so, too?

"It is a great pity, but we paroquets are fast being exterminated. In some regions, where less than twenty-five years ago we were very plentiful, not a paroquet is now to be seen. We were once quite common in Ohio, Indiana, Illinois, Pennsylvania, and other parts of the United States. We are now to be found, in diminished numbers, in remote localities only of the lower Mississippi Valley and the Gulf States and in some regions of Florida. To escape from our enemy, the plume-hunter, we make our homes in practically uninhabitable regions. That is a long word for you little folks, but spell it out slowly, as I did, and you will understand what it means.

"Our nesting-time is during February and March. Then colonies of us paroquets, sometimes numbering a thousand, flock to a cypress swamp and build our flimsy nests in forks of trees, near the end of a slender, horizontal branch. Often there are fifty nests in one small tree, each containing from four to five pretty, greenish-white eggs. It is a good thing we build our nests in wild and unsettled places, for they are so flimsy that the eggs are plainly visible from beneath. What a temptation to the bad boy they would be, and to the bad man, also! Some paroquets, however, choose a hollow tree in which to deposit their eggs.

"Well, I have told you about all I know of myself and family, so will close by reciting in my very loudest and prettiest screech, so that all the neighborhood may hear, a few lines about a Mr. Macaw who was silly enough, after escaping from a cage, to return to it. He is a cousin of mine, a *distant* cousin, for he was born in South America; but he wears the same colored coat and vest as I do, his tongue is just as thick, and his bill curves like a parrot's, also:

MR. MACAW'S LESSON.

'Mr. Macaw was tired of his cage—
Too much of a prison for home;
Mr. Macaw was in a great rage,
And so he *settled* to roam.

The cage door was open, the window too
(Strange chance, both open together!),
So he took his chance and away he flew;
But, alas! it was wintry weather.

Wind from the north, ground covered with rime,
A frost that made your limbs shiver;
Poor Mr. Macaw! this was not like the clime
On the banks of the Amazon River.

So Mr. Macaw grew wise, as do men,
When taught by experience bitter;
He flew back to his cage, and determined then
He would never again be a flitter.'

THE CAROLINA PAROQUET.

(*Conurus carolinensis.*)

BY LYNDS JONES.

FEW birds indeed can lay claim to such beautiful and varied dress as our native paroquet. But for this dress and for certain habits which will be spoken of more particularly a little later, he has had to pay a most severe penalty. Once an abundant bird over the whole southeastern portion of the country, ranging commonly as far north as southern Ohio and Illinois, and sometimes even as far north as southern Michigan and New York, and as far west as eastern Colorado, his numbers and range have been reduced to a few individuals in the wilds of the Indian Territory and the adjacent parts of Texas, and the fastnesses of the Florida swamps. The region over which he ranged so numerously in advance of civilization, suffers a distinct loss in his extermination.

It is hardly fair to lay the blame for the disappearance of this bird solely at the door of the plume-hunters and collectors, for it must be admitted that the paroquet was a real menace to the fruit-grower and farmer when he was abundant. Even his extreme fondness for the fruit of the cockle-bur, thistle, and a few other noxious plants, could hardly atone for the complete ruin of the apple crop, or his serious inroads upon the wheat or corn field. One could not stand tamely by while a flock of these birds, with all their beauty, stripped his orchard of every blossom and bud.

The food of the paroquet was entirely vegetable, consisting of the seed of the cockle-bur, as already stated, sycamore and cypress seed, pecan and beech nuts, the fruit of the pawpaw, mulberries, wild grapes and various other wild fruits as well as cultivated fruits, the seeds of pine cones and the burgrass. Grains of various kinds were eaten while in the milk, and Mr. Frank M. Chapman found them eating the seeds of thistles. So varied a diet enabled these birds to pass the winter in the northern parts of their range as well as farther south. It has been stated that paroquets have been found hibernating in hollow trees in the coldest winters. If they were actually found in such places they were undoubtedly simply taking refuge from some severe storm, to issue forth again when it had passed.

The paroquet's strong, hooked beak was probably so formed for the cutting of stems and husks of plants and the crushing of seeds and nuts, but he also finds it useful in climbing about trees as an aid to his yoked feet, and as a partial support while he sleeps in some hollow tree, the bill being hooked over a projection or into a convenient crevice.

Major Charles E. Bendire describes the flight as undulating, like that of the woodpeckers, but very swift, accompanied by a continuous chattering while on the wing. The birds remain together in flocks of from six to twenty individuals (before they became so scarce, by hundreds), and are very devoted to each other. The cries of a wounded companion will always recall the whole flock to his aid, thus enabling the hunter to kill every bird in the flock. It is this characteristic, no doubt, which has very largely caused the rapid disappearance of the birds before advancing civilization.

The nesting-habits of the paroquet are in some doubt, but the evidence seems to indicate that the birds may rear their brood either in a cavity in a tree or build a slight nest after the fashion of the mourning-dove. Such nests seem to be largely confined to the cypress swamps of Florida. The eggs, several of which have been secured from birds in confinement, are pure glossy white, smooth, and rather ovate in shape, somewhat larger than those of the mourning-dove, and averaging 1.39 x 1.07 of an inch.

These birds seem to nest in colonies, a fact which led Major Bendire to suggest that when the colonies were very large the birds were forced to build

CHICAGO COLORTYPE CO

CAROLINA PAROQUET.
Life-size.

FROM COL. CHI. ACAD. SCIENCES.
A. W. MUMFORD, PUBLISHER, CHICAGO

open nests from a lack of suitable nesting-places in cavities.

The cry is described as "shrill and disagreeable, a kind of grating, metallic shriek." One call resembles the shrill cry of a goose. They sometimes give utterance to low conversational notes while perched.

It seems almost incredible that scarcely more than half a century has witnessed the passing of a once abundant species of our native bird. Like the bison, the paroquet has been swept away by the rushing tide of progress, leaving only fading memories where once they were characteristic features of the landscape. We may congratulate ourselves that there are few of our birds and mammals that find it so impossible to survive the advance of civilization.

WHAT THE WOOD FIRE SAID TO A LITTLE BOY.

What said the wood in the fire
To the little boy that night,
The little boy of the golden hair,
As he rocked himself in his little arm-chair,
When the blaze was burning bright?

The wood said: "See
What they've done to me!
I stood in the forest, a beautiful tree!
And waved my branches from east to west;
And many a sweet bird built its nest
In my leaves of green,
That loved to lean
In springtime over the daisy's breast.

"From the blossomy dells,
Where the violet dwells,
The cattle came with their clanging bells,
And rested under my shadows sweet;
And the winds that went over the clover and wheat,
Told me all that they knew
Of the flowers that grew
In the beautiful meadows that dreamed at my feet!

"And the wild wind's caresses
Oft rumpled my tresses;
But, sometimes, as soft as a mother's lip presses
On the brow of the child of her bosom, it laid
Its lips on my leaves, and I was not afraid,
And I listened and heard
The small heart of each bird,
As it beat in the nests that their mothers had made.

"And in springtime sweet faces,
Of myriad graces,
Came beaming and gleaming from flowery places.
And under my grateful and joy-giving shade,
With cheeks like primroses, the little ones played;
And the sunshine in showers,
Through all the bright hours,
Bound their flowery ringlets with silvery braid.

"And the lightning
Came brightening,
From storm skies, and frightening
The wandering birds that were tossed by the breeze,
And tilted like ships on black, billowy seas;
But they flew to my breast,
And I rocked them to rest,
While the trembling vines clustered and clung to my knees.

"But how soon," said the wood,
"Fades the memory of good!
For the forester came, with his axe gleaming bright,
And I fell like a giant all shorn of his might.
Yet still there must be
Some sweet mission for me,
For have I not warmed you and cheered you to-night?"

So said the wood in the fire
To the little boy that night,
The little boy of the golden hair,
As he rocked himself in his little arm-chair,
When the blaze was burning bright.

—*Atlanta Constitution.*

THE MISSISSIPPI.

W. E. WATT.

AMERICANS like to boast of the things of this country that are larger, longer, more valuable, or more wonderful than anything of the kind in the world. They have recited in school such a number of statements about the Mississippi river that the great stream has become one of the essential points of our nation's honor.

You may be able to make the average man believe that Washington was not always as truthful in his youth as Weems in the cherry-tree story tried to make him; that Captain John Smith drew somewhat on his imagination when some sixteen years after the expedition into the woods he told the story of his rescue by Pocahontas; that perhaps, after all, we did not whip the entire British nation twice in open warfare—but it will be hard to make any native-born American admit that the Mississippi river is not the longest in the world.

He may listen to your argument in favor of the Nile or the Amazon, but he will tell you that he still thinks that if the Mississippi had been measured correctly at first, taking the source of the Missouri as the source of the Mississippi, we would have been the possessors of the longest river on earth.

And if that should seem a trifle weak he will at once tell you that the great river is more wonderful than all others because its source is several hundred feet nearer the center of the earth than its mouth. In other words, the river flows up hill. The curvature of the earth is not the true arc of a circle from the equator to the poles, for the axis of the earth is shorter than its diameter at the equator by about twenty-six miles. It is thirteen miles less from the north pole to the center of the earth than from any point on the equator to the center. So the river flows towards the equator with an apparent fall as estimated from the sea-level, but with an actual rising away from the earth's center just as the sea rises round this shoulder of the earth.

So the Mississippi is a source of joy and boastful conversation to every citizen of the United States.

The Acadian settlers of Nova Scotia whose praises have been sung by Longfellow in his "Evangeline", were the earliest to reclaim land from the sea in America. Being weaker than those who used the ax to fell the giants of the forest primeval, they were more skillful with the spade. They took advantage of the extremely high tides of the Bay of Fundy and its branches, and when the water was low threw up embankments which prevented the sea from covering part of the rich red mud flats before the village of Grand Pre.

At the time of their painful dispersion they had secured all the land between the original shore and the island which stood out in the basin of Minas.

Though they could not take these rich lands with them in their exile, many of them carried the knowledge of dike-building down to the lower courses of the Mississippi, and taught the rest of the Americans there how to get the fat lands of the river bottoms by means of levees.

When General Pakenham gave up his life and lost a fine British army to General Jackson after the treaty of peace had been signed in the War of 1812, his right rested on the bank of the Mississippi where there was a levee a little over five feet high.

This levee cut off the waters from spreading when the freshet was on. It was sufficient at that time. Extensions of levee work cut off more and more of the bottom-lands from the spread of the high waters till now nearly four-fifths of the area over which the waters of the June freshet used to spread are protected by these structures.

The levees are not now the low banks of earth which once kept the waters back. The great mass of water that comes from the melting of snows in the Alleghenies and the Rockies must either spread out or pile up. Confining within less than a mile of width a surplus of water that formerly spread itself for a hundred miles makes it nec-

essary for the water to rise and rush forward with greater violence.

Year by year the levees have crept up the sides of the great river, choking it into narrow walls. Year after year it has risen in its wrath and burst its bounds to destroy the cities and plantations which have been fattening in the mud of its alluvial flats. Every year the levees are put up higher, and as the works extend to the northward and more effectually close up the southern places of spreading out there is an average increase in the stage of high water and in velocity of the current. When it was allowed to wander over great stretches of country the water seemed in no hurry to get to the gulf, but now it goes tearing madly through its narrowed banks, and it has become a question with Congress which will take much deliberation and experiment as well as great financial outlay to solve.

It has been proposed that great reservoirs be constructed in the mountain districts to hold back the waters that are wasted in their rush to the sea. If there could be made in the Bad Lands in northern Wyoming a reservoir that would hold all the waters accumulating there during the months of spring, that reservoir would "skim off" the top of the Mississippi river two thousand miles away and save the people there from the perils that threaten them whenever the water mounts toward the danger-point.

It would require a vast artificial lake to hold these waters, but there are mountain ranges that could be utilized to form the barriers and the land taken from profitable grazing could be paid for with much less expense than the cost of one inundation of Mississippi bottom lands when a levee breaks.

Instead of one vast reservoir it will probably be found expedient to lay out a great number of works for retaining the western waters, as well as others in the eastern mountains and some in the beds of other tributary rivers whose sources are in the great basin between.

If these stores of water could be utilized for irrigation it is probable that the works would eventually pay for themselves in the increase in value of cultivated lands. The water at present is largely wasted because it rushes past the lands that need it before their distress of drouth comes, and its bulk is fairly spent when they need most the water that has passed. Adequate systems of reservoirs would also prevent largely the wearing away of banks and the changing of the course of the channel and even of the river itself which now sometimes tears away the foundations of cities, obliterates landmarks, and carries off bodily many well-tilled farms. Navigation could be much improved if the stages of high water could be moderated.

The Kansas farmer complained that the Missouri river is too thick to drink and too thin to plow. Control of surplus water near the sources would make this river so moderate that commerce would move along its surface. Varying moods and shifting sands now prevent navigation on that great river almost completely.

The Chinese have a problem similar to ours. Their government esteems their board of public works as one of the highest in their country. This board has charge of the canals and embankments along the great rivers. But it is a Chinese board.

The Hoang Ho resembles our great water course in that it rises in mountains and flows for hundreds of miles through comparatively level country in its lower courses. It deposits mud along its way through the great plain so that the people are continually obliged to construct levees higher and higher until nature no longer will put up with such treatment and the great yellow river breaks its bonds and travels across the country to find a new outlet at the seacoast.

In 2500 years it has altered its general course nine times with terrible destruction of life and property. Its last great breach occurred in 1887, when it tore through the empire a new channel that caused its waters to reach the sea through the mouth of the Yangtsekiang five hundred miles away from its present mouth. More than a million lives were lost and the devastation of the country has never been approximately estimated. The gap torn in

its embankment was two-thirds of a mile in width. Efforts to close it were ineffective except in low water, and when it was at last almost accomplished the celestials had a narrow but constantly deepening breach to mend, its depth during the last days of the work being so great that a torrent sixty feet deep fought with gigantic might against the endeavors of the men. At times the bed of this river has actually stood above the level of the surrounding country, its walls having risen with the rise of the bed due to the deposit of mud till it seemed as if the great river had risen to take a look over the surrounding plain to see where it could wreak the direst vengeance on those who prevented it from running unvexed to the sea.

We may learn from the wide experience of the Chinese that there is no safety for us in merely building higher the walls to restrain the Mississippi. The nation must take hold of the matter with a strong hand. Possibly forty or fifty millions will be necessary to construct the works which will moderate the flow and distribute its waters to those who need it in their irrigating ditches. Even though it cost thrice the sum paid to Spain in settlement of the Philippine question, the people would more gladly give it.

Nothing short of a great ship canal along the bed of the Mississippi will satisfy Americans. There is but one objection to the work, and that is its great expense. But we have recently seen that the cost of one great inundation along the Brazos was far more than the figures here named, and no account need be made of the loss of life and the suffering that followed that great disaster.

Our great river must be controlled. Not in the Chinese fashion, which we know to be merely the storing of wrath against the day of wrath, but it must be done intelligently and with patience, with faith in ourselves and a determination to prevent the great loss of life which will be imminent every time there happens to be the coming of a flood from the eastern mountains and another from the western at the same time.

Our great water way, when properly controlled and protected by permanent revetments and masonry, will furnish the farmers of the great plains a natural outlet to the sea for all their produce. This will be monopolized by no railway trust; no combination of steamboat men will put the farmer into the hands of corporations seeking to rob him of the best part of his crop on the way to market, for there will be docks along every man's water front, and the rudest flatboat will always rely upon the favoring current to bear its cargo to the sides of independent vessels plying the seas to the uttermost parts of the earth.

INDIAN SUMMER.

Withal there comes a time when summers wane,
When from the sunshine something seems withdrawn,
And pensive shadows lengthen on the lawn;
White bindweed wanders lonely in the lane,
The one sweet thing that now unwithered doth remain.

But there is beauty in autumnal bough
No less than in dear April's dewy leaves,
When with its store of golden-girdled sheaves
Piled stands the wain where one time passed the plow,
And ripened labor reaps fulfillment of its vow.

Then, though no more the oblivious cuckoo calls
From land to land, nor longer on the spray
Of yellowing elm the throstle vaunts his lay,
The ringdove's mate, as fades the leaf and falls,
Reiterates its note of love that never palls.

Though fluttereth still the soul-like lark aloft,
There is a quiet in the woodland ways,
The retrospective hush of vanished days,
And around garden close and orchard croft
A something in the air celestially soft.

From hamlet roofs blue spires of smoke once more,
As dies the day in mist along the dale,
And widowed evening weeps behind her veil,
From log-replenished ingle heavenward soar,
And lamps are early lit, and early latched the door.

—*Alfred Austin.*

FROM COL. F. M. WOODRUFF

A. W. MUMFORD, PUBLISHER, CHICAGO

CHIPMUNK.

Life-size.

THE CHIPMUNK.

(*Tamias lysteri.*)

C. C. M.

NATURALISTS, as well as many ordinary observers, it is said, recognize numerous varieties among the chipmunks of the United States, founded principally on the markings of the fur; for in their habits they are all very similar. Elliott Coues describes four varieties found in this country.

The American chipmunk, hackee, or chipping squirrel (*Tamias lysteri*) is distributed all over the United States. The face is of a reddish brown tint, with darker spots on the forehead and cheeks; the nape of the neck is ashen gray, the hind-quarters reddish brown, the under surface whitish; there is a dark-brown stripe on the back, a black stripe over the eye, with white above and below it, and there is a wide white side-streak edged with blackish brown; the upper surface of the tail is dark-brown, the base being grayish yellow, the tip whitish and the lower surface a ruddy hue.

This description may seem superfluous, in view of our picture of the lively little animal; we think, however, it may induce closer observation of the markings of its fur.

The chipmunk is visible at all seasons of the year, but late in summer it may be seen running about, "its cheek pouches filled and its eyes beaming with the satisfaction which its riches afford it." According to the different months in which they mature, it gathers its varied stores, for the most part consisting of buckwheat, hazelnuts maple seeds, and corn. During the winter it hibernates to some extent, but it seems to stand in need of food during the whole winter. Audubon dug up a burrow in January, and at the depth of about four feet he found a large nest of leaves and grass in which were three chipmunks; others seemed to have disappeared in the lateral passages at the approach of the diggers. The animals were overcome with sleep and not very active, but they were not as torpid as true hibernating animals are, and they snapped viciously at the naturalist, who tried to handle them. The animal does not become torpid before November. It does not leave its subterranean home during the winter, but keeps a passage open. When the snow melts it begins its activity above ground.

The young are born in May, and a second litter usually in August. It is said the males engage in fierce combats during the breeding-season.

The farmer is not very friendly to this animal, which he regards as a pest. It is hunted extensively. A whole army of enemies is constantly engaged in its pursuit. "Boys utilize it to practice the noble sport of hunting; weasels pursue it both on and under the ground; cats deem it a prey equally as good as rats and mice, and all larger birds of prey carry it off whenever they have a chance. One of these birds has even gained for itself the name of squirrel-hawk, because of its attacks on the chipmunk." The rattlesnake, according to the observations of Geyer, also follows the poor little creature with a great deal of perseverance. Winter often causes sad havoc among the numerous young brood born in summer. Yet they are very plentiful, at least in favorable years, the great fecundity of the female making up for the losses. Their chief protection against enemies is the difficulty in finding them and the amazing nimbleness they display as they dart between and under hedges like wrens.

The beauty and gracefulness of the ground-squirrels render them interesting pets, but as they never become quite tame, are timid and addicted to biting, and gnaw everything in the cage they are not very desirable to keep. Their care presents no difficulties, and they thrive well on the simplest diet of grain and fruit.

Greenwood Cemetery, Brooklyn, N. Y., is suffering for the second time in its history from a too great increase in

its colony of chipmunks. Eighteen years ago they became such a nuisance that a trapper was employed, and 28,000 small striped pelts were the results of his first year's work.

This year it was noticed that an unusual number were about, even in the early spring, when the chipmunks first appear after a winter's sleep. Now it is estimated that there are at least 20,000 chipmunks in the cemetery, and a great deal of damage has been done. Through their burrowing habits they have undermined the gravestones, and even in many cases caused graves to sink in, when rainwater has helped to hollow out their burrows.

The chief enemies of the chipmunks are the florists, for the animals nip growing plants at the roots to reach the sap. One Brooklyn florist says that since Decoration Day he has had to put in 250 new plants to keep up an original plat of 150. Florists with contracts to keep graves in condition have entered strong protests, but outside florists, who work by the piece, have been making money.

The eight special policemen on the grounds have been furnished with poisoned nuts to scatter about. No diminution has yet appeared in the chipmunk army, as they reproduce three or four times a year and increase fourfold in a season if not checked. But if poison fails another trapper may be called in.

Our Animal Friends says that some children were feeding chickens with some stale bread one day, and two or three chipmunks appeared. They wanted the bread, too, and every time the children threw a bit down, both chickens and chipmunks would make a rush for it; and nearly always the chipmunks got it. One of them was particularly smart; he gathered all his pieces in a little pile between two stones, and he seemed to keep one eye on them and the other on the lookout for fresh pieces all the time. At last one of the chickens saw the pile and made a run for it, but its owner got there first, and he just sat right down on the top of the heap and *chattered.* The chicken kept on coming nearer and looking rather as if he would fight for it, so Mr. Chipmunk sat straight up, twirled his tail, and just seemed to shake with anger. Then another came along to help him, and the two tucked all the pieces into their pockets and off they darted, leaving the poor chicken looking awfully disappointed.

TED'S WEATHER PROPHET.

GRANVILLE OSBORNE.

Flittin' along from tree to tree,
Chipper 'n friendly ez he kin be;
Dancin' erbout on the'r talles' lim',
Jes' the likeliest place fer him.
Bound ter foller 'n seems to know
Very bes' places I like to go;
Bobbin' his head 'n winkin' his eye,
'S if he knew all erbout ther sky;
'Nen he nods an' sez as plain,
"Goin' ter rain; goin' ter rain!"

Little feller 'ith coat all brown,
Vest uv red wher' the wings come down,
Primpin' his feathers 'n winkin' at me,
Mincin' er-round so he kin see;
'Taint no use ter hide erway,
'At's a game what two can play;
'Course he finds me, 'nen he tries
Ter make believe he's awful wise.
All uv a suddin he sez again,
"Goin' ter rain, goin' ter rain!"

Climbed way up ter his nest one day,
"Better be careful," I heard him say;
Ruffled his coat 'n looked so mad,
I didn't 'spose he could be so bad.
Coziest nest 'at ever you seen,
Snuggled way up amongst ther green;
Four little eggs, ther purtiest blue,
Didn't touch one uv 'em, honest 'n true!
Robin hops on 'n begins ter explain,
"Goin' ter rain, goin' ter rain!"

THREATENED EXTERMINATION OF THE FUR SEAL.

THE fur-seal herds of the north Pacific breed on islands situated in Bering Sea and belonging to the United States and Russia. On these islands, Pribilof and Komandorski, for nearly a hundred years they have received all necessary protection from attacks on land. The existence of the herds, however, demands the further protection of the females when they are feeding or migrating in the open sea beyond the usual three-mile limit of territorial jurisdiction. The animals visit certain islands in the summer. They breed on them and make them their home. The young remain there until driven away by the storms of winter. The adults leave the islands in summer only to feed, going to a distance of one hundred to two hundred miles for that purpose. The winter is spent by the entire herd in the open sea; their migrations extending from one thousand to twenty-five hundred miles to the southward of their breeding-resorts.

For many years, both under Russian and American control, the herds have, as I have said, received absolute protection on land, the killing for skins being restricted to the bands of superfluous males. As only one male in about thirty is able to maintain himself on a rookery or to rear a family, about twenty-nine out of every thirty are necessarily superfluous. The survival of one male in a hundred is sufficient for all actual needs of propagation. The young males on land are as easily handled and selected as sheep, and no diminution whatever to the increase of the herd has arisen from selective land-killing. The number of females in the herd bearing young each year was, in the earlier days, about 650,000 on the American islands and perhaps half as many on the Russian. The numbers of males and of young were together about twice as many more. This gave an annual total on the American, or Pribilof, islands of about 2,000,000 animals of all classes, while on the Russian, or Komandorski, islands there were about 1,000,000.

About 1884 different persons, known as pelagic sealers—chiefly citizens of Canada, but some of them from the United States—began to attack the herd in Bering Sea. Here no selective killing was possible. The females were always in the numerical majority, as the males had become less numerous on account of land-killing and as they left the islands less frequently in the summer. Each female above two years, when taken in the sea, died with her unborn young. Most of the adult females so taken after July 1 had left their young on the islands, and these orphan pups invariably starved to death.

Beginning with this increase of pelagic sealing in 1884 the fur-seal herds rapidly declined in numbers. In 1897 there were about 130,000 breeding-seals on the American islands, or about 400,000 animals of all classes, while on the Russian islands there were less than 65,000 breeding-animals, or less than 200,000 of all classes.

For this great reduction in numbers there is but one cause—a cause plain, self-evident, and undeniable—and that is the slaughter of breeding-females at a rate largely in excess of the rate of increase. While other causes have been assigned, none of them is worthy of the slightest consideration in explaining the decline.

Even in 1893 it was evident, to all capable of forming an opinion, that pelagic sealing was the sole known cause of the decline of the fur-seal herds. It was also evident that as an industry it must be self-destructive, since, if permitted to exist on any scale which would make it profitable, it must destroy the herd on which it operated.—"*Lessons of the Paris Tribunal of Arbitration*," *by President David Starr Jordan, in Forum.*

THE PEACH.

WILLIAM KERR HIGLEY,
Secretary of The Chicago Academy of Sciences.

THE peach (*Amygdalus persica, L.*), is one of our most important and best-known fruits.

It is not found in the wild state, in its present form, though in some localities it propagates itself, having escaped from cultivation.

It is probably a native of China, where it has been cultivated for centuries and where it is said to reach its greatest perfection, although Darwin holds that the evidence seems to indicate that the wild almond of Persia is the original source of the cultivated almond, the peach, and the nectarine. The specific name *persica*, has its origin in the fact that the peach was obtained from Persia, both by the Romans and the Greeks.

Dr. Willis tells us that "it was introduced into Italy from Persia by the Romans, in the reign of Claudius Cæsar. It was introduced into Great Britain during the sixteenth century, and thence brought in 1680 by the settlers of Virginia to America."

The number of varieties seems to be unlimited. Over four hundred have been catalogued, though less than one hundred of these are constant. The nectarine is considered a variety and closely related to the peach and the plum, the apricot, and the cherry.

The tree itself, when bearing its beautiful rose-colored, five-petaled flowers, is highly ornamental. It seldom grows higher than twenty feet and its branches form a symmetrical top. One very ornamental variety produces double flowers and bright, shining leaves, but no fruit.

This valuable plant is generally placed in the family *Rosaceæ*, which includes many species of economic and ornamental importance. Besides those already mentioned, here belong the rose, the strawberry, the raspberry, the blackberry, the apple, the pear, and the quince, as well as many beautiful wild forms.

The thousand or more species usually classed in this family may be readily separated into distinct groups, to which are given distinct family names by some authorities. Thus, the peach, the cherry, the plum, and the almond, which resemble each other in regard to the structure of their fruits and in their chemical constituents, may be placed in a family by themselves.

It is of interest to note that this luscious fruit was not always considered free from noxious qualities. Pliny states that it was considered by some that its presence in Egypt was due to its introduction there by the Persian king for the purpose of poisoning his enemies.

The Chinese writings refer to the peach as early as the fifth century before Christ, and it is given the name "tao" by Confucius. We are also told that in these writings "the peach tree holds the same place that the tree of knowledge does in the sacred scriptures, and that the golden Hesperides, apples of the heathen, hold among the western nations."

In Chinese mythology a peach tree is mentioned which was thought to possess the power of causing immortality but which produced its fruit but once in a thousand years, and another, which grew on a mountain and which existed in the early history of China, was said to be guarded by a number of demons.

PEACH.
½ Life-size.

CHICAGO:
A. W. MUMFORD, PUBLISHER.

THE TRANSFORMATION OF THE VICEROY.

(*Basilarchia archippus.*)

REST METCALF.

UGH! The ugly worm! Crush it! Wait a moment, listen, while I tell you a more excellent way. Notice on what your worm is feeding; take a branch of it home and place it in a bottle of water with the worm on it; then place the bottle with its contents in a large box, fastening a wire securely over the box, to prevent the escape; then watch your worm. Perhaps your worm will be the one so often found on the milkweed (*asclepras*) with black and yellow stripes around his body, two little horns in front on his head and one at the tail. If you keep him well supplied with fresh leaves, in a short time he will eat all he wishes and then, and not until then, will he leave the plant on which he is feeding and travel many a long journey up and down and all around the box, until you may imagine he has gone crazy from his confinement; but that is not the case, as you will soon see. When he finds just the right place, he will remain quite still to all appearances, but really he is very busy with his bobbin of silk and glue bottle weaving a small silken mat and fastening it very securely to the top of the box, and the next thing you will see him hanging by his tail from this mat, with his head recurved. Watch him and you will notice that he makes little jerky motions. For about twenty-four hours he remains in that same position, when suddenly he drops down his head so that he hangs straight down; now don't leave him for a moment, for very soon after taking that position, his black and yellow striped coat begins to split open, right between those two little black horns on the head, as evenly as though cut with a sharp knife and a pale green globular object comes into sight. With a few contortions of the body the little fellow pushes up his old coat, folding each stripe, just as Japanese lanterns fold up, then with a dexterous movement he fastens the end of his beautiful green chrysalis to the mat, dropping his old clothes, so closely compacted together that you would hardly recognize them. Now for two hours he exercises by little shrugs until the beautiful green chrysalis hangs complete, with gold band and pure gold spots, the most beautiful chrysalis I ever saw. Everyone exclaims, "How beautiful!" and wonders how an ugly worm could so transform itself into a thing of beauty

For ten days we can see no change in the looks of this chrysalis; then it grows darker and darker until you can distinguish the veins on the wings of the future butterfly. Then this little fellow, tired of his close quarters, opens the door of his beautiful chrysalis and creeps out, clinging fast to the empty nest. O, what tiny wings! But as you watch they dry out and lengthen to three times their first size and you behold the beautiful large Viceroy—orange-red wings with black lines along the nervures and a row of white spots along the outer margin, his black body beautifully spotted with white.

Or perhaps you may find, on the carrots in your garden, a worm with black and green stripes around his body, the black stripe being decorated with yellow spots. He will spin a long silken mat the length of his body and to that mat fasten a swing to hang around his body, so that by using a little glue at the end of his body the swing will hold his chrysalis in place. This chrysalis is not as beautiful as the Viceroy, but very interesting in its odd shape and in its development and will well repay all the interest taken in it. Perhaps you may be surprised by not seeing a beautiful butterfly emerge from your chrysalis, but instead an Ichneumon fly, for often the Ichneumon fly deposits her egg in the caterpillar's back, and he can not say her nay; after he is nicely settled in his chrysalis this egg hatches and develops rapidly, needing so much food that nothing is left of the poor caterpillar or worm, but the fly prospers and soon comes forth full-grown, from

a round hole which he makes in the side of the chrysalis.

Each variety of worm and caterpillar will reward you with a different chrysalis or cocoon. If you are not sure of your worm place a box of dirt in your box, for some worms go into the dirt to make the great change. After watching these changes you, too, will say: "Don't crush the worms! For are they not a symbol of our own death and resurrection when we shall awake in His glorious likeness?"

BIRD LORE OF THE ANCIENT FINNS.

IN the *Bulletin of the Michigan Ornithological Club* H. S. Warren says that nature and nature-worship form the center of all the life of the ancient Finns, and he quotes freely from Crawford's translation of "The Kalevala," the national epic of Finland. He says that, "as the English language is not strong in diminutives, and therefore lacks some of the most effective means for the expression of affectionate, tender, and familiar relations, in this respect all translations from the Finnish into English must fall short of the original, the former being the language of a people who live pre-eminently close to nature, and are at home among the animals of the wilderness, beasts and birds, winds and woods and waters, falling snows and flying sands." The metre is like that of "Hiawatha," and is the characteristic verse of the Finns.

As to birds, the duck lays the mundane egg. "Then the water-mother finds a place upon her own knees for the duck to rest, where it lays an egg which rolls into the sea. There it breaks and is transformed into the earth."

From one half the egg, the lower,
Grows the nether vault of Terra;
From the upper half remaining
Grows the upper vault of heaven;
From the white part come the moonbeams,
From the yellow part the sunshine.

* * * * * *

Wainamoinen, wise and ancient,
Made himself an ax for chopping,
Then began to clear the forest,
Then began the trees to level,
Felled the trees of all descriptions,
Only left the birch tree standing
For the birds a place of resting,
Where might sing the sweet-voiced cuckoo,
Sacred bird in sacred branches.
Down from heaven came the eagle,
Through the air he came a-flying,
That he might this thing consider—
And he spake the words that follow:

The eagle inquires of the ancient singer, Wainamoinen, why he has left the birch tree only standing; and upon being assured it was left solely for the use of the birds, he commends Wainamoinen's "hero-judgment." There is a lesson in forestry for the modern day.

Wainamoinen, old and trusty,
Turned his face and looked about him;
Lo! there comes a spring-time cuckoo,
Spying out the slender birch tree—
Rests upon it, sweetly singing:
"Wherefore is the slender birch tree
Left unharmed of all the forest?"
Spake the ancient Wainamoinen:
"Therefore I have left the birch tree,
Left the birch tree only growing,
Home for thee for joyous singing:
Call thou here, O sweet-voiced cuckoo,
Sing thou here from throat of velvet,
Sing thou here with voice of silver,
Sing the cuckoo's golden flute-notes;
Call at morning, call at evening,
Call within the hour of noontide,
For the better growth of forests,
For the ripening of the barley,
For the richness of the Northland,
For the joy of Kalevala."

Thus is the cuckoo looked upon as a prophetic bird, or perhaps a mediator between the man and his gods.

The woodpecker is another sacred bird of "The Kalevala." In that epic he is not directly named, perhaps, because he was so very sacred, but the minor wood god, Nyyrikki, upon whom Lemminkainen calls in his distress to help him track the elk, is, like his father, Tapio, evidently a survival of Pikker, the woodpecker.

O Nyyrikki, mountain hero,
Son of Tapio of forests,
Hero with the scarlet headgear,
Notches make along the pathway,
Landmarks upward on the mountain,
That the hunter may not wander.

BIRD NOTES.

F. SCHUYLER MATHEWS says, in an article in *Popular Science*, that the bird not only possesses an ear for music but the mind to produce it. As our own conventional conception of music does not at all correspond with the wild bird's song, we are apt to consider the latter as foreign to art. If, however, we choose to consider the bird's conception of music a lawless one, we must show that he ignores all fundamental principles. This it is impossible to do, for he invariably resolves his effort to a perfectly intelligible, logical, musical idea. His music is, therefore, an art at least in part.

"There are," Mr. Mathews continues, "three woodland singers who will perfectly illustrate my idea of the underlying principle of bird-music. These are the chickadee, the white-throated sparrow, and the hermit-thrush. The chickadee sings, or I may say, calls his mate, with a perfect musical third, or with two notes separated by a complete musical interval. One bird may sing the third; another may answer in two descending notes. The remarkable thing about this simple example of melody is that the intervals between the notes are correctly measured. The result of his effort is a combination of tones in perfect accord with a law of music, and we are bound to accept it as an example of melody.

"The chickadee, too, it should be remembered, is not a high type of bird; there are many steps of progression between him and his more gifted cousins, the thrushes, who are, indeed, musicians of a high order. But, just here I might as well call attention to the fact that bird-music should not be overestimated. Its character is fragmentary, and its unconventionality is obvious. The wild songs of the woods and fields are not musical compositions; they are at best but detached bits of melody imperfectly conceived, although often replete with the suggestions of a complete musical idea.

"For instance, the white-throated sparrow or Peabody bird sings a perfect musical phrase which we may harmonize as we please, because it certainly suggests harmony. This is absolutely no more than the bird sings. The musical intervals, the pitch, and the lengths of the notes are all correctly sustained. In other words the bird suggests a complete musical idea. But the little Peabody bird seldom attempts a more difficult or elaborate task. He knows his limitations, and keeping within these, his attempts are musically both consistent and perfect. But let us turn our attention to the more gifted songster of the northern woods, the hermit thrush. His capacity for simple melody, his technical mastery of tone intervals and note values, his phrasing and his brilliancy as a performer, are certainly not exceeded by any vocalist of nature.

"But we must again studiously heed the limitations of the bird's idea of music. We are still in the presence of the untamed singer, who is amenable only to his own elastic laws. The hermit thrush starts his song with a prolonged keynote (often it is A) and then springs upwards in thirds and fifths with such rapidity and ease that we are amazed at the accuracy of the performance. Not only are the tones correctly given, but they are embellished with subsidiary or tributary tones.

"The last note, C, too faint to be heard at any distance, is rendered in a gyrating, suppressed way, impossible to describe, but comparable to the soft tones of a harmonicon. This note is an excellent example of bird lawlessness regarding music. It is quite antipodal in character to the initial note (A) with which the bird slowly begins, as if desirous to found upon it a solid musical phrase; but he fails most utterly at the last and subsides into an exquisite, elusive, compound tone—I do not know what else to call it—which he rounds off in a plaintive pianissimo. He is not satisfied; he begins the same strain

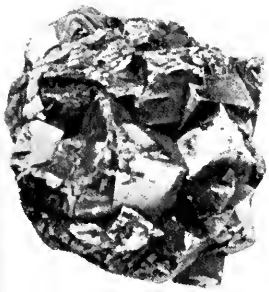
again, now in another key, and with no better success in the final than in his first effort. So he starts again with a variation, this time striking an initial note higher than before. Then he makes another attempt; but still he seems dissatisfied and, after a short rest, three tiny high notes come from his throat, full of perfect melody, as simple as that of the chickadee."

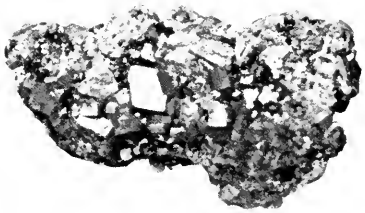
The bird is a transcendentalist, ever attempting what he cannot satisfactorily accomplish, but failing, only to delight us with the strange sweetness of the imperfect performance. The highest form of bird-music is unquestionably revealed in the songs of the thrushes. Here we have not only a simple fundamental rule, amply demonstrated, but also a partially developed series of musical ideas, strung together with a well chosen relationship. Of course, musically considered, the development of the melody and the connection of the phrases are more or less imperfect; but that does not matter. The truth is, the bird is an accomplished singer who cares less for conventional rules than he does for the essence, or the soul of the music; but above all he succeeds in inspiring his listener. What more, may I ask, could be expected of a musician?—*School Journal.*

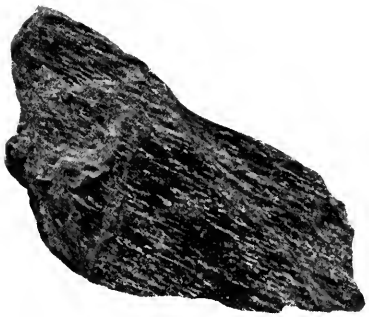
STORY OF A NEST.

ANNA R. HENDERSON.

Far away in the beautiful land of Brazil,
Where the birds are all singing o'er valley and hill,
Two little children walked out 'neath the trees,
Talking in musical Portuguese;
And if you will listen to what I say,
I'll tell you in English their words that day.
"Sister," said Manuel, "often I've heard,
That the trees scarce have room for the nest of each bird;
For this is the land of these beautiful things,
And the air seems alive with their songs and their wings;
And I think that I know of a little bird breast,
Which was puzzled and troubled for place for a nest."
"Now, brother," said Lena, "don't tell me a word,
Let me hunt for the nest of this crowded-out bird,"
So away they went roving o'er hill and through dell;—
Of the nests that they found 'twould take hours to tell.
There were nests in the orange trees, blossoming white,
There were nests in the coffee trees, glossy and bright,
There were nests in the hedges, the bushes and grass,
In the dark, hanging vines, by each roadside and pass.
There were blue eggs and speckled eggs, brown eggs and white,
And yellow throats opening with chirpings of fright.
"Search no longer," said Manuel, "'mid bushes and trees,
'Tis a stranger place, sister, than any of these."
"I give up," said Lena, a shade on her brow,
"Come, hasten, dear Manuel, I'll follow you now."
Then away to the garden the little feet sped,
And he showed her the nest in a big cabbage head!







CHICAGO:
A. W. MUMFORD PUBLISHER.

Pyrites
Limonite
Hematite

IRON ORES

Magnetite.

Pyrites
Limonite
Specular

COMMON MINERALS AND VALUABLE ORES.

THEO. F. BROOKINS.

I.—IRON MINERALS.

PROBABLY many a bright youth, accustomed to wander through the fields in enjoyment of nature, has been thrilled with pleasurable anticipations on finding, in some outcrop of crystalline rock, a mineral substance that glittered as gold. That his anticipations were premature should not deter the ambitious youth. Men far beyond him in experience have been deceived by that same "fool's gold." History records that shiploads of the valueless yellow iron pyrites were sent to England by explorers of America on the supposition that they were accumulating gold.

Of the various compounds of iron occurring in nature, but four may be considered as relatively common—pyrite, magnetite, hematite, and limonite. Pyrite consists of iron and sulphur; magnetite, hematite, and limonite are oxides of iron. The first-named mineral differs largely from the others in external appearance as well as in composition. The others are, however, readily differentiated. We will discuss each of the four minerals in the order mentioned above.

The sulphide of iron, pyrite, occurs in many crystalline rocks; but, owing to the difficulty of separating the iron and sulphur, is not used as an ore of iron. The mineral much resembles in external appearance a yellow ore of copper, called chalcopyrite, from which it may be distinguished in that it will strike fire with steel. A specimen of pyrites containing large crystals is an interesting subject of study. These crystals are cubical in shape, but generally massed together so that no single crystal form may be observed as complete. Peculiar striations on the cube faces may often be noted. The striations of no two adjoining faces are continuous; but rather a striation of one face bears to that of another in direction the relation of the stem of a printed T to the top, or vice versa. Owing to the affinity of each component element for oxygen, pyrite often changes to vitriol, or else forms the oxide of iron, limonite, described below.

The black oxide of iron, magnetite, occurs widely distributed. As its name indicates, it sometimes displays the properties of a magnet. If a fragment of unequal dimensions be suspended freely by a string, the longer dimension will gradually swing into a north and south direction. The property possessed by magnetite of attracting other bits of iron appears to have been known to the ancients, and by them the name lodestone was applied to the mineral. Since the power to attract other particles of iron is not apparent in all specimens of magnetite we must consider other more distinguishing characteristics. The ore is very heavy; particles of it are attracted by an artificial magnet, in which regard it differs from the other minerals we have mentioned; if a piece of the ore be scratched across the surface of a harder substance, *e. g.*, smoky quartz, a black "streak" will be left. Pure magnetic iron ore is intensely black, with no coloring.

In a series of ore beds formerly operated by a mining company of northern New York, four distinctions

of the crude ore were made, two varieties of blue, one of black, and one of gray. The blue coloring is apparently due to the presence of impurities; the black ore is evidently magnetite; and the steel-gray mineral, failing in the characteristic properties of magnetite, finds its class place under hematite. Hematite differs from magnetite in representing a higher degree of oxidation. It is often found, as indicated above, in beds distributed in close conjunction with those of magnetite. This ore is a valuable source of iron. Hematite commonly occurs in earthy materials, as red ochre. Its streak is red. All rocks of a reddish or red color owe the color to this oxide of iron.

When hematite rusts, the brownish-yellow or yellow iron oxide, limonite, results. The streak of limonite is yellow, thus distinguishing it from hematite. Disseminated through beds of clay, limonite gives them the characteristic yellow color. Such clays turn red when heated, since the water of the limonite is driven off, leaving hematite as a residue. This is the explanation of the usual coloring of bricks. Yellow ochre is impure, or earthy, limonite.

WHEN ANIMALS ARE SEASICK.

PHEBE WESTCOTT HUMPHREYS.

ANYONE who has traveled extensively has had an opportunity in some of the ocean voyages to witness the seasickness of animals, and many queer stories are told from time to time of their actions at such times—how lions become unkinglike, monkeys ape humanity, and dogs are especially woeful—and one realizes that human beings are not the only ones that suffer from seasickness, by any means.

One hears a good deal about pangs that have filled the men and women with woe, but little is said of the menageries brought to America every year, or carried hither and yon in wave-tossed boats.

Lions and tigers may be majestic when they have unwavering earth or rock against their paws, but a seasick cat of these tribes is as forlorn as any man ever was, and doesn't look a bit more kingly than a wet rabbit. Even its roars and growls have a weeping sound in them, quite in keeping with the general appearance of the beast.

A monkey is as pitiable an object when it is seasick as any other beast so stricken, and its forlorn facial expression is so humanlike and the way it clasps its paws across its stomach is so natural that the man who is not seasick necessarily sees something to laugh at in the misery of the creature. Not so with the seasick man. If he sees a seasick monkey he is sure to get very angry, thinking the poor thing is mocking him.

It takes a dog to be woeful at sea. It has a way of doubling all up, with its tail between its legs and its head hanging down that shows a deep-seated pain. To free itself the dog goes through all sorts of contortions. It will stretch out on the deck, groan and whine, sometimes rising on its haunches and lifting its head and howling long and miserably, as some dogs do at the sound of music.

Many other animals show signs of great distress when on the water in rough weather, and any animal that is thoroughly seasick will show almost human signs of distress and appeal for sympathy, yet one can scarcely help laughing at their actions, even in the face of their evident suffering.

THE TRAMPS OF BIRDLAND.

ELANORA KINSLEY MARBLE.

THE birds had met in council that morning, and from the great chattering and chirping I judged some very serious question was up before the board.

"Something must be done," Mr. Red-eyed Vireo was saying, as I sauntered down to the orchard and seated myself beneath an apple tree, "we have stood the imposition long enough. Every year we meet and draw up resolutions, with many 'whereases' and 'wherefores,' and 'aforesaids'—resolutions with nothing resolute about them. To-day, I say, something must be done."

Mr. Wood-thrush, Mr. Towhee, Mr. Chipping Sparrow, Mr. Yellow-breasted Chat, Mr. Song Sparrow, and several Mr. Flycatchers, beside a number of other small birds, nodded their heads in unequivocal assent.

"We have enemies enough," continued Mr. Vireo, "how many only Mother Nature knows. Even in the darkness of night we are not safe from the owls, skunks, snakes, and other robbers, and in the day-time, besides our feathered foes, we have the ruthless 'collector,' and the ever-present bad boy. Enemies without are bad enough, but to have in our very midst a—a—" Mr. Vireo paused, presumably choking with indignation, but really because he had quite forgotten what he had prepared to say.

"Hear, hear!" cried the assembled birds, making a great clamor and clatter in order that the speaker might have a chance to slyly consult his notes.

"A tribe of social outcasts—tramps, in fact," continued Mr. Vireo, "whose females, disliking the cares of family life, build no homes of their own, but instead deposit their eggs in some other bird's nest that their young may be hatched and reared without any trouble to themselves. Our mates have enough to do to bring up their own families, so I say the tribe of cowbirds must be driven from this community, or else, like the rest of us, be forced to work."

"H'm! yes," sighed Mr. Towhee, "that's what we say every year, and every year the conditions remain just the same. The cowbirds are tramps by nature, and you can't change their natures, you know."

I judged, from the great chattering and chirping, that grave exceptions were taken to this remark, but quiet at length being restored, Mr. Towhee continued:

"My mate says it depends upon ourselves whether the whole tribe shall be exterminated. She, for one, does not intend to hatch out any more of Mrs. Cowbird's babies. This spring we found one of her speckled eggs in our nest, but it wasn't hatched out, I warrant you. We simply pierced the shell with our bills, picked it up by the opening, and carried it out of the nest."

A round of applause greeted these remarks, much to Mr. Towhee's gratification.

"It strikes me," said Mr. Indigo Bunting, "that the whole fault lies with our mates. From the size and different markings of Mrs. Cowbird's eggs they can always be distinguished from their own. No self-respecting bird should ever brood one; in that way we can exterminate the race."

"'Tis the mother-instinct, I presume," said Mr. Vireo, "or the kindly nature of some females, not to neglect a forlorn little egg abandoned by its parents at their very door. Ah," he broke off, pointing in a certain direction, "is not that a sad sight for an affectionate husband to see?"

On a fence near by stood two birds—a very small one, with a worried, harassed air, endeavoring upon tip-toe to drop into the mouth of the great fat baby towering above her a green caterpillar which she held in her bill.

"That is Mrs. Vireo, my mate, and her foster child," continued the speaker. "The egg of the cowbird being larger than her own, received all the warmth of her breast, so that her own little ones perished in the shell. It takes all her time and strength to feed that great hulking baby, who will accept her nurs-

ing long after he can take care of himself, then desert her to join his own tribe in the grain fields."

"Last year my mate had no better sense than to brood one of Mrs. Cowbird's eggs," said Mr. Chipping Sparrow. "It emerged from the shell first, of course, and in attending to its everlasting clamor for food she neglected her own birdlings so that all but one of them died. That one has always been a puny, weak little thing. We were greatly astonished, I assure you, at the size of our first offspring, neither of us being acquainted with the habits of Mrs. Cowbird, and disappointed that in neither feather nor feature it resembled her or me."

"I got the best of the lazy tribe, this year," chuckled Mr. Yellow Warbler. "Our nest was just completed, and my mate had deposited one egg, when in our absence one day Mrs. Cowbird sneaked in, laid one of her own beside it and then stealthily crept away. My mate said nothing, and might have brooded it with her own, but the next day the same thing, in our absence, occurred again; another female of the lazy tribe, I presume, finding our home quite to her liking."

"Two to one," said the Chat with a laugh, "that was not fair. Well, what did you do then?"

"Why we concluded to abandon the nest and build another, but on second thought gave up that plan. We simply built a floor over the lower portion of the nest, and on the upper floor, or second story, so to speak, my mate deposited four eggs, those, with the one shut in with the Cowbird's, making her full complement, you see."

"It would have been far easier, it seems to me," said Mr. Towhee, "to have thrown Mrs. Cowbird's eggs out of the nest as we did. But then you and your mate must learn by experience and you will know better what to do the next time."

"Doubtless," said Mr. Yellow-throat, a trifle stiffly, "but my mate is a very dainty bird and wouldn't for a moment think of using a cradle for her little ones that had been occupied, even for a short time, by two female tramps."

"Hm!" replied Mr. Towhee, in his turn not altogether pleased, "that accounts probably for the number of abandoned nests one meets with every year, containing a speckled egg of Mrs. Cowbird's. Too dainty, indeed!"

"Did you ever happen to see one of the homeless creatures seeking somebody's else nest in which to lay her egg?" interrupted Mr. Chipping Sparrow, scenting a quarrel in the air. "I saw one in the woods once sneaking through the undergrowth, and when Mr. and Mrs. Red-eyed Vireo had flown away for a little time, out she crept, inspected their nest, and, finding it to her taste, entered and deposited her egg. She felt sure, you see, that Mrs. Vireo had a kind heart and would hatch out the foundling with her own."

"And she did," sadly said Mr. Vireo, "she did."

"The company the tribe keeps is no better than themselves," said Mr. Wood Thrush. "During the breeding-season you will see the grackles, and red-winged blackbirds, and the cowbirds chattering and gossipping together, as they roost for the night. They are a lawless crew. No self-respecting bird will be found in such company."

"I saw a number of the cowbird tribe perching on the backs of a bunch of cattle in the pasture-land to-day," said a very young Mr. Flycather. "What do you suppose they were doing?"

"Searching for parasites," gruffly said an old bird; "that's the reason they are called cowbirds. They were once called 'buffalo birds' for the same reason."

No one spoke for the space of several minutes.

"If there are no further remarks, said Mr. Red-eyed Vireo, "the question will be put. All in favor—"

"What is the question, Mr. Chairman?" meekly asked a very young Mr. Flycatcher.

"Is it or is it not our duty to destroy every egg of Mrs. Cowbird's we find in our nests, thus forcing the tribe to build homes of their own in which to bring up their familes? All in favor—"

"Ay," chirruped every bird at once.

"Contrary minded?"

There was no response, so the meeting was declared adjourned.

NARCISSUS.

CHICAGO:
A. W. MUMFORD, PUBLISHER.

THE NARCISSUS.

WILLIAM KERR HIGLEY,
Secretary of The Chicago Academy of Sciences.

THE genus of plants called Narcissus, many of the species of which are highly esteemed by the floriculturist and lover of cultivated plants, belongs to the Amaryllis family (*Amaryllidaceæ.*)

This family includes about seventy genera and over eight hundred species that are mostly native in tropical or semi-tropical countries, though a few are found in temperate climates.

Many of the species are sought for ornamental purposes and, on account of their beauty and remarkable odor, they are more prized by many than are the species of the Lily family.

In this group is classed the American Aloe (*Agave americana*) valued not only for cultivation, but also by the Mexicans on account of the sweet fluid which is yielded by its central bud. This liquid, after fermentation, forms an intoxicating liquor known as *pulque.* By distillation, this yields a liquid, very similar to rum, called by the Mexicans *mescal.* The leaves furnish a strong fiber, known as vegetable silk, from which, since remote times, paper has been manufactured.

The popular opinion is that this plant flowers but once in a century; hence the name "Century Plant" is often applied to it, though under proper culture it will blossom more frequently.

Other plants of equal economic and historic interest, but less known, belong to this family. It is said that one species furnished the fluid used by the Hottentots for poisoning their arrows.

The genus Narcissus derives its name from a Greek word meaning "stupor" because of the narcotic effect produced by the odor and by portions of the plants of some species.

There are about twenty-five species, chiefly natives of southern Europe, but some of them, either natural or modified by the gardener's art, are world-wide in cultivation.

Blossoming early in the season they are frequently referred to as "harbingers of spring." The flowers are handsome, large, varying in color from yellow to white and sometimes marked with crimson. They are usually borne on a nearly naked stem. Some of the species are very fragrant. The leaves are elongated, nearly sword-shaped and usually about a foot in length, rising from the bulbous underground stem.

Among the forms that are familiar are the daffodils, the jonquils, and the poet's narcissus.

An interesting feature in the structure of the flowers is the cup or crown, which is found at the base of the flower segments. The length and character of this is an important feature in the separation of the species.

In Grecian mythology Narcissus was the son of the river god, Cephissus. He failed to return the love of the mountain nymph, Echo, which so grieved her that she pined away till nothing remained but her voice, which gave back with absolute fidelity all sounds uttered in the hills and dales.

Narcissus was punished for this by Aphrodite, who caused him to love his own image as it was reflected in the water of a neighboring fountain. "Consumed with unrequited love, he too, wasted away and was changed into the flower which bears his name."

FASHION'S CLAMOR.

E. K. M.

JUDGING from late millinery creations, and the appearance of windows and showcases, women, in spite of the efforts of the Audubon societies, still elect to adorn themselves with the stuffed remains of rare or common birds.

A live bird is a beautiful and graceful object, but a dead duck, pigeon, or gull peering with glassy eyes over the brim of a woman's hat is, to the thinking mind, both unbecoming and repulsive. In deference to "sentimental" bird lovers and at the same time the behest of Dame Fashion, wings and breasts are said to be manufactured out of bits of feathers and quills which have all the appearance of the original. Wings and breasts, yes, but never the entire creature, which the bird lover—in a millinery sense—chooses above all other adornments for her headgear. Apart from the humanitarian side of the subject, one cannot but marvel that such women cannot be brought to regard the matter from the esthetic point of view.

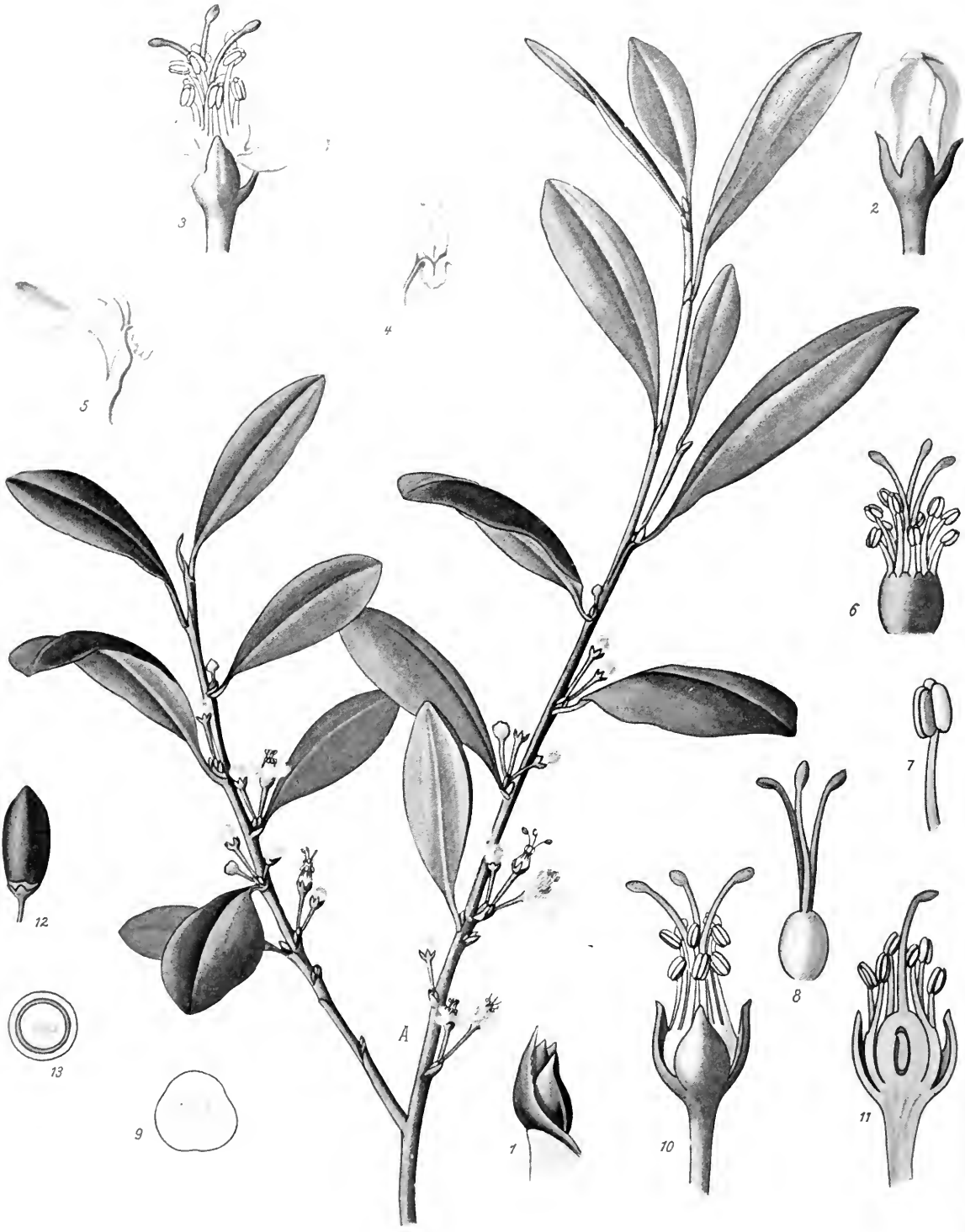
"Esthetic," repeats my lady, glancing admiringly in the mirror at the death's head above her brow, "esthetic point of view, indeed! Why, the point of view with most women is to wear whatever they consider becoming, striking, or *outré*. Now I flatter myself in selecting this large gull with spreading wings for my hat, that I attained all three of these effects, don't you?"

"Especially the *outré*," muttered one of her listeners, at which my lady laughed, evidently well pleased.

Five women out of every ten who walk the streets of Chicago and other Illinois cities, says a prominent journal, by wearing dead birds upon their hats proclaim themselves as lawbreakers. For the first time in the history of Illinois laws it has been made an offense punishable by fine and imprisonment, or both, to have in possession any dead, harmless bird except game birds, which may be "possessed in their proper season." The wearing of a tern, or a gull, a woodpecker, or a jay is an offense against the law's majesty, and any policeman with a mind rigidly bent upon enforcing the law could round up, without a written warrant, a wagon load of the offenders any hour in the day, and carry them off to the lockup. What moral suasion cannot do, a crusade of this sort undoubtedly would.

Thanks to the personal influence of the Princess of Wales, the osprey plume, so long a feature of the uniforms of a number of the cavalry regiments of the British army, has been abolished. After Dec. 31, 1899, the osprey plume, by order of Field Marshal Lord Wolseley, is to be replaced by one of ostrich feathers. It was the wearing of these plumes by the officers of all the hussar and rifle regiments, as well as of the Royal Horse Artillery, which so sadly interfered with the crusade inaugurated by the Princess against the use of osprey plumes. The fact that these plumes, to be of any marketable value, have to be torn from the living bird during the nesting season induced the Queen, the Princess of Wales, and other ladies of the royal family to set their faces against the use of both the osprey plume and the aigrette as articles of fashionable wear.

If this can be done in the interest of the white heron and osprey, on the other side of the water, why cannot the autocrats of style in this country pronounce against the barbarous practice of bird adornment entirely, by steadfastly refusing to wear them themselves? The tireless energy of all societies for the protection of birds will not begin to do the cause among the masses so much good as would the total abandonment of them for millinery purposes by what is termed society's 400.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COCA.*

(*Erythroxylon Coca Lam.*)

DR. ALBERT SCHNEIDER,
Northwestern University School of Pharmacy.

It is an aromatic tonic and cerebral stimulant, developing a remarkable power of enduring hunger and fatigue.—*Gould: Dictionary of Medicine.*

AT THE very outset I wish to state that coca is in no wise related to cocoa, a mistake which is very often made. The term coca, or cuca, as it is sometimes spelled, applies usually to the leaves of *Erythroxylon coca*, which are used as a stimulant by the natives of South America and which yield cocaine, a very important local anæsthetic. Cocoa or cacao refers to the seeds of *Theobroma cacao*, fromwhich cocoa and chocalade are prepared, so highly prized in all civilized countries. With these preliminary statements I shall begin the description of coca, hoping at some future time to describe the even more interesting and important cocoa-yielding plant.

Coca and cuca are South American words of Spanish origin and apply to the plant itself as well as to the leaves. The plant is a native of Brazil, Peru, and Bolivia. It is a shrub varying in height from three to ten feet. The leaves resemble the leaves of tea in general outline. The margin, however, is smooth and entire, the leaf-stock (*petiole*) short; upper and lower surfaces smooth; they are rather thin, leathery, and somewhat bluish-green in color. The characteristic feature of the leaf is two lines or ridges which extend from the base of the blade, curving out on either side of the midrib and again uniting at the apex of the leaf. The flowers are short pedicled, small, perfect, white or greenish-yellow, and occur singly or in clusters in the axil of the leaves or bracts. The shrub is rather straggling and not at all showy.

Coca has been under cultivation in South America for many centuries. According to A. de Caudolle the plant was very extensively cultivated under the rule of the Incas. In fact it is generally believed that the original wild stock no longer exists; such eminent authorities as D'Orbigny and Poeppig maintaining that the wild growing specimens now found in South America are plants which have escaped from cultivation. Coca is now extensively cultivated in Peru, Bolivia, Brazil, and other South American countries, particularly in the Andes region. It is also extensively cultivated in British India and in Java. Attempts have been made to introduce it into Southern Europe but without success.

The plants are grown from seeds sown in pots or boxes in which they are kept until they are from eight to ten inches high, after which they are transplanted during the rainy season. Coca thrives best in a warm, well-drained soil, with considerable atmospheric moisture. In the Andes region an elevation of 2,000 feet to 5,000 feet is most suitable. The young growing plants must be protected against the heat of the sun. The maximum growth is attained in about five years.

The leaves are the only parts used although the active principle, cocaine, is present in small quantities in all parts of the plant. As soon as the shrubs are several years old the leaves are picked, usually several times each year. This work is done principally by women and children who pick the leaves by hand and place them in aprons. They are then spread upon large mats, awnings, or cemented floors, and exposed to the sun for from five or six hours to two or three days. During very warm, bright weather drying may be completed in one day. If the process of drying is slow or if it rains upon the leaves they assume a dark color and are of less value. On the first indications of rain the leaves are placed in sheds specially made for that purpose.

Coca leaves have been used for many centuries by the natives of South America who employed them principally as a stimulant, rarely medicinally. The leaves were at one time highly prized.

Acosta states that during the reign of the Incas the common people were not permitted to use the leaves without permission from the governor. After the passing of the Incas and after coca was more extensively cultivated all classes chewed the leaves. Children were, however, not allowed to use them. According to Mariani, the young Indian on arriving at the proper age was sent to an old woman whose duty it was to instruct him and to invest him with authority to chew coca leaves. The native carries the leaves in a little pouch (*huallqui* or *chuspa*) suspended from the belt. This pouch also contains a small bottle-gourd or calabash (*ishcupura*) in which is carried the ash of some plant (species of *Chenopodium*), known as *Llipta*. A few leaves are placed in the mouth and rolled into a ball; a stick moistened with saliva is now dipped into the ash and wiped upon the leaves. The ash is supposed to develop the flavor and to cause a flow of saliva which is either entirely swallowed or partially expectorated. It is said that the use of the leaves enabled the Indians to undergo extreme hardships. A French missionary states that the leaves were absolutely necessary to the slaves employed in the quicksilver mines of Peru. They were also used in dressing wounds, ulcers, and taken internally for the cure of intestinal troubles, jaundice, and various spasmodic troubles. Historians seem to agree that the constant chewing of the leaves by the Indians did not produce any very marked deleterious effects. Mariani, upon the authority of several authors, states that it even seems to be conducive to longevity. The dead of the South American Indians were always supplied with a liberal quantity of coca to enable them to make the long and fatiguing journey to the promised land.

Chewing coca leaves is a habit which may be compared to the habit of chewing tobacco with the difference that the former is by far less injurious though there are good reasons to believe that it is far from harmless. Dr. Wedell says an habitual coca chewer is known as coquero and is recognized by his haggard look, gloomy and solitary habit, listless inability, and disinclination for any active employment. The same authority states further that the habitual use of coca acts more prejudicially upon Europeans than upon the Indians accustomed to it from their early years. Occasionally it causes a peculiar aberration of intellect, characterized by hallucinations.

Chewing coca leaves has never become common among civilized nations. Large quantities of leaves are, however, imported for the purposes of extracting the active principle cocaine, whose effects are very marked. Cocaine causes a feeling of depression, and a marked reduction in the activity of the senses preceded by stimulation. Cocaine solutions are very extensively employed to produce local anæsthesia in minor surgical operations. Dentists employ it very extensively. Its use has several serious drawbacks. Occasionally it produces no effects whatever and again an ordinary medicinal dose has caused fatal poisoning. For these reasons dentists, physicians, and surgeons often hesitate in using it. According to some authorities the poisonous effects are due to a second alkaloid which occurs in the leaves of some varieties of coca. If that is the case, then poisoning may be prevented by excluding these varieties from the market, which is not an easy matter considering that the leaves are collected, dried, and shipped by ignorant natives. It is also known that the active principle is rapidly destroyed, hence the necessity of using fresh leaves. In the course of one year most of the cocaine has undergone a chemical change and the leaves are absolutely worthless. Careless drying also destroys much or all of the cocaine.

Description of Plate.—*A*, flowering branch; 1, bracts, enlarged; 2, flowering bud; 3, flower; 4 and 5, petal with ligula; 6, pistil with stamens; 7, stamen; 8, pistil; 9, ovary, transverse section; 10 and 11, corolla; 12 and 13, fruit.

*Cvea on plate, typographical error; Coca correct.—Ed.

OUR NATIVE WOODS.

REST H. METCALF.

HOW many different varieties of wood are there in your own town? If you never have considered this question you will be surprised at the variety, and, I am sure, will enjoy making a collection for yourself. A pretty cabinet size is two inches in length and the same in diameter. This size is very convenient, unless you have an abundance of room, and will show fibre, grain, and color quite distinctly. If you will plane off two sides of the block you will see the grain plainly, and, if possible to polish one side, you will see what a beautiful finish some of our own woods will take.

All that is necessary in obtaining your collection is a small saw, but a congenial companion will greatly add to your pleasure. Saw your specimen considerably longer than you call for after it is prepared, for most of the varieties will check in drying; then let it thoroughly dry before preparing for your collection. The fruit trees around your home may first take your attention. You will be interested in noting the differences in the grain of the apple, apricot, barberry, cherry, pear, peach, plum, and quince; and while you are becoming interested in the fruit trees, notice the variety of birds that visit the different trees, for you will find each bird has its favorite fruit and favorite nesting-place. The mountain ash will perhaps feed as many birds in the fall and winter as any tree, and is a pretty tree for the lawn, holding its place with the maples, the ever graceful elm, admired by all, except the man who is trying to split it into firewood, and a favorite with the Baltimore oriole. If you wonder why the horse chestnut was so named, just examine the scars after the leaves fall and you will think it rightly named. Who has not tried carrying a horse chestnut in his pocket to prevent rheumatism? The weeping birch, as well as the weeping maple, are much admired for shade and ornamentation, but are not very common. We were told recently that the Lombardy poplar was coming back as a tree for our lawns, but many prefer the balm-of-gilead, so popular for its medicinal qualities. In the United States there are thirty-six varieties of the oak; you will find several in your own town and I trust will add a collection of acorns to your cabinet, and friends from the South and West will help make your collection a complete one. Then you will become interested in the cone-bearing trees and a variety of cones will also be added to your evergrowing collection, you will enjoy gathering some green cones and listening to the report as the seed chambers open, and if you gather a small vial of the common pine and hemlock seeds you will puzzle many a friend. One person remarked, when shown a vial of hemlock seed, "O yes, I have seen something like that, that came from Palestine, but I have forgotten the name." Some of the fir trees are pitted with holes where the woodpeckers insert grub-bearing acorns, leaving the grub to fatten, and in the fullness of time devouring it. Then the trees bearing edible nuts will call for their share of attention. The chestnut is familiar to all, as well as the butternut and hazelnut, but I knew one collector who called an ash tree butternut. There are twelve varieties of ash in our country, a wood that is coming more and more into prominence, and deservedly so; its toughness is proverbial, and it has long been utilized by carriage-makers for certain parts of wheels. A fine, handsome wood, combining in itself the qualities of oak and pine.

There are eighteen varieties of willow, several of the alder, but throughout the United States there is only one kind of beech. The ironwood is often wrongly called the beech. The hard and soft pine are interesting trees. The soft especially is a favorite for the sawyer, a beetle with long horns, who cuts large

holes through the wood. When obtaining your specimen from the thorn tree you may be fortunate enough to see the shrike getting his breakfast from the thorns where he had placed it some time before. The locust with its fragrant racemes of white blossoms in the spring and long seed pods in the fall will call for attention, and you may perhaps receive, as I did, a locust seed from the tree planted by George Washington at his Mount Vernon home many years ago. The shumachs and white birches are very artistic and sought out by all artists, for who does not want to put a white birch into a landscape! Every one knows the black birch by its taste. The laurel has a pretty, fine grain. The witch hazel is another favorite for its medicinal qualities as well as its popularity for being the last blossom of the autumn. And many others will be added from the shrubs and vines until your collection, just from your own town, will number nearly, if not quite, one hundred. You will thus, too, have become interested in all nature and will be able more fully to appreciate all the beautiful things God has given us to use and enjoy.

BIRD WORTH ITS WEIGHT IN GOLD.

POSSIBLY the rarest of all feathered creatures is the "takahe" bird of New Zealand. Science names it *Notornis Mantelli*. The first one ever seen by white men was caught in 1849. A second came to white hands in 1851. Like the first it was tracked over snow, and caught with dogs, fighting stoutly, and uttering piercing screams of rage until overmastered. Both became the property of the British museum. After that it was not seen again until 1879. That year's specimen went to the Dresden museum at the cost of $500. The fourth, which was captured last fall in the fiords of Lake Te Anau, in New Zealand, has been offered to the government there for the tidy sum of $1,250.

Thus it appears that the bird is precious; worth very much more than its weight in gold. The value, of course, comes of rarity. The wise men were beginning to set it down as extinct. Scarcity aside, it must be worth looking at—a gorgeous creature about the size of a big goose, with breast, head, and neck of the richest dark-blue, growing dullish as it reaches the under parts. Back, wings, and tail-feathers are olive-green, and the plumage throughout has a metallic lustre. The tail is very short, and has underneath it a thick patch of soft, pure white feathers.

Having wings, the takahe flies not. The wings are not rudimentary, but the bird makes no attempt to use them. The legs are longish and very stout, the feet not webbed, and furnished with sharp, powerful claws. The oddest feature of all is the bill, an equilateral triangle of hard pink horn. Along the edge, where it joins the head, there is a strip of soft tissue much like the rudimentary comb of a barnyard fowl.

"Around the glistening wonder bent
The blue wall of the firmament;
No clouds above, no earth below,
A universe of sky and snow."

—*Whittier.*

RED-TAILED HAWK.
1/3 Life-size.

FROM COL. F. NUSSBAUMER & SON
A. W. MUMFORD, PUBLISHER, CHICAGO.

THE RED-TAILED HAWK.

(*Buteo borealis.*)

C. C. M.

UNTIL recently the red-tailed hawk was classified with the obnoxious hawks which prey upon birds and poultry, but the Department of Agriculture instituted an investigation of this species and concluded that it has a far worse reputation with the average farmer than it deserves. The late Major Bendire asserts that, while it does capture a chicken or one of the smaller game birds now and then, it can readily be proved that it is far more beneficial than otherwise and really deserves protection instead of having a bounty placed on its head, as has been the case in several states. The red-tailed buzzard, as it is sometimes called, in its light and dark geographical races, is distributed throughout the whole of North America. Its food is chiefly small quadrupeds, red squirrels, gophers, and moles, and the remains of these rodents may be found in this bird's nest containing young. Where this hawk is found these small animals are most abundant. Longfellow in the "Birds of Killingworth," among the "Tales of a Wayside Inn," has written a defense of the hawks that the Audubon societies might well use as a tract.

The nest of the red-tail is placed in high trees in deep woods; it is large and bulky, though comparatively shallow, and is made of sticks and twigs mixed together with corn husks, grass, moss, and on the inside may be found a few feathers. It is said that sometimes the deserted nest of a crow or that of another hawk is fitted up and used. Mr. J. Parker Morris records a nest occupied first by the great horned owl and afterwards by the red-tailed hawk each year. The young owls leave the nest before the hawk is ready to occupy it. Two or three, rarely four, eggs are laid. Eggs are found as late as the middle or latter part of May. They present many differences in size and markings; their ground color is white or bluish white, some are entirely unmarked, while others are very heavily blotched and splashed with many shades of red and brown; and Davie says some are faintly marked here and there with a light purplish tint, and again the colorings may form an almost confluent wreath at either end. The average size is 2.36 by 1.80.

In old paintings the hawk is represented as the criterion of nobility; no person of rank stirred without his hawk in his hand. Harold, afterwards king of England, going on an important embassy into Normandy, is drawn in an old bas-relief, embarking with a hawk on his fist. In those days it was sufficient for noblemen's sons to wind the horn and carry the hawk.

According to Mr. Horace A. King this is one of the commonest birds of prey to be found in northern Illinois. They may be met with in all sorts of places, but are most common in the vicinity of heavy timber. In driving through the country one will see them perched upon rail fences, trees by the wayside, sitting on the ground in stubble or pasture fields, or soaring over fields in search of their prey. When on one of his foraging expeditions, the red tail, on sighting his quarry, will remain at the same place in the air by a continual flapping of the wings, when at the proper time he will dart swiftly and silently upon it.

Mr. Claude Barton, while rowing up Flat river recently, came upon six mallards. At sight of him the birds took flight, following the river. About two miles further up the stream he again came upon the same flock. There were four ducks and two fine drakes. He hid his boat in the rice and watched them. All at once a large red-tailed hawk dashed into the flock. The ducks, with the exception of one, dove, and this one took wing, a swift pursuer following. The hawk did not seem to gain on his prize, and the poor duck was screaming with terror. Had the duck sought safety in the water it would probably have escaped, but it was too frightened apparently to think of it.

A TRANSPLANTING.

ALICE WINSTON.

IT WAS the kitten who did it, though no one knew but Martha. Aunt Jenny thought it was the work of Providence and Aunt Amy thought it was the result of her own smiles and caresses. Aunt Mary never thought about it at all, of course. But really it was the kitten. And what was this thing that the kitten accomplished? The taming of Martha. And why did Martha need taming? Because she came at twelve, a very barbarian, with freckles and unmanageable hair, under the dominion of three smooth-locked ladies, who never had a freckle and whose hair had always been smooth.

Perhaps it would be better to begin at the beginning which was twenty years before there was any kitten. Most serene and happy would have been the lives of the three Miss Clarkes, if it had not been for Arthur. Arthur was their brother, and the combination of prim, blonde girls and harum-scarum black-eyed boy, made a most surprising family. The son and heir was not looked on as a success by his sisters and the other staid and respectable citizens of Summerfield. He did not join the church and he did not go to college, he wedded no one of the many eligible town's daughters, and, lastly, on his father's death he did not settle down at home, to take care of his property and his sisters.

This last of his misdeeds had made a breach between himself and his sisters. The more serious, because of the very deep affection which lay at the bottom of their half apologetic demeanor toward their brother. The difference between them was augmented by his removal to a far western town and his marriage with one of the natives. For the next twelve or thirteen years they never saw him and heard of him but seldom. Then he died suddenly, after accomplishing his task of wasting all his money.

So it happened that Martha saw her aunts for the first time on the day of her father's funeral, and her dim recollection was of cold faces and mannerisms which worried her mother. Martha was the eldest of four and her mother was one of the ornamental of earth, and her father one of the restless. So the first eleven years of her existence was wandering up and down through many cities, attended with much care for her slender shoulders, and an amount of worldly experience such as forty years of life had not given to the elder generation. Then her father died and they all went to share the spendthrift poverty of the home, whence her mother drew her ideas of domestic economy.

Through wifehood and widowhood, to her deathbed, Mrs. Clarke clung to an unreasoning hate of her sisters-in-law, and a dread of the time when her children must come into their hands kept her struggling against death for months.

But just one month after her pitiful fight was over, Martha started for Summerfield.

Poor Martha! Never captive carried to slavery felt such dread as did she on her eastward journey. When the friend who had borne her company left her at a station near Summerfield, even the stoicism of Martha gave way before the horror of the unknown and she clung to the last landmark of her old life, with a sobbing eagerness, which even a carefully nurtured child might know.

But there was no trace of frail, human grief in the little maiden who lifted the sullen blackness of her big eyes to Aunt Jenny's face that evening, who received Aunt Mary's greeting with a self-possessed composure alarming to that shy and gentle lady, and who gave the same degree of cold attention to Aunt Amy's sweet speeches.

They had looked forward to the coming of Arthur's daughter with a strange mixture of excitement, pleasure, and dread. The dread was predominant now. For this stern little woman was not their flesh and blood, not the child

of their brother, but of the woman who had kept them apart from their brother in his trouble and sickness and death.

Martha was quiet and docile enough. In fact she did what she was told with a resignation most depressing. Aunt Jenny took her to church and the sight of her critical dark eyes roving over minister and congregation spoiled the sermon for Aunt Jenny. Aunt Mary told her stories of her father intended to be gently humorous. In the midst of them Martha jumped up and ran off into the garden. She cried there for half an hour, but nobody ever knew, and this business lost her the little hold she had had on Aunt Mary's heart. Aunt Amy tried to amuse her and took her to Sunday-school, and to the Band of Hope. She gave her a doll and invited the neighbor's children to come and take tea. The doll was a source of secret amusement to Martha, but the visits of these pretty and proper children were trials which she could scarcely bear with patience.

All the while, as the aunts half suspected, she was criticising everything that came within the ken of her hungry eyes. She found Aunt Jenny imperious, Aunt Mary dull, and knew that Aunt Amy was thinking of her sweet smile as she smiled. For Martha was outside of it all, a mere spectator of this life of peace and quiet and plenty, and she secretly hungered after something to care for—something to take the place of the little brothers and sisters who had always run to her to have their faces washed and their aprons buttoned. They expected her to play with dolls, she, Martha Clarke, who had had real work to do and had learned to push and crowd her own way.

Months went by and the barrier was unbroken. One evening the tea bell rang again and again without bringing any Martha. The aunts were in consternation. Had she run away or was it a case of kidnaping? After nearly an hour the suspense was ended by the arrival of Martha. But such a Martha! Her neat raiment was muddy and torn. Her hair was in shocking disorder, Her right hand, tied up in a handkerchief, was emphatically bloody, but in spite of this, it was used to steady her bonnet, which she carried by the string, basket-wise, in her left hand.

Exclamations of horror and surprise burst from the astonished women. "Martha, where have you been? What have you been doing? What is the matter with your dress? Have you hurt your hand? Why, it's bloody! Has the child been fighting? Martha, are you going to answer?"

Martha was actually embarrassed. As she advanced into the lamplight they saw that her cheeks were crimson and her eyes sparkling, also that the contents of her bonnet was a dilapidated kitten. When she did speak, her voice was shriller than usual.

"I fell down in the mud and my hand is hurt," was her meager and hesitating answer.

"Where did the cat come from?"

"It isn't a cat, it's a kitten, and it was out in the yard, and I tried to catch it and it ran away and a dog chased it. When I came up, the dog was eating the kitten, and I hit him and then he bit me and pushed me down in the mud. But I'm going to keep the kitten." The last defiantly, then on second thought, she added:

"If you please. It's awfully hurt, that kitten"

In the silence that followed the shrill child-voice the aunts looked at each other and one thought was in the mind of each. "She looks like Arthur."

When Martha went to bed that night the kitten, with its wounds all dressed, was slumbering peacefully before the kitchen fire.

Time passed on happily for the kitten, which was not very much injured after all, and full of new interest for Martha, who plunged head and soul into the education of the kitten. Toward her aunts her feeling was unchanged. She drew a line between them and the kitten.

One evening Aunt Jenny and Aunt Amy had gone to prayer-meeting. Aunt Mary was not well and she sat bolstered up in a rocking-chair, knitting, before the bright fire in the sitting-room grate. Martha sat beside her, also knitting, in theory, but in practice carrying on a flirtation with the kitten, which was now a very gay kitten, in-

deed. An empty rocking-chair stood very near the fire and the kitten was leaping back and forth between its chair and Martha's, making its attacks with much caution and its retreats with much speed. Aunt Mary was sleepily watching the fun.

Suddenly there was a loud crash. The kitten had fallen into the fire in such a fashion as to knock over the rocking chair in front of the grate. It was a prisoner in the fiery furnace.

Many years had passed since Aunt Mary had moved so quickly. She threw herself at the rocking-chair and flung it to one side. She snatched up the unfortunate kitten and made one rush to the kitchen and the kerosene can, and by the time Martha overtook her, was soaking the poor little burned paws.

Half an hour later when Aunts Jenny and Amy opened the sitting-room door, an astonishing sight met their eyes. The firelight redness flickered over the excited faces of Martha and Aunt Mary laughing and talking eagerly together, Martha no longer dignified and Aunt Mary no longer shy. That was the beginning of the end, but Aunt Mary was always Martha's favorite.

And it was the little kitten who did it.

TWO BIRD LOVERS.

SUNDAY afternoon the birds were sweetly mad, and the lovely rage of song drove them hither and thither, and swelled their breasts amain. It was nothing less than a tornado of fine music. I kept saying, "Yes, yes, yes, I know, dear little maniacs! I know there never was such an air, such a day, such a sky, such a God! I know it! I know it!" But they would not be pacified. Their throats must have been made of fine gold, or they would have been rent by such rapture-quakes. — *Mrs. Nathaniel Hawthorne, in a letter to her mother.*

Lovely flocks of rose-breasted grosbeaks were here yesterday in the high elms above the springhouse How very elegant they are! I heard a lark, too, in the meadows near the lake, the note more minor than ever in October air. And oh, such white crowns and white throats! A jeweled crown is not to be mentioned beside theirs such marvelous contrasts of velvets, black, and white! Swamp sparrows, too, and fox sparrows—I saw both during my last drive.—*From letter to Ed., from Nelly Hart Woodworth, Vermont, Oct. 20, 1899.*

WINTER TIME.

ROBERT LOUIS STEVENSON.

Late lies the wintry sun a-bed,
A frosty, fiery, sleepy-head;
Blinks but an hour or two; and then,
A blood-red orange sets again.

Before the stars have left the skies,
At morning in the dark I rise;
And shivering in my nakedness,
By the cold candle, bathe and dress.

Close by the jolly fire I sit
To warm my frozen bones a bit;
Or, with a reindeer-sled, explore
The colder countries round the door.

When to go out, my nurse doth wrap
Me in my comforter and cap,
The cold wind burns my face, and blows
Its frosty pepper up my nose.

Black are my steps on silver sod;
Thick blows my frosty breath abroad;
And tree and house, and hill and lake,
Are frosted like a wedding-cake.

FROM COL. F. NUSSBAUMER & SON.

MARYLAND YELLOW-THROAT.

THE MARYLAND YELLOW-THROAT.

(*Geothlypis trichas.*)

C. C. M.

ONE of the first birds with which we became acquainted was the Maryland Yellow-thoat, not especially because of its beauty but on account of its song, which at once arrests attention. *Wichity, wichity, wichity, wichity*, it announces from some thicket or bush where it makes its home. It is one of the most active of the warblers and is found throughout the United States, Canada, and Nova Scotia; in winter it migrates to the South Atlantic and Gulf States and the West Indies.

The nest is not an easy one to find, being built on the ground, under the foot of a bush or tussock of rank grass, sometimes partly roofed over like the oven bird's. The eggs are four or five, rarely six in number, creamy-white, speckled, chiefly at the larger end, with reddish-brown, dark umber, and black; in some, occasional lines or scrawls appear. The average size is .69 x .52 inches. Oliver Davie says that the best description of this bird's song was given by Mr. Thomas M. Earl. One evening in May, 1884, he was returning from a day's hunt, and, after a rest on an old log, he was about to start on his journey homeward. At this instant a little yellow-throat mounted a small bush and, in quick succession, said: *Tackle me! tackle me! tackle me!* The fact is, the yellow-throat has several notes and is rather noisy for so small a bird. It is known by other names, as black-masked ground warbler, black-spectacled warbler, brier wren, and yellow brier wren.

The female is much duller in color than the male, without black, gray, or white on head. The young are somewhat like the adult female.

BOB-O-LINK.

GRANVILLE OSBORNE.

Soaring high up in the bright blue sky,
Can't keep track of him if you try;
Flitting around in the pasture lot,
Likes to be friendly, rather than not;
Dancing along on the old rail fence,
Sunshine and flowers where the woods commence;
Got so he almost talks to me;
Head a-nodding, he says, says he—
"Bob-o-link, o-link, o-link."

Clover and buttercups just seem to try
Coaxing him up in the meadow to fly;
Bees hunting honey keep buzzing around,
Seem to know best where the sweetest is found,
Almost forget when a-hearing him sing
What kind of honey they all came to bring;
Pert and saucy as he can be,
Tail a-flitting, he says, says he—
"Bob-o-link, o-link, o-link."

Wings jet black and glossy as silk,
Waistcoat a-gleaming as white as milk;
Dainty and slender, quicker than light,
First in the morning, last one at night,
Perched on the post of the barnyard gate,
Singing his sweetest to waken his mate;
Dressing his feathers and winking at me,
Mincing around, he says, says he—
"Bob-o-link, o-link, o-link."

A STUDY OF THE COLOR PHOTOGRAPH.

THE color photograph is found to be most useful in developing the color sense in children. The act of recognizing various colors and shades is educative. When we consider that all the effects of the color photograph are produced by combinations of the three primary colors we at once step into a realm of thought and observation that is boundless. The danger is that we may attempt too much with the abundance of material at hand and, by forgetting the limitations of the unformed mind, confuse instead of enlighten.

It is well for the teacher to know the process by which the color photograph is produced, but young children who know little of the laws of light are not expected to understand it fully. In advanced classes the following will be found beneficial:

A natural object is placed before a camera and a water screen is adjusted so no rays but the yellow may reach the photographic plate. A negative is thus obtained recording all the yellow that appears upon the surface of the object, whether it shows as pure yellow or in combination with other colors. With the camera and object in exactly the same position and another screen which absorbs all the rays but the red ones coming from the object, a negative of the red is obtained. A third negative of the blue in the object is similarly got, and we have an accurate representation of the form and all the colors of the object separated into red, yellow, and blue.

From these negatives three half-tone plates are made upon copper. A half-tone plate is an acid etching produced by photographic process with fine lines crossing each at right angles so that the picture appears as a series of microscopic square points which decrease in size in the lighter portions of the plate.

Red, yellow, and blue inks of the rarest quality are used in printing from these plates, with great care exercised as to getting the exact depth of color required for each. By placing a sheet of fine tissue paper beneath a plate printing red, the red is deepened, another sheet makes it more intense, and others are placed under the plate, if necessary, to get the rich red required to blend with the yellow and blue to make the exact reproductions of nature's colors which appear in the color photograph.

The order of the printing is yellow first, and when this is thoroughly dry the red is laid on, and the blue a day later. As the color is nowhere a solid mass, but a series of points, one color does not hide another, but the three colors shine through and make the blendings which appear in the beautiful and delicate shades and tints of the color photographs.

Do not manifest surprise when you find pupils wholly or partly color blind. The boy who cannot find a red marble in the grass will show by his conversation that red and green are the same to him. His is an extreme case, but there are many who are slow to name the primary colors and totally fail to recognize differences in tints.

For ordinary purposes there should be little effort given to the naming of the shades. If the colors are talked about by name, enough is done in the line of language. But classes become readily interested in comparing reds, and blues, or greens to say which is the deeper or the purer. The location of a patch of color often changes its apparent intensity. Contrast with sur-

roundings may deceive the eye. Whistler has used Naples yellow so the observer declares it pure white.

A good exercise in color recognition is given in choosing masses of color on the picture and telling what primary colors are in them; also in comparing two masses and saying which appears to have the more red or yellow in it.

Where the class have water colors excellent practice may be had in selecting and mixing colors to correspond with a given one. The mixing should be first tried without placing the mixed mass beside the copy. Very young children often make surprisingly accurate judgments of color, and no game pleases them more than a mixing contest, having the game decided in each instance by placing the best work beside the original.

No pictures have inspired so many young people with a desire to copy as have the color photographs. Their perfection of detail has not discouraged such attempts. The more easily copied lithograph has no such fascination. This shows that the nearer we approach nature in any presentation the more strongly we appeal to human nature and draw out its latent powers.

THE PILEATED WOODPECKER.

BELLE P. DRURY.

THIS noble bird may be found in wooded districts of Illinois, but I made its acquaintance in the Indian Territory, where it is quite common.

In size and beauty of color it is second only to the ivory-billed.

The Choctaw Indians told me it was the "Good God" bird. I asked what they meant by that designation. The reply was "Only listen and you will know."

For days I spent much time watching several pairs as they flew about among the trees on the Shawnee Hills, but the only sound I heard was the hammering of their strong stone-colored bills on the sides of the trees, a noise that might easily be heard a quarter of a mile away. They did not descend to fallen logs for their prey but made the chips and bark fly from the upright trees.

Naturalists say the pileated will occasionally leave the insect-laden trees in search of fruit and grain, a thing the ivory-billed never does.

My beautiful, noisy companions eyed me and my opera glass suspiciously, trying always to keep on the other side of the tree from me, and, for a time, gave me no hint of the reason for their Indian name.

But at last a hunter appeared upon the scene when the frightened birds bounded away through the air uttering a cry which did indeed resemble the words "Good God," spoken in gutteral tones. The marksman brought down a fine specimen, which he gave to me. With magnificent red top-knot and wide-spread wings it looks as if it might be longing to fly back to its home among the Shawnee Hills.

THE LYRE-BIRD.

(*Menura superba.*)

LYNDS JONES.

IF AUSTRALIA were noted for no other thing than the ancient and strange animal forms which are to be found nowhere else on the earth, it would still be a wonderful continent. Not the least remarkable of these forms is the lyre-bird, the subject of the present sketch. Since its discovery on January 24, 1798, by one Wilson, it has been handed about among the different orders of birds by different systematists until its anatomy seemed to give it a more or less permanent place among the birds of passerine form, in spite of its fowl-like build and strong legs and large feet.

The appearance of the bird, except the superb tail, is not remarkable; but paradoxical as it may be, the tail is the bird's crowning glory, at once giving it a name and fame. Like many other cumbersome things, the lyre-bird's tail is used for ornament during a part of the year only, being donned at the mating season and doffed at the close of the nesting period. It assumes the lyre-shape only when voluntarily spread, appearing simply as a long, greatly developed tail at other times. The bird throws up a mound of earth, dome-shaped, which serves as a raised platform or stage well suited to tail spreading and other courting antics. Strutting and wing-dragging are accompaniments of the tail-spreading, and strongly suggest gallinaceous affinities, especially since the bird is the size of the ordinary barn-yard fowl.

In habits the lyre-bird is lowly, preferring the ground to bushes or trees, and running from danger rather than flying, the strong legs and feet permitting a swift retreat. Rarely the bird may mount a tree, ascending branch by branch instead of flying up at once. They are said to use the wings to aid them in running, and in hopping upward in the trees. They are so wary and timid that it is difficult to secure specimens except by resorting to deception or the use of dogs. The barking of the dogs drives them into the trees, allowing the hunter a fair mark. They are inhabitants of the dense brush from which it is next to impossible to dislodge them.

Authorities agree that the lyre-bird's powers of song are remarkable. It seems to have the power of mocking almost every other bird, as well as the barking of the dingo, besides possessing a sweet song of its own. One author states that for the first two hours of the morning it repeats over again its own song, then gradually changes it to imitate other birds, ending its four-hour song period with imitations of all the other birds within hearing, then remaining silent for the rest of the day.

The nest is a dome-shaped affair with the opening in one side, made of "small sticks, interwoven with moss and fibers of roots." "The single egg laid is of a very dark color, appearing as if it had been blotched over with ink." The young emerges from the egg a downy white ball, perfectly helpless, and remains in the nest for several weeks. The food seems to consist of insects, myriapods, and snails, of which large quantities must be destroyed to satisfy a bird of this size.

This is another of the world forms which are doomed to complete extinction. It is to be earnestly hoped that the time of its disappearance will await a more careful study of its habits than has been accomplished thus far. A study of these curious forms can hardly fail to throw much light upon the development of the bird fauna of the world.

FROM COL. F. KAEMPFER
A. A. M. MEEK & SHEPHERD, CHICAGO

LYRE BIRD.
1-5 Life-size.

ROBERT AND PEEPSY—THE TWINS.

NELLY HART WOODWORTH.

IN THE latter part of May a pair of Baltimore orioles built a nest in my maples, from which, eventually, a brood of noisy fledglings were launched upon the world. A quantity of Hamburg embroidery was woven into the nest and festooned gracefully from the outside.

This was obtained from my neighbor's washing as it lay bleaching upon the grass, a task demanding more time and strength than seemed necessary for useless ornamentation.

To all appearance the esthetic taste of the builders was more pronounced than was their family discipline.

The children were a clamoring, rollicking group, pushing each other about and insisting, forcibly, upon a high point of view that constantly threatened their frail lives. I was in constant fear lest they come tumbling down and it was not long before my worst fears were realized.

They fell, with a shower, upon the morning of the 23rd of June, tumbling pell-mell into the strawberry bed, the biggest baby picking himself up in a hurry, and climbing upon one of the fence wires.

The other nestlings were marched off by the head of the family to other fields of observation, the first little bird hopping from the fence to a wild rose-bush that grew beside the kitchen door.

There he was fed by his father during the day; as his mother did not appear I inferred that she had her hands full with the other children.

Neither parent appearing the next morning, the first baby was put into a grape basket upon the window-sill.

Before noon the old birds came; the wire netting was removed from the window, both parents coming at short intervals into the kitchen with food.

To my surprise they did not return the following morning, when I fully intended to speed the parting guest, though the little one was placed in a cage outside the door. The helpless infant was left in an orphaned condition to my care; he could not feed himself, nor did he understand, under my tutelage, how to open his beak when food was brought. It was necessary to pry it open, the lunches coming so often that nearly all my time was spent in attending to his meals. That very evening the chore-boy brought a lank, long-legged bobolink which was given into my keeping only because it was threatened with starvation.

Like the oriole he was too young to feed himself and had been for twelve hours without food.

A more uninviting specimen of babyhood could not be imagined, forlorn, ragged, with unfeathered spaces upon his homely little body; but, though he had none of the oriole's commanding beauty, he was sure to perish unless regularly adopted and his infant wants supplied.

He was placed in the cage while the oriole was taking a nap, the introduction prefaced by being stuffed till his bare little crop was as round and full as an egg. Mrs. Olive Thorne Miller, who was with me at the time, assisted at the christening of the pair.

As the oriole was always peeping we called him "Peepsy;" the bobolink was named "Robert" with due respect to the Robert o-Lincoln family.

They were oftenest called "the twins," and troublesome twins they were, waking me at three o'clock each morning and crying loudly for their breakfast, which was prepared the previous evening.

Peepsy was first taken in my hand and given a few mouthfuls, then Robert's turn came, after which Peepsy was thoroughly fed and when Robert's demands were appeased, both birds were returned to the cage for another nap.

After sleeping innocently for another hour they awoke, insisting with emphatic protest upon an immediate supply of rations.

There were times when they jerked their heads from side to side and not

a morsel was safely lodged or appropriated, persisting in the clamor until, after patient effort, both little creatures were satisfied at last.

As may be surmised this was no enviable task, though the twins went promptly to bed at dusk leaving me free for the evening.

Peepsy was far the brighter bird. He took the lead at first, helping himself to his meals at times, twinkling the soft brown wings at my approach with most flattering evidences of favor.

Robert was a different bird; he scratched and bit, flopped about and hissed out his disapprobation.

The last was not without compensations. Whenever his beak was opened wide in disapproving hisses the opportunity was seized to fill it with food.

Sometimes his tactics changed; he would throw back his head and refuse to swallow. In a short time he took on prettier ways, now and then coaxing a little while receiving his meals with dainty baby eagerness.

From first to last their tastes diverged; Peepsy was high-born, Robert was of low degree. These low-born instincts preferring the cage floor he was given a sod to stand upon, the oriole's decided preference for higher stations culminating in the swing, his both by right of preference and forcible possession. In ten days Peepsy began to believe himself a full-grown bird. Then began an investigation of the cage and its appointments, diving into every corner, thrusting himself into the drinking cup as far as its size would allow, playing with the food, and throwing the earthworms given him to the top of the cage before attempting to swallow them. He would thrust his beak into Robert's feathers or catch hold of his legs, while the bobolink with ruffled plumage drew back with becoming indignation. He certainly *was* a homely baby which did not excuse the other twin for putting on airs, regarding him with lofty condescension, or stepping on his big, sprawling feet when they came too near. This unseemly behavior may have accounted for Robert's despondent hours from which he emerged to sing low and tentatively with the tinkling music of falling raindrops. Then they tried to stand upon one foot, balancing with great difficulty meanwhile, crowding into the swing and tumbling out upon the floor together.

In utter indifference to his own toilet Peepsy insisted upon preening Robert's plumage, calling his attention to the matter by vigorous pulls at his tail, or jerking some truant feather that beauty or tidiness required to be smoothed into place.

This unappreciated service was resented with many hisses, darting at the persecutor with wide-open beak and dire threatenings of vengeance, after which they cuddled up lovingly together for a nap.

For several days this self imposed helpfulness was so officious that the twins were separated lest Robert's temper, not over-good at the best, be permanently spoiled.

On this account Peepsy had the liberty of the house and went oftenest abroad. What with a better disposition and more enticing manners there was no resisting, whether it was coaxing to sit upon my finger or happy as bird could be when admired and caressed.

He would fly to my shoulder, pull a stray lock of hair lying against my throat, dodge skillfully when the hand was raised in protest, only to reappear and bite my lips as they moved in cautioning words.

He followed me to my chamber morning by morning, hopping up the stairs one at a time till we reached the top, when he flew to my shoulder and entered the room master of ceremonies.

As the clothes were replaced upon the bed he darted down upon sheets and blankets on purpose, seemingly, to be "shooed" away. Too much notice was spoiling the child, though his reign, poor baby, was short!

He was quite independent as to feeding himself when Robert first began to pick up cracker crumbs. What was stranger still, when the bobolink was well-versed in such matters, his memory was so unreliable that he forgot how to eat over night and had to be taught all over again for several mornings, nor would he swallow till the egg

or cracker was thrust clear down his throat.

After the first month, in which the oriole took the lead, the order was reversed. Robert was first thereafter, coming to the front and taking entire charge of the establishment, chaperon, servant, adviser, nor was he above making sarcastic remarks at the expense of the faithful companion who followed closely at his heels.

He pecked at the little blue kid shoes on the perch above, pulled the tiny toes, tweaked the feathers and tried to pull them out, and behaved generally, I regret to say, most impolitely. With this increased assurance there was a marked gain in song.

He sang while we breakfasted or dined, the same ideally happy bobolink medley, a new discovery of the joy of living, lifting his voice in rainy days in rhythm with the shower, Peepsy joining with sundry encouraging notes but no real song.

After the first month both birds were fond of the bath; water in bowl, pitcher, or tumbler, was a challenge seldom ignored.

Robert's short memory and inexperience were liable to mistake the dish of cracker and milk for a bath tub, crowding into and flirting the contents over chairs and floor. He was specially fond of my mother, planting his feet in her soft, wavy hair and jerking her locks in utter disregard of all threatening.

The door to the next room, left ajar, was a ceaseless fascination. When the cage door was opened they started promptly, Robert leading, Peepsy following meekly, till they reached the crack in the door, stretching out their necks and peering with curious eyes into the room beyond; then, as if confronted with some terrible ogre they turned quickly about and hopped back to the cage.

The hidden possibilities were too great. In a moment back they came, repeating the search over and over, till the door was thrown open and they were at liberty to explore the terrors and resources of the room beyond. After one of these excursions Peepsy was found fast asleep in the narrow space between the door and the wall!

Both birds were very curious over the sweeping, Robert superintending, keeping just in front of the broom, hopping straight into the dust-pan, bristling his feathers when reproved, or flying, in frigid terror, if pursued. They helped also in preparing the meals, following from kitchen to pantry, from pantry to kitchen, till a too generous attendance was checked for the time by compulsory return to the cage.

Ignorant of all fear they became my constant companions from room to room, from house to garden and orchard, when wild birds looked down in wonder, coming from the higher branches to peer and question, Peepsy answering politely, fluttering the brown velvet wings in unavailing winningness, while Robert silently ignored their inquisitive ways. During the intense heat of midsummer I saw less of the twins than usual, the house being darkened as much as possible to exclude the heat. Opening my door I heard the patter of little feet as they crossed the hall; Peepsy stood upon the threshold and, with a welcoming chirp, flew towards me, coaxing and nestling against my cheek with many evidences of gladness.

The heat of the day was waning; the sun had withdrawn from the valley; the heights were radiant still, the peaks of the mountain range dazzlingly lit with golden light. I carried the bird out-of-doors and across the way where children were playing, the tiny guest enjoying the call thoroughly, lunching upon raspberries, exploring the rooms, "trying on" each nook and corner, and regarding with astonished interest a huge feather duster that lay upon the carpet.

Advancing and retreating before the huge monster, ruffling his feathers in rage, he hopped around it several times before his courage was equal to an attack. Then, with wide-spread wings he charged upon the savage enemy, striking it with his beak, trampling upon and biting the feathers.

When we returned Robert's indigna-

tion knew no bounds; he was furious.

He might have been jealous that Peepsy went abroad while he stayed at home; anyway, he pounced upon his brother in angry passion, caught his foot and jerked him off the perch, pulled out his feathers and tumbled him over upon the floor, when I interfered promptly.

As it was past their bedtime I saw them safely asleep, both little heads laid snugly against their wings, and thought by morning the quarrel would be forgotten. When I saw them next poor little Peepsy lay dead upon the cage floor. I strongly suspect that Robert rose early to help him out of the world; at least there was no appearance of suicide!

The remaining twin sang freely for a few hours; he had vanquished an imaginary foe and was singing the song of him who overcometh.

After that he seemed preyed upon by remorse, nor was he ever himself again, refusing food and pining away gradually through the few remaining weeks of his short life, when, in spite of all his faults, he died, as the story-books say, much loved and lamented.

THE COWBIRD.

(*Molothrus ater.*)

C. C. M.

"BUFFALO-BIRD" was formerly one of the names applied to this bird of strange habits, and Major Bendire, who was long an observer of all that took place on the plains, states that one will rarely see a bunch of cattle without an attending flock of cowbirds, who perch on their backs searching for parasites, or sit with "lazy ease," their familiarity with the cattle suggesting their name of cowbird. They also follow the freshly plowed furrows and pick up worms and larvæ. Mr. P. M. Silloway, who has made a very extended and careful study of the cowbird, says that its strange behavior and stealthy movements at certain seasons have prevented the acquisition of full data concerning many features of its life, and a few unfounded speculations about its habits have become current. It occupies a parallel place with the European cuckoo. It never builds a nest, but deposits its eggs in the homes of other birds, usually those of the smaller species. It is, therefore, a homeless creature, and its young are all orphans or adopted children. "It is, indeed, a peculiar bird, having no attractiveness of color, no beauty of voice, and no home. No wonder that, when in the haunts of other species, it hides and skulks as it seeks a suitable and convenient habitation to house its unborn orphan." Major Bendire gives a list of ninety-one birds in whose nests she has been known to leave her eggs. This includes woodpeckers, flycatchers, orioles, thrushes, sparrows, vireos, wrens, and warblers, but the most frequently imposed upon are so small that the cowbird's big nestling is almost certain to be the one to survive, the smaller birds being crowded out, and left to perish. It is said that as many as seven cowbird eggs have been found in a single nest, but there is generally only one. It is believed that a brood of insectivorous and useful birds is almost invariably sacrificed for every cowbird raised. Mr. Ridgway, in his fascinating book on the birds of Illinois, gives the following vivid picture of the female searching for a nest in which to deposit her egg: "She hunts stealthily through the woods, usually among the

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A. W. MUMFORD, PUBLISHER, CHICAGO.

COW BIRD.
½ Life-size.

undergrowth, and when a nest is discovered, patiently awaits from a convenient hiding-place the temporary absence of the parent, when the nest is stealthily and hastily inspected, and if found suitable, she takes possession and deposits her egg, when she departs as quietly as she came." "In the village of Farmington, Conn.," says Florence A. Merriam, "we once saw a song sparrow on a lawn feeding a cowbird bigger than she. When she handed it a worm, one of my field class exclaimed in astonishment, 'I thought the big bird was the mother!' "

Some of the foster parents abandon their nests, or build a second nest over the eggs, but usually the little bird works faithfully to bring up the foundling. Sometimes the egg is recognized by the mother and quickly thrown out. Frequently, also, the cowbird will eject one or more eggs of the owner to make room for her egg, or to deceive the owner and leave the same number of eggs as were in the nest before her visit. Sometimes an egg of the owner is found on the ground near a nest containing an egg of the cowbird, and it is no unusual occurrence to find an egg of the cowbird lying near a nest of a species regularly imposed upon by the parasite. Silloway says that the wood thrush, towhee, field and chipping sparrows, yellow-breasted chat, and the Maryland yellow-throat are oftenest selected to bear the burden of rearing the young of the cowbird.

In their courtship the males are very gallant. They arrive from the south several days in advance of the females. At this season—about the middle of March—they generally associate in groups of six or eight, and the males are easily distinguished by the gloss of their black plumage in contrast to the dull brown of the female. They do not pair, the females meeting the advances of the males indiscriminately. Dr. Gibbs, however, thinks that the birds may pair frequently for the summer, and suggests this as reasonable, referring to an incident coming under his notice when he saw a blue jay, on the point of despoiling the nest of a vireo, driven away by a pair of cowbirds in a most valiant manner. In going to the nest he found a large overgrown cowbird occupying the largest share of the structure, "while a poor little red-eyed vireo occupied a small space at the bottom, and beneath his big foster brother."

The eggs of the cowbird hatch in eleven or twelve days. They average .88 by .65 of an inch, the length varying from .95 to .67 of an inch, and the width varying from .72 to .58 of an inch. The ground is a dingy white or gray, and the markings vary through all the shades of brown, sometimes evenly distributed over the surface, and at other times predominating around the larger end. There is so much diversity in the appearance of different specimens, that frequently the investigator is puzzled in distinguishing the true eggs of the towhee, cardinal, and other species from those of the cowbird.

In the breeding season the male grackles, red-winged blackbirds, and the cowbirds of both sexes, nightly congregate to roost together. Early after the breeding season they form into flocks of from fifty to sixty. The birds have then finished moulting, and the glossy black of the males has been changed into the duller colors of the females and the young. They assemble with the blackbirds of various species where food is most abundant and easy to be procured.

Late investigations of the food habits of the cowbird indicate that the species is largely beneficial. Prof. Beal showed the food of the cowbird to consist of animal and vegetable matter in the proportion of about twenty-eight per cent. of the latter. Spiders and harmful insects compose almost exclusively the animal food, while weed seeds, waste grain, and a few miscellaneous articles make up the vegetable food. Mr. Silloway thinks "it is not improbable that the so-called insectivorous birds displaced by the cowbird are thus kept in check by this natural agent, and their mission performed by the usurper in directions as helpful as the special functions of the sufferers. We may later come to understand that one cowbird is worth two bobolinks after all."

THE LEGEND OF SAINT SILVERUS.

There runs an old, old legend,
A tale of Christmas time,
Low breathed round the fireside
In distant Northern clime;
It tells how once an angel
Looked down in mercy sweet,
And bade the people listen
To hear the Master's feet:
"Behold the Christ-child cometh!
The King of love is near!
Oh! bring your gifts of Noel
Unto the Lord most dear."

With golden grain of plenty
Fair shone each raptured home;
The corn crown'd every dwelling
Whereto the Christ should come.
And one, a blue-eyed stripling,
In longing all unknown,
With heart aflame had labored
For gift that God might own:
"Behold the Christ-child cometh!"
Up rose the music blest,
And Silverus stood waiting
With sheaf the richest, blest.

A tiny bird, nigh fainting,
A little trembling thing,
Through chilling airs of Christmas
Drew near on drooping wing;
The people raised a clamor,
They chased it from the corn,
They drove it from the garlands
That gleamed for Christmas morn:
"Behold the Christ-child cometh!"
His praise they fain would win;
How could they bring to Jesus
An offering marred and thin?

On drooping, dying pinion
That vainly sought relief,
The shivering bird down lighted
Where shone the proudest sheaf;
And Silverus moved softly,
Though dews all wistful stirred,
Close, close within his bosom
He fed the fainting bird:
"Behold the Christ-child neareth!"
He spake in faltering tone,
"The golden ears are broken,
Yet broken for His own."

And while the sheaf of beauty
Grew marred and spent and bare,
The sweet bird flew to heaven;
The King of love stood there:
"Oh! tender heart and Christlike,
Whose yearnings soared on high,
Yet could not see, uncaring,
My weakest creature die!
Lo, I am with thee always,
My Christmas light is thine;
The dearest gift of Noel
Is pity poured for mine!"

BIRDS GATHERED HIS ALMOND CROP.

AN ALMOND-GROWER of this locality hit upon a neat device for gathering his crop last fall. His trees bore largely, and this early became known to the yellowhammers, a species of the woodpecker tribe of birds, and they had regularly stored away large quantities of ripe nuts taken from the orchard in the limb of an oak tree near by. The astute orchardist watched operations, and at last hit upon a novel nut and labor-saving plan, and he lost no time in putting it into execution.

The limb was sawed from the tree and replaced by a square-shaped funnel, long enough nearly to reach the ground; a bucket was then set underneath. A genuine robbing game then went merrily on. The birds gathered the nuts, which they dropped into the funnel and down into the bucket below, and as regularly as night came the almond-grower would in his turn empty it of its contents and set it back for a new supply. This was kept up until the entire crop had been gathered and the yellowhammers had departed broken-hearted at the heartless deception practiced upon them.—*Sutler (Cal.) Enterprise.*

STORIES FROM BIRDLAND.

A SPECIMEN of the egg of that rara avis, the great auk, which was discovered after twenty-seven years in a disused attic in the house of Lord Garvagh in England, recalls to mind the fact that only about seventy of these zoölogical treasures are now known to exist. Of these G. F. Rowley of Brighton possesses half a dozen, while Prof. Alfred Newton of Cambridge, the well-known zoölogical expert, has half that number. The same gentleman discovered a splendid set of ten, labeled "penguin eggs," in the Royal College of Surgeons upward of thirty years ago, while the university museum at Cambridge possesses four, which were the gift of the late Lord Lilford, whose beautiful grounds at Oundle were a veritable paradise of bird life. One of these was brought to light in a farmhouse in Dorsetshire, and another changed hands in Edinburgh for a mere trifle. It is a remarkable fact that, whereas in 1830 the market price of a great auk's eggs was no more than $1.25, Lord Garvagh's specimen was bought from Dr. Troughton in 1869 for $320; Sir Vauncey Crewe, in 1894, paid $1,575 for one; in 1897, another was knocked down in London for $1,470, and a slightly cracked specimen went about the same time for $840; not so long ago a couple of these eggs was purchased at a country sale for $19 and resold for $2,284.

Some few years ago a robin took up his abode near the communion table in the old abbey at Bath, England, and remained there for some considerable time; his victualing department being presided over by a friendly verger, he naturally had every inducement to remain, and remain he did. During sermon time, with the exception of an occasional chirp of approval, he preserved an exemplary silence, neither coughing nor yawning, but when the hymns were sung, and he perched himself on the communion rail, his voice could be heard high above those of the human singers. All redbreasts, however, do not behave so well, and one at Ely cathedral some time ago carried on in such a manner that he brought disgrace on his tiny head. During the service he behaved fairly well, but when the clergyman ascended the pulpit and began to speak, the robin deliberately perched himself on an adjacent pinnacle of the chancel screen and began to sing, and the louder the preacher spoke the greater volume of sound proceeded from the irreverent bird, till he had to be removed.

The first place in the ranks of birds was until lately given by naturalists to eagles and hawks. The low-foreheaded tyrants are now dethroned, and the highest development of the race is reached in the family of the sparrows, if the following story be true. A man was feeding with breadcrumbs a wood pigeon at his feet. One of the bird's feathers, which was ruffled and out of place, caught the eye of a sparrow; the little bird flew down, seized the feather in its beak and pulled its best. The feather did not yield at once, and the pigeon walked off with offended dignity. The sparrow followed, still holding on; and, in the end, flew off triumphant with the trophy to its nest.

DECEMBER.

Down swept the chill wind from the mountain peak,
From the snow five thousand summers old;
On open wold and hill-top bleak
It had gathered all the cold,
And whirled it like sleet on the wanderer's cheek;
It carried a shiver everywhere
From the unleafed boughs and pastures bare;
The little brook heard it and built a roof
'Neath which he could house him, winter-proof;
All night by the white stars' frosty gleams
He groined his arches and matched his beams;
Slender and clear were his crystal spars
As the lashes of light that trim the stars;
He sculptured every summer delight
In his halls and chambers out of sight.

. . . . . .

'Twas as if every image that mirrored lay
In his depths serene through the summer day,
Each fleeting shadow of earth and sky,
Lest the happy model should be lost,
Had been mimicked in fairy masonry
By the elfin builders of the frost.

—*Lowell.*

THE WILD CAT.

(*Lynx rufus.*)

C. C. M.

THE species of lynx found in forests in the United States is the red or bay lynx. Its popular name is wild cat, but it is a true lynx, with the ear tufts characteristic of that group, and differs from the other members of it principally in the color of its fur. It is a resident of every part of the United States from ocean to ocean. The general color is usually red, but darker, and sometimes nearly black along the backbone, while under the body it is whitish and on the breast pure white. The entire fur, except the breast, is covered with spots and streaks of darker fur. The length of the body and head is about fifty-three inches and the tail is six inches long. The color of the fur is of a brighter red in summer and a darker brownish-red in winter. Different writers have classified several species of the American lynx, including the Texas lynx, which is found in Texas, and southern California; the Oregon lynx, which inhabits northern Oregon and Washington. There is also a Florida lynx. It is believed there is not much justification for these divisions, which Brehm says are based principally upon the different markings of the fur, and that in a general way it may be said that the specimens obtained from southern climates have shorter fur, which is more brightly colored and more distinctly spotted than those from the northern regions; but otherwise these animals do not differ in their habits and characteristics, which are those of the lynx group in general.

The natural home of the wild cat is a dense forest abounding in deep thickets and game. It rarely seeks sparsely-wooded sections. Sometimes it will hunt the hare even on the plain, and a prairie fire will drive it to the neighborhood of settlements. It is capable of great endurance in walking, can leap an astonishing distance, climbs well, and is said to be a good swimmer. Its sense of hearing is very acute, and its sight keen. It is a night-prowler, hiding at the dawn of day, and remaining still until evening. The wild cat selects for its lair a deep thicket, a cavern, or hole in a tree trunk.

As the shades of evening fall, says Brehm, it becomes active. During the day it seems as rigid as a statue, but at night it sets out, and on the first part of its journey makes frequent pauses, like those made by the domestic cat previous to entering an enclosure that appears to threaten danger. Only a very inexperienced person could mistake the spoor of the lynx for that of any other animal. The imprint is very deep owing to the strength of the paw, which exceeds that of a large wolf. It is very round and, as the claws are hidden, it is blunt in front. The pace is short compared with the size of the imprints made. The spoor takes a form something like that of a row of pearls; any one who has once seen it is sure to recognize it again.

The wild cat seems clumsy; its body is heavy, but it possesses the agility of its kind and surpasses them in rapidity of movement and endurance. Almost all animals and birds are its prey, although only the strongest lynx will attack deer. In temperate climates it is detested by the farmer and sportsman as it kills more than it needs, for its sustenance, often merely lapping the blood of its victim, and eating only the choicest portions. In the south it will not return a second time to this food, but in the north, where game is scarce, it always returns, remaining near the carcass until it is all eaten.

The wild cat has been tamed but it has not been found to be a very attractive animal to handle when angry. Loewis gives the following report of a

FROM COL. F. KUSSBAUMER & SON
A. W. MAMLOND, PUBLISHER, CHICA

CHICAGO LITHOTYPE CO.

WILD CAT.
1-6 Life-size.

female that he kept. He says: "A few months sufficed to teach my young lynx her name, 'Lucy.' When, during a hunting expedition, I would call out this name, together with those of numerous dogs, she would always respond to her own name, but to no other. Her training had been very easy and had reached such a point that when she was engaged in a passionate, but forbidden chase of hares, sheep, or poultry, and I called her, she would stop instantly and return, like a guilty dog, crouching low on the ground and pleading for mercy. When she was too far away to hear our voices, the report of a gun was sufficient to call her back in breathless haste. Lucy took part in all my autumnal hunting-trips. When she got sight of a poor hare she at once engaged in hot pursuit, and, in spite of her great excitement, she always had enough reasoning power to gauge the distance and to approximate the difference between the hare's speed and her own. She would obey only my brother's and my own summons, and showed no respect to any other persons. When we were both absent for a whole day, nobody could control her, and then, woe be unto the careless chicken or the thoughtless goose! During our absence she would, as soon as it became dusk, climb on the roof, lean against the chimney, and go to sleep. As soon as our carriage came into the yard, late at night, she sprang to the stairs in a few bounds. If I then called her name she would come to me quickly, put her strong fore-paws on my shoulders and, purring and rubbing herself against me, she would follow me into the room and prepare to pass the night on the bed or the lounge."

The fur of the lynx is very valuable. The Scandinavian specimens are counted among the largest and finest. Siberia and Russia furnish many thousands of skins. The flesh is said to be very palatable. It is light colored and tender, like the best veal, and is free from the disagreeable taste so common in game. The lynx was known to the ancients but was exhibited much more rarely in Rome than the lion and leopard, because even then it was so much more difficult to take alive. The one that Pompey exhibited had been captured in Gaul. The life of the wildcat in the natural state was shrouded in mystery which left room for many fables.

CHRISTMAS ONCE IS CHRISTMAS STILL.

PHILLIPS BROOKS.

The silent skies are full of speech,
  For who hath ears to hear;
The winds are whispering each to each;
The moon is calling to the beach;
And stars their sacred wisdom teach
  Of Faith and Love and Fear.

But once the sky its silence broke,
  And song o'erflowed the earth;
The midnight air with glory shook,
And angels mortal language spoke,
When God our human nature took
  In Christ the Savior's birth.

And Christmas once is Christmas still;
  The gates through which He came,
And forests wild, and murmuring rill,
And fruitful field, and breezy hill,
And all that else the wide world fill,
  Are vocal with His name.

Shall we not listen while they sing
  This latest Christmas morn,
And music hear in everything,
And faithful lives in tribute bring,
To the great song which greets the King
  Who comes when Christ is born?

THE EUROPEAN SQUIRREL.

(*Sciurus vulgaris.*)

C. C. M.

THIS is regarded as the typical species among the tree squirrels, and its character and that of the common species of American squirrels are very similar. The attitudes of the animals are familiar to all who have watched the antics of squirrels in their arboreal homes. It is widely distributed throughout all of Europe and across the Caucasus and Ural through southern Siberia to the Altai and eastern Asia. Brehm says it is not equally common everywhere or every year. Its favorite haunts are dry, shady forests with high trees and it is as much averse to dampness as to sunshine. When fruit and nuts are ripe it visits the gardens of villages, but only when they are connected with the forest by small tracts of trees or bushes. It will not attempt to forage far from the protection of the trees. Where there are many pine cones the squirrel makes its permanent home, and builds one or several habitations, usually in old crows' nests, which it improves very ingeniously. If it intends to make only a short stay, it uses the forsaken nests of magpies, crows, or birds of prey, just as it finds them, but the nests which it intends to serve as a permanent sleeping-place, a shelter against bad weather or a nursery, are built new, though the materials collected by birds are often utilized. It is said that every squirrel has at least four nests, though nothing has been definitely proven as to this. Hollows in trees, especially hollow trunks, are also frequented by them and occasionally built in. The open-air nests usually lie in a fork, close to the main trunk of the tree; the bottom is built like one of the larger bird's nests, while above there is a flat conical roof, after the manner of magpies' nests, close enough to constitute a perfect protection from the rain. The main entrance is placed sideways, usually facing east; a slightly smaller loop-hole for escape is found close to the trunk. Moss forms a soft lining inside. The outer part consists of twigs of various thicknesses, intertwined. Brehm says this squirrel especially likes to use the firm bottom of a forsaken crow's nest, filled with earth and clay, as a base upon which to construct a nest of its own.

A famous naturalist, describing this little creature, says that it is one of the principal ornaments of a forest. In quiet, fine weather it is incessantly active, keeping as much as possible to the trees, which at all times afford it food and cover. Occasionally it will deliberately descend a tree, run to another tree and climb that; doing this often in pure playfulness; for it need not touch the ground at all, unless it wishes to do so. He calls it the monkey of the woods of temperate climes, and it is possessed of many attributes which remind one of that capricious inhabitant of the warmer zone. There are probably few mammals which are possessed of such constant briskness and remain for so short a time in the same place as the squirrel does in tolerably fair weather. It is ever going from tree to tree, from top to top, from branch to branch; and even on the ground it is anything but clumsy or out of place. It never walks or trots, but always proceeds in longer or shorter bounds, and so quickly that a dog can hardly overtake it, and a human being has to give up the pursuit after a short time. "It glides up even the smoothest trees with wonderful ease and speed. The long, sharp claws on the toes stand it in good stead, for it hooks them into the bark, all four feet at once. Then it takes a running start for another leap and darts further upward; but one bound succeeds another with such rapidity that the ascent proceeds uninterruptedly, and looks as if the creature glided up the tree. Usually it ascends to the top of the tree without pausing, not infrequently reaching the highest

FROM COL. F. KAEMPFE.
A. W. MUMFORD, PUBLISHER, CHICAGO.

EUROPEAN SQUIRREL
Life-size.

point; then it goes out on one of the horizontal branches and generally jumps to the tip of a branch of another tree, covering in these jumps distances of four or five yards, always in a downward direction. How necessary the bushy tail is for leaping has been demonstrated by cruel experiments, which consisted in cutting off the tail of some captive squirrel. It was then seen that the mutilated creature could not leap half so far as one having a tail. The squirrel is an excellent swimmer, though it does not go into the water willingly."

The squirrel eats fruit or seeds, buds, twigs, shells, berries, grain, and mushrooms. The seeds, buds, and young shoots of fir and pine trees form its principal food. It bites pine cones off at the stem, comfortably sits down on its haunches, lifts the cone to its mouth with its forepaws, and turning it constantly around, it bites off one little scale after another with its sharp teeth, until the kernel is reached, which it takes out with its tongue. Hazel nuts are a favorite dainty with it. Bitter kernels, like almonds, for instance, are poison to it; two bitter almonds are sufficient to kill it.

When food is abundant the squirrel lays by stores for less plenteous times. In the forests of southeastern Siberia it stores away mushrooms. "They are so unselfish," says Radde, "that they do not think of hiding their supply of mushrooms, but pin them on the pine needles or in larch woods on the small twigs. There they leave the mushrooms to dry, and in times of scarcity of food these stores are of good service to some roaming individual of their kind."

Four weeks after the breeding-season the female gives birth to from three to seven young, in the softest, best located nest; the little ones remain blind for nine days and are tenderly nurtured by the mother. After they have been weaned the parents leave the young to their fate. They remain together for a while, play with each other and soon acquire the habits of their parents. By June it is said the female has another family, and when they also are so far grown up that they can roam around with her, she frequently joins her first litter, and one may see the entire band, sometimes consisting of from twelve to sixteen members, gamboling about in the same part of a wood.

The squirrel is a very cleanly animal, licking and dressing its fur unceasingly.

The finest squirrel skins come from Siberia, and the farther east they are procured the darker and more valuable they are. The back and under part of the furs are used separately. Russia and Siberia annually furnish from six to seven million skins, valued at about one million dollars. Most of these skins are manufactured in Russia and exported to China. Besides the skins, the tails are employed as boas, and the hair of the tail makes good painters' brushes. The flesh is white, tender, and savory, and is much esteemed by epicures.

"IN ORDERS GRAY."

E. F. MOSBY.

VERY demure is the soft gray of the catbird's garb, but under it is hidden a spirit ever ready for frolic and fun. His liquid, shining eyes are very innocent, yet they are full of mischief. He always looks to me as if he had a secret—one, however, that he is willing to share with any friendly looker-on. Not even the chat takes a more genuine delight in sport. Hide-and-seek is a favorite game with the whole tribe, and in their shadowy gray, how they glide through the branches and lurk in the thick

The beautiful is as useful as the useful.—*Victor Hugo.*

AND ALL

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BIRDS AND ALL NATURE

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EDITED BY C. C. MARBLE.

ILLUSTRATED BY COLOR PHOTOGRAPHY.

203 Michigan Avenue, Chicago, Ill.

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MONTHLY—SEPTEMBER TO JUNE.

Illustrated by Color Photography.

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COLORED PLATES FOR NOVEMBER.

Lady-Slipper.
Tea.
Towhee.
Canary.
S. Carolina Paroquet.
Chipmunk.
Peach.
Common Minerals and Valuable Ores.

COLORED PLATES FOR DECEMBER.

Narcissus.
Coca.
Red Tailed Hawk.
Red Breasted Nut-hatch.
Lyre Bird.
Cow Bird.
Wild Cat.
Black Squirrel.

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"I believe this is the best book on bird study ever written. I have been all through it and found it the most original aud instructive book I know."

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Office of

Board of Education,

HERBERT B. HAYDEN, SUPT.

COUNCIL BLUFFS, IOWA, Oct. 8, 1898.
W. E. WATT, President.

DEAR SIR—It is indeed a pleasure to bear testimony to the educational value of so beautiful a production as the *CHARTS OF NORTH AMERICAN BIRDS*, issued by the Nature Study Publishing Co., of Chicago.

We have recently ordered a supply of these Charts for the Schools of this city. Our teachers are already finding them a most inspiring basis for Nature Study and Language work.

They inspire a love for the birds and through this, a love for all Nature. The children are eager to tell about the birds with which they are acquainted and are very ready to look up information concerning those that are new to them. All this adds a new spirit and zest to the Language work in those rooms in which the Bird Charts have been used. As a basis for Information Lessons they are also of great value.

The color-photography process gives us the most beautiful representation of our North American birds of which I know. I consider the set invaluable. Cordially given,

HERBERT B. HAYDEN,
Supt. City Schools.

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I am in receipt of the CHART mentioned in your letter, and it is indeed beautiful. Every bird lover should render you the gratitude of his heart that your Company has done such wonderful things in this line. I wish that every school in the land might have a copy.

Very sincerely yours,
Mexico, Mo. JAMES NEWTON BASKETT.

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Yours very truly,
Oberlin, Ohio. LYNDS JONES.

NATURE STUDY PUB. CO.,
203 Michigan Ave., Chicago.

1726 N St., Washington, D. C.
October 29, 1898.

NATURE STUDY PUB. CO.,
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Yours truly,
DR. ELLIOTT COUES,
Editor of *Osprey*.

Joliet, Ill., Nov. 9, 1898.

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