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BIRDS AND ALL NATURE.

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THE TUFTED TITMOUSE.

(*Parus bicolor.*)

LYNDS JONES.

HOW vividly a first meeting with some interesting species rests in the memory of the bird-lover! It was at the evening twilight of October 14, 1886, that a strange whistle rang through that gem of woods near Grinnell, Iowa, which has witnessed the birth of more than one passion for bird study. Soon the busy gleaner came to inquire after the intruder on his chosen feeding grounds, evidently looking for a suitable resting-place for the night while taking his evening lunch. The voice, the actions, the appearance, all were new to me, and every movement was watched with breathless interest lest the next flight should take the bird away beyond recall. At last he settled in a green-briar tangle, carefully stowed himself away beneath a huge linden leaf, whistled once or twice, and was ready for the coming darkness.

Never before nor since have I seen the tufted tit in that Iowa grove, but he is one of the common resident birds at Oberlin, Ohio. Northern Ohio is about the northern limit of his range, which extends into northern New Jersey and southern Iowa, possibly the southern half of Iowa. He ranges west to the eastern border of the plains, occasionally found as far north as Minnesota and well into Michigan, and is found breeding even to the Gulf of Mexico southward. He appears to be resident wherever found, but no doubt a few venturesome individuals may wander farther north than the usual range.

One can hardly mistake the tufted tit for any other bird, for he is very noisy the most of the year, the exceptions being the coldest part of mid-winter and during the breeding season, for his songs or whistles are peculiar to him. True, his chick-a-dee-dee closely resembles the chickadee's song to the uninitiated, but the clearly whistled *pe-to*, *pe-to*, *pe-to*, or *ee-to*, *ee-to*, *ee-to*, or *pe-ter*, *pe-ter*, or *pe-ter*, *e-ter*, *e-ter* will at once discover him. It is well worth one's while to write out the many different variations that may be heard proceeding from one bird. Another favorite one, judging from the frequency of its use, is: *Pe-dl'*, *pe-dl'*, *pe-dl'*, or *te-dl'*, *e-dl' e-dl'*, and occasionally this: *Chee-pa*, *chee-pa*, *chee-pa*. In short, he seems to have a song to suit every occasion.

Like the chickadee, he delights in scrambling about the trees in the most reckless fashion, hanging head down as handily as a nuthatch. His crest gives him a more stately air than any of his cousins, but his inquisitiveness is equal to all combined. One cannot enter the woods but he will be sought out by this active denizen and accompanied hither and thither with not so much as a "by your leave."

His habits seem to vary with locality, or possibly more exactly, with abundance. In this part of northern Ohio, where the species is not more than fairly common, the birds rarely enter the villages, and they nest almost exclusively in the woods. I am informed that farther south and west they are often seen in villages, and nest there in boxes provided, as well as in the woods.

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The nest is placed within a box or hollow in a tree, a deserted woodpecker's hole being preferred, where leaves, strips of bark, feathers, hair, or almost any soft, warm materials are arranged carefully, the coarser material outward, the finer and warmer inside. The eggs range from five to eight in number, and are creamy white, rather coarsely and evenly marked with shades of rufous brown. They average about $.73 \times .54$ of an inch. It is said that the male bird never assists in building the nest, but sings to cheer his mate, thus revealing the whereabouts of the nest.

While the northern Ohio woods are incomplete without a company of these cheerful birds, I have looked in vain for them during the early summer months in some years. In winter they range the woods for food, penetrating to every portion of it, stowing themselves away in some warm hollow in a tree at night, but in the nesting season they are confined to the region of the nest, and so are not readily seen.



FROM COL. F. M.
WOODRUFF.

TUFTED TITMOUSE.
10/11 Life-size.

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EPITAPH ON THE HARE.

Here lies, whom hound did ne'er pursue,
Nor swifter greyhound follow,
Whose foot ne'er tainted morning dew,
Nor ear heard huntsman's halloo.

Old Tiney, surliest of his kind,
Who, nursed with tender care,
And to domestic bounds confined,
Was still a wild Jack hare.

Though duly from my hand he took
His pittance every night,
He did it with a jealous look,
And, when he could, would bite.

His diet was of wheaten bread,
And milk, and oats, and straw;
Thistles, or lettuces instead,
With sand to scour his maw.

On twigs of hawthorn he regaled,
On pippin's russet peel,
And, when his juicy salads failed,
Sliced carrot pleased him well.

A Turkey carpet was his lawn,
Whereon he loved to bound,
To skip and gambol like a fawn,
And swing his rump around.

His frisking was at evening hours,
For then he lost his fear,
But most before approaching showers
Or when a storm was near.

Eight years and five round rolling moons
He thus saw steal away,
Dozing out all his idle noons,
And every night at play.

I kept him for his humor's sake,
For he would oft beguile
My heart of thoughts that made it ache
And force me to a smile.

But now beneath his walnut shade
He finds his long last home,
And waits, in snug concealment laid,
Till gentler Puss shall come.

He, still more aged, feels the shocks
From which no care can save,
And, partner once of Tiney's box,
Must soon partake his grave.

—*Cowper.*

A TRANSIENT BOARDER.

C. S. COOK.

WHEN I came down stairs in the morning I found him in possession of the premises. I watched him for a few minutes with much interest. I had not before seen a California wren, and found him very different in appearance and conduct from the eastern wrens with which I was acquainted. "Wrensie" was very self-possessed, and did not appear to resent my intrusion at all. In fact, he seemed disposed to ignore my presence, a fact which led me to judge it best to adopt the same course toward him.

I must explain our situation a little by saying that, as the cottage in which I was living was in a very unfinished condition, the lower floor was not divided by any partitions, the kitchen in the L and the front room forming one large room.

The weather being warm, and the walls open, the flies were very numerous in the room, a fact evidently keenly appreciated by the little fellow, for, as I proceeded to sweep the whole house he did not allow his industry to be seriously interfered with. While I was busy in the attic he was not idle down stairs; while I was regulating the front room he was picking up things in the kitchen. When I approached him too closely he would quietly slip out of doors through one of the numerous openings about the floor, or perhaps go up into the attic which was very accessible to him. He rarely remained out of doors more than a few minutes at a time. A forenoon of house-cleaning would seem more favorable to an estrangement than to a rapprochement; yet while I was at dinner I felt something upon my foot. Looking under the table I saw Wrensie perched upon my shoe. While I watched him he jumped up on a fold of my trousers, apparently thinking it a better point of observation. He was not disturbed by my interest nor by my motions at the table. He never seemed to mind ordinary motions even when he was very near. With other birds I have considered entire quiet necessary under such circumstances.

I maintained my policy of manifesting no concern as to Wrensie's movements, merely abstaining from making any very sudden or rapid motions which would be likely to startle him. With this single exception I went about all work freely. While I would have been glad to cultivate his acquaintance, quickly, I thought it better not to try to do so. The universal method of winning favor in the eyes of such strangers is to feed them; but Wrensie would have nothing but live game, and no kitchen delicacy received a moment's attention. Fortunately, however, there was little need of studying to win his confidence, as but little encouragement was necessary. He was afraid of nothing; not from innocent ignorance by any means, but from complete self-confidence. He was not defiant, but intrepid. This confidence was not gained by observing that he was not molested, but had its source in the spirit of the bird, as shown by the fact that there was little difference in his demeanor during the six days he was with me.

The next day a mason came to the ranch to see about a proposed fireplace and chimney. As we stood talking over the matter, one on each side of a small table, my little boarder came and made a thorough search for game among the various articles on the table. While working in the kitchen I often found him at my feet, several times even between them as I stood at the stove or table. This was a position of such danger to him that I felt obliged to be very cautious in my movements. Occasionally he would perch on my shoulder or head, never staying very long but never betraying any distrust.

It was most entertaining to watch him in his pursuit of game. As a hunter he was full of resources, untiring in his efforts, insatiable in his appetite. When he saw a fly on the floor or table near him he would slowly and stealthily approach, his little black eyes snapping, his frontal feathers depressed so as to give him a vicious look, and often with his wings trembling with excitement as he held them slightly loosened at his sides. When he judged himself near enough he would make a little run and try to snap up his victim. This method of stalking, though much used, was the least successful of his hunting expedients, a large majority of the flies escaping.

When in a favorable locality he would sometimes keep quiet for a time—that is, relatively quiet—as quiet as a small bird can be expected to remain, ready to seize any impudent flies that came within the reach of his bill, which would snap on them with a loud sound. He was most skillful at this, making the quickest motions conceivable. Although these snap shots were very successful, the flies rarely came past in sufficient numbers to satisfy him long, and he would soon set out to hunt up his game.

Then there was the full chase. It was not now a matter of a little dash on foot, but a full flight after a big blue-bottle fly which can dart through the air like a bullet. Back and forth they go with a great rush and much dodging. When caught, these big flies made a large mouthful for the victor. He would light on the floor and proceed to swallow his prey. This usually required several efforts. Watching him called to mind one's own experiences with big gelatine capsules. With the final and successful effort Wrensie's eyes would close with a distressed look as the fly went down his throat.

Flies were often to be found floating on the surface of the water in a large water pail. This fact did not long escape Wrensie's eye, and he made his round to this trap with much regularity. When the pail was well filled with water he could reach the flies with comparative ease; but when the water became low this became a most difficult matter. He did not fly down to get them, but would reach down while hanging to the edge of the pail. Often repeated trials were necessary. It

was surprising to see to what a distance he could stretch himself in these efforts. Holding on to the edge always, he would swing himself down, stretch his neck to the utmost, and then, just as he was on the point of falling into the water, with a quick flutter of his wings he would raise himself to the top again, never relinquishing his hold on the rim. In this way he would pick up flies at the center of the pail when it was not half filled with water, which, in view of the small size of the bird, was an acrobatic feat.

Then there was the battue. When he approached a window thickly covered with flies a scene of the wildest excitement followed. Wrensie would dash into the melee, afoot or a-wing as it happened, his bill snapping faster than a repeating rifle. The slaughter would be continued until the remaining flies were dispersed, which soon came to pass.

Even the still hunt was not without interest. No setter ever worked the ground more faithfully. Every nook and corner of the house was examined for moths. Moreover, every article was scrutinized, and, when possible, he looked beneath and within. A pair of working gloves lay upon the floor. Wrensie unhesitatingly went in, disappearing entirely and remaining long enough to put his head into every finger—which he may, or may not have done. It interested me much to note that in such explorations his assurance was complete. In this kind of delving I was prepared to see some hesitation in my presence. It seemed to me that when I was standing by him it would be only reasonable caution on his part to remain where he could keep his eyes on me. But he never seemed to watch me; and gave me numerous opportunities to capture him, as he would disappear in a dish or in some hole, and remain for some time. He never hesitated in this, nor did he seem to scrutinize his surroundings before going out of sight.

Wrensie was not only persistent and thorough in his search for moths in dark corners, but determined as well. He would crowd himself into openings so narrow that he would have to back out after concluding the search. One day he undertook to pass between two cans on a shelf. He made a strong effort, but so narrow was the passage that he could not push his way in; his wings were too prominent. He backed away a few steps and looked at the crack a moment with his head cocked on one side. Then quickly stepping up to it, he stood on one leg, turned his body up edgewise, and squeezed through.

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Perhaps as good an example as I can give of Wrensie's fearlessness is to describe his behavior one day when I had some work to do on the outside of a window. I stood on a staging just in front of the window, and was engaged in driving nails in the window casing. This hammering made a great noise, shaking the loose sash sharply. Wrensie was busily engaged catching flies on the inside of the window, standing on the top of the lower sash; that is, at the middle of the window. All my motions, all the noise and the jar failed to frighten him away, although at times he looked at me pretty sharply.

While so courageous in most ways, still Wrensie had his ideas of caution. Upon my return to the house after a short absence he would usually leave the room abruptly, either going out of doors or up into the attic. Even if I came in very quietly, taking precautions not to disturb him, the result was the same. This conduct always seemed to me a curious fact, and an inconsistency which I could not explain.

Clever and interesting as he was, Wrensie had his shortcomings. His disposition was not that of the typical bird: "Sweetness and light" were not his. In his spirit was none of the exuberant joy of the great songsters, nor any of the bonhommie of happy-go-lucky sparrows. During the whole term of our acquaintance not a sound left his throat! In complete silence did he pursue his vocation. A perfect helpmate, but a faulty companion. A very practical sort of bird he was, full of activity, but without vivacity. Can it be that the spirit of our industrial age is so pervasive that even the birds are unable to escape its influence? It would seem that evolution has produced the utilitarian and "strictly business" type of character among them.

One day there was a noisy flutter of wings at the door, and the harsh cry of the butcher-bird was heard. On stepping out I saw feathers floating in the air. I concluded that I would see no more of my little companion and helper. The blue-bottle fly was avenged.

THE SQUIRREL'S USE OF HIS TAIL.

BY JAMES NEWTON BASKETT, MEXICO, MO.

OF COURSE every one who has had a pet squirrel has noticed what an important thing his tail seems to be to him. When he makes his toilet he usually ends by bringing the hairy brush around and apparently wiping his face with it, as though it were his towel. But I suspect that he is as much concerned, even here, about the care of his tail as about the cleanliness of his features, for Bunny's beauty, like that of some others, lies as much in his train as in his countenance. One use, therefore, of the squirrel's tail is to make him look pretty. I think, at least, no one can see him put it into such graceful curves along with his delightful postures without feeling that he is posing for esthetic effect.

Still, a little study of his ways may make us think that there is a more practical purpose even in this feature of his tail's use. We had a pet squirrel in the house recently—one of the western fox species or variety. He had become quite tame in his cage before he was released in my study. At intervals I had him brought in, and we usually romped together at least once a day.

At first everything was so new and strange to him that he was very shy and must go about investigating. I noticed that, as he approached anything which he feared might prove dangerous, he always projected his tail over his back far forward—sometimes feeling the object with the extreme hairs before touching it with his nose. He annoyed me greatly by tearing the wall paper from a certain angle. One day I threw a pamphlet so as to strike just above his nose while at his mischief. It frightened him badly, and he suspected that the scare had come out of the wall. But he could not resist the fascination of this sport, and it was interesting to watch him approach and try by all sorts of devices of his tail to see if the enemy were within.

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If he were walking past or around anything that he feared he kept his tail stretched at full length on the side of his body that was next the object—sometimes he held it many inches from himself. If something moved suddenly in front of him as he ran, his tail shot over him away ahead of his nose, as if projected there by his sudden stop. But it was the natural instinct of thrusting his tail at anything threatening him too suddenly for flight. Much of his play at times was a kind of mock fright in which he seemed to imagine himself pursued by all kinds of enemies—even myself—and the most familiar objects becoming terrible. Then the use he made of his tail was most exaggerated, having in it perhaps some of the elements of terrifying the enemy, as seen in the swelled rails of cats, the bristles of hogs, dogs, etc.

One could not resist the impression that the tail was thrown out as a shield or a screen, but this did not always seem a satisfactory explanation, for it was certainly a very frail thing and very conspicuous. Besides, it would seem to furnish the enemy a good handle to catch hold of.

The theory has been advanced that this last is the very purpose of this use of the tail; and from my study of this pet I became convinced that he thrust out his tail when suddenly surprised in the hope that *it* might be taken and his body *left*. The skin on the tail of most rodents (of which the squirrel is one) slips easily from the bone, and leaves, to a grasping enemy, often a little bunch of "hide and hair." So Bunny offers this—feeling that he would rather leave his tail in jeopardy and go into life whole otherwise. The glass-snake (a lizard) in its efforts to escape, frequently *breaks off* a portion of its tail, which the pursuing enemy may stop to capture while the body wriggles into safety.

This, likewise, is doubtless one of the reasons why the squirrel insists upon the tail's being always curled up over his back while he is absorbed in eating. It is not always merely a beautiful pose. As he thus sits in the trees his greatest enemies are the various large birds of prey which may dart down on him from above. Now, this mass of tail that is above him is apt to mislead the aim of the enemy, and, like the pioneer's cap thrust around the tree, is intended to draw the fire into a harmless medium.

There can be no doubt that a squirrel uses his tail to steer him in a leap, much as the tail steers the boy's common kite. Perhaps, also, it acts slightly as a balance, but in this respect its greatest use must lie in its "up and down" rudder effect—or rather parachute-like effect—as he makes those tremendous leaps from a tall treetop to the earth.

Here it comes well into play in lessening the shock of alighting, an emergency enabling him to escape some enemies—as a weasel or mink, perhaps—which may chase him around in the trees.

The arrangement of the long hairs, projecting out sidewise on the bone, is strikingly like that of the feathers on the tail of the very earliest reptile-like birds which had long bony tails, used doubtless as the squirrel's, since they were down-sailers rather than up-flutterers—if I may be allowed to so compound my words and ideas. Some other downward-leaping mammals have the hairs similarly arranged. Another rodent, the anomalure, which flies down, as a flying-squirrel, by thin membranes, has special horny scales on the under side of its tail either to assist in climbing or to resist slipping down when a tree trunk is grasped.

The squirrel's tail, therefore, is a factor of his safety, as well as a feature of his ornamentation.

Another use which he makes of it is that when he "lies down to pleasant dreams" it forms "the drapery of his couch"—a coverlid for his head and body.



FROM COL. CHI. ACAD.
SCIENCES.

NORTHERN HARE.
 $\frac{1}{3}$ Life-size.

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THE NORTHERN PRAIRIE HARE.

THIS is the most northern species of the group of hares (*Lepus campestris*), familiarly known in the United States as jack rabbits because of their large size and enormous ears. They are lively animals of astounding jumping powers. In America there is no such distinction between the term "hare" and "rabbit" as there is in Europe, where the large, long-eared, stout varieties, living in shallow "forms," are named hares, and the smaller and more slender kind, which digs a deep burrow, is the "rabbit." In this country the authorities say that no well-defined distinction exists. Of the so-called jack rabbits the northern prairie hare here depicted may be taken as the type. It is one of the largest species of hares, measuring about twenty inches in length, and it has long, strong, and vigorous limbs, and such remarkably long ears that the popular name it bears is fully justified.

This northern species is found on the western prairies from British America to Colorado. It undergoes a winter change of coat, becoming nearly white, but the blanching is never complete and russet streaks or patches remain through the winter. The habits of this animal are those of hares in general, and all the species known as jack rabbits are famous for their great speed and for the astounding leaps they make in running. They are the most fleet and agile of American mammals. They are not much pursued for the reason that they are difficult to shoot, and their celerity of movement enables them to elude four-footed foes also. Pending the complete change from the summer brown to the snowy-white coat of winter, the animal presents a very singular mottled appearance.

Hares are a very important article of commerce and, during the winter season, tons of them are daily shipped to the principal markets from all quarters. They are sold at cheap rates, and are frequently peddled about the streets by the cartload at surprisingly low figures.

The methods of pursuit and capture of these animals are numerous, but the most common and successful are trailing in the snow with dogs, hounding, and coursing. To trail hares in the winter one must have dogs of keen scent and a light fall of from two to four inches of snow must have been deposited the night previous to an early morning start. Two or more hunters equipped with dogs and guns usually start together. Thickets of elder and blackberry are sought where the game is known to lie. The hunters skirt the border of a patch of these bushes and the dogs are sent in. The dogs soon drive the hares from cover when they become a ready mark for the gunners. Where the ground is rocky they will try to hide by running into any hole or crevice which may offer protection. In hounding hares the hunters are stationed at various points on the paths as the hares, like deer and foxes, follow regular beaten tracks. The hounds start the game from belts of pine, cedar, or hemlock. Each hunter waits for the animals to pass his station and fires at them as they go by at full run. It is considered no mean accomplishment to secure a hare under these circumstances. Trapping and snaring are also methods of capturing jack rabbits. They are principally employed by pot hunters, and many people make it their sole business during the winter months. Greyhounds are used in coursing hares, but the jack rabbit frequently discomfits both horse and hound. Hares do not live in burrows, as is the case with the rabbit, but lie in a form in bush or thicket, a slight depression in the ground serving for a nest, or sometimes a hollow stump, or the under side of a ledge of rock is selected. The young, when born, are covered with hair, their eyes are open, and they are able almost immediately to support themselves. The rabbit, on the other hand, is born with closed eyes, and requires the constant attention of the mother for some time. The hares are not so prolific as the rabbits, the female bringing forth but from three to five young at a litter, the rabbits bearing from five to eight.

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Hares generally feed at night, lying in their forms in some bush or copse during the greater part of the day; rabbits, on the contrary, generally remain in the warmest corner of the burrow during the dark hours. The food of the hare consists of all kinds of vegetables similar in nature to cabbage and turnips, which are favorite dainties with it; it is also especially fond of lettuce and parsley.

The great speed of the hare in running is chiefly due to the fact that the hind legs are longer than the fore. This is also the reason why it can run better up hill than down. Generally it utters a sound only when it sees itself in danger. This cry resembles that of a little child, being a shrill scream or squeak.

Among the perceptive senses of the hare, hearing is best developed; the smell is fairly keen, but sight is rather deficient. Prudence and vigilance are its most prominent characteristics. The slightest noise—the wind rustling in the leaves, a falling leaf—suffices to excite its attention and awaken it from sleep. Dietrich Aus Dem Winckell says that the greatest vice of the hare is its malice, not because it expresses it in biting and scratching, but because it often proves its disposition in the most revolting manner, the female by denying her maternal love, and the male by his cruelty to the little leverets.

It is said that captive hares are easily tamed, become readily used to all kinds of nourishment usually fed to rabbits, but are very delicate and apt to die. If they are fed only on hay, bread, oats, and water, and never anything green, they live longer. A tame hare, in the possession of Mr. Fuchs in Wildenberg, which slept and ate with his dogs, ate vegetable food only in default of meat—veal, pork, liver, and sausage causing it to go into such raptures that it would execute a regular dance to get at these dainties.

Besides the flesh, which as food is justly esteemed, the fur of the hare is also put to account. The

skin is deprived of its hair, tanned and used in the manufacture of shoes, of one kind of parchment, and of glue; the hair is used in the manufacture of felt.

Mark Twain, in his "Roughing It," gives this humorous and characteristic description of the jack rabbit:

"As the sun was going down, we saw the first specimen of an animal known familiarly over two thousand miles of mountain and desert—from Kansas clear to the Pacific ocean—as the 'jackass-rabbit.' He is well named. He is just like any other rabbit, except that he is from one-third to twice as large, has longer legs in proportion to his size, and has the most preposterous ears that ever were mounted on any creature but a jackass. When he is sitting quiet, thinking about his sins, or is absent-minded, or unapprehensive of danger, his majestic ears project above him conspicuously; but the breaking of a twig will scare him nearly to death, and then he tilts his ears back gently, and starts for home. All you can see then, for the next minute, is his long form stretched out straight, and 'streaking it' through the low sage-bushes, head erect, eyes right, and ears just canted to the rear, but showing you just where the animal is, just the same as if he carried a jib. When he is frightened clear through, he lays his long ears down on his back, straightens himself out like a yardstick every spring he makes, and scatters miles behind him with an easy indifference that is enchanting. Our party made this specimen 'hump himself.' I commenced spitting at him with my weapon, and all at the same instant let go with a rattling crash. He frantically dropped his ears, set up his tail, and left for San Francisco at lightning speed. Long after he was out of sight we could hear him whiz."

C. C. M.

DESTRUCTION OF BIRD LIFE.

STEPS have been taken under the direction of the New York zoölogical society to ascertain, as nearly as possible, to what extent the destruction of bird life has been carried in this country and the result of the investigation is given in its second annual report, recently published. Replies to questions on the subject were received from over two hundred competent observers in the different states and territories, and the following table is believed to give a fair, certainly not exaggerated, idea of the loss of bird life within the past decade and a half.

The following are the percentages of decrease throughout the states mentioned, during the last fifteen years, according to the reports:

Maine	52 per cent.
New Hampshire	32 per cent.
Vermont	30 per cent.
Massachusetts	27 per cent.
Rhode Island	60 per cent.
Connecticut	75 per cent.
New York	48 per cent.
New Jersey	37 per cent.
Pennsylvania	51 per cent.
Ohio	38 per cent.
Indiana	60 per cent.
Illinois	38 per cent.
Michigan	28 per cent.
Wisconsin	40 per cent.
Iowa	37 per cent.
Missouri	36 per cent.
Nebraska	10 per cent.
North Dakota	58 per cent.
District of Columbia	33 per cent.
South Carolina	32 per cent.
Georgia	65 per cent.
Florida	77 per cent.
Mississippi	37 per cent.
Louisiana	55 per cent.
Texas	67 per cent.
Arkansas	50 per cent.
Montana	75 per cent.
Idaho	40 per cent.
Colorado	28 per cent.
Indian Territory	75 per cent.
General Average	46 per cent.

At least three-fifths of the total area of the United States is represented by the thirty states and territories above named, and the general average of decrease of bird life therein is 46 per cent. These figures are startling indeed and should arouse everyone to the gravity of the situation which confronts us. It requires but little calculation to show that if the volume of bird life has suffered a loss of 46 per cent. within fifteen years, at this rate of destruction practically all birds will be exterminated in less than a score of years from now.

WE BELIEVE IT.

THERE is no being so homely, none so venomous, none so encased in slime or armed with sword-like spines, none so sluggish or so abrupt in behavior, that it cannot win our favor and admiration—the more, the better we know it. However it may be in human society, with the naturalist it is not familiarity which breeds contempt. On the contrary, it has been said, with every step of his advancing knowledge he finds in what was at first indifferent, unattractive, or repulsive, some wonder of mechanism, some exquisite beauty of detail, some strangeness of habit. Shame he feels at having so long had eyes which seeing saw not; regret he feels that the limits of his life should be continually contracting, while the boundaries of his science are always expanding; but so long as he can study and examine, he is so far contented and happy.

THE PINEAPPLE.

THIS tropical fruit is so-called from its resemblance in form and appearance to the cones of some species of pine. Its botanical name in most general use is *Ananassa sativa*, but some botanists who do not regard it as distinct from *Bromelia*, call it *B. ananas*. The *Bromeliaceæ*, to which it belongs, are a small family of endogenous plants, quite closely related to the canna, ginger, and banana families, and differing from them in having nearly regular flowers and six stamens, all perfect. As the pineapple has become naturalized in parts of Asia and Africa, its American origin has been disputed, but there is little doubt that it is a native of Brazil, and perhaps some of the Antilles, now a part of the domain of the United States. This fruit is a biennial, with the habit of the Aloe, but with much thinner leaves. In cultivation it early produces seeds but, in ripening, the whole flower cluster undergoes a remarkable change; all parts become enormously enlarged, and when quite ripe, fleshy and very succulent, being pervaded by a saccharine and highly flavored juice. Instead of being a fruit in the strict botanical sense of the term, it is an aggregation of accessory parts, of which the fruit proper forms but a very small portion.

The first pineapples known in England were sent as a present to Oliver Cromwell; the first cultivated in that country were raised in about 1715, though they were grown in Holland in the preceding century. The successful cultivation of the fruit was early considered one of the highest achievements in horticulture, and the works of a few years ago are tediously elaborate in their instructions; but the matter has been so much simplified that anyone who can command the proper temperature and moisture may expect success.

For many years pineapples have been taken from the West Indies to England in considerable quantities, but the fruit is so inferior to that raised under glass that its cultivation for market is prosecuted with success. The largest fruit on record, as the produce of the English pineries, weighed fourteen pounds and twelve ounces. Better West Indian pineapples are sold in our markets than in those of England, as we are nearer the places of growth.

The business of canning this fruit is largely pursued at Nassau, New Providence, whence many are also exported whole. The business has grown greatly within a few years, and now that the United States is in possession of the West Indian islands, exportations may be expected to increase and the demand satisfied.

More than fifty varieties of the pineapple are enumerated. The plant is evidently very variable, and when South America was first visited by Europeans, they found the natives cultivating three distinct species. Some varieties, with proper management, will be in fruit in about eighteen months from the time the suckers are rooted. The juice of the pineapple is largely used in flavoring ices and syrups for soda-water; the expressed juice is put into bottles heated through by means of a water bath and securely corked while hot. If stored in a cool place it will preserve its flavor perfectly for a year. The unripe fruit is very acrid, and its juice in tropical countries is used as a vermifuge. The leaves contain an abundance of strong and very fine fibers, which are sometimes woven into fabrics of great delicacy and lightness.

Nor is it every apple I desire;
Nor that which pleases every palate best;
'Tis not the lasting pine that I require,
Nor yet the red-cheeked greening I request,
Nor that which first beshrewed the name of wife,
Nor that whose beauty caused the golden strife.
No, no! bring me an apple from the tree of life.

C. C. M.



PRESENTED BY LOUIS
G. KUNZE.

PINEAPPLE.
½ Life-size.

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CO., CHICAGO.

LITTLE BUSYBODIES.

BELLE P. DOWNEY.

ONE'S own observation tends to confirm the wonderful stories told by naturalists about ants. They have a claim to rank next to man in intelligence.

Seven or eight ants once attempted to carry a wasp across the floor. In the course of the journey they came to a crevice in a plank caused by a splinter which had been torn off. After repeated attempts to cross this deep ravine all the ants abandoned the task as hopeless except one who seemed to be the leader of the enterprise. He went on a tour of investigation, and soon found that the crevice did not extend very far in length. He then went after the retreated ants. They obeyed the summons and returned, when all set about helping to draw the wasp around the crevice. This little incident proves the ant is possessed of the power of communicating its wishes to others. Ants have been seen to bite off the legs of a cockroach in order to get it into the narrow door of their nest. The brain of ants is larger in proportion to their size than that of any other insect. Naturalists think that they have memory, judgment, experience, and feel hatred and affection for their kind. They are valorous, pugnacious, and rapacious, but also inclined to be helpful as they assist each other at their toilet. They have a peculiarity among insects of burying their dead. It is a curious fact that the red ants, which are the masters, never deposit their dead by the side of their black slaves, thus seeming to show some idea of caste.

Ants yawn, sleep, play, work, practice gymnastics, and are fond of pets, such as small beetles, crickets, and cocci, which they entertain as guests in their homes.

Indeed, ants are social, civilized, intelligent citizens of successfully governed cities. Even babies are claimed by the state. Their government is a happy democracy where the queen is "mother" but not ruler, and where the females have all the power. The queen is highly honored and at death is buried with magnificence. In her devotion to her lot in life she pulls off her glittering wings and becomes a willing prisoner in the best room of a house of many apartments. Here she is cared for by devoted followers who polish her eggs, carry them upward to the warmth of the sun in daytime, and back to the depths of the habitation to protect them from the chill of night. These eggs are so small as scarcely to be seen by the eye alone. They are bright and smooth, without any division. It is very strange, but these eggs will not develop into larvæ unless carefully nursed. This is effected by licking the surface of the eggs. Under the influence of this process they mature and produce larvæ. The larvæ are fed, like young birds, from the mouths of the nurses. When grown they spin cocoons and at the proper time the nurses help them out by biting the cases. The next thing the nurses do is to help them take off their little membranous shirts. This is done very gently. The youngsters are then washed, brushed, and fed, after which the teachers educate them as to their proper duties.

It is astonishing how many occupations are followed by these little busy-bodies whose size and weakness are made up for by their swiftness, their fineness of touch, the number of their eyes and a powerful acid which they use in self-defense. Their jaws are so much like teeth that they serve for cutting, while their antennæ are useful for measurement, and their front feet serve as trowels with which to mix and spread mortar. Ants may be said to have the following occupations: Housewives, nurses, teachers, spinners, menials, marauders, soldiers, undertakers, hunters, gardeners, agriculturalists, architects, sculptors, road makers, mineralogists, and gold miners.

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Ants keep cows—the aphides—for which they sometimes build stables and place in separate stalls from the cocci, which they also use. They make granaries where they store ant rice. If the grain begins to sprout they are wise enough to cut off the sprout. If it gets wet they have often been seen carrying it up to the sunshine to dry and thus prevent sprouting. The honey-ant is herself a storehouse of food in case of famine. This kind of ant has a distension of the abdomen in which honey is stored by the workers for cases of need. They inject the honey into the mouth of the ant. When it is needed she forces it up to her lips by means of the muscles of the abdomen. It is said that the Mexicans like to culture honey ants and eat the honey themselves.

The leaf-cutting ant is the gardener. It is devoted to growing mushrooms or at least a kind of fungi of which it is fond. This accounts for the beds of leaves it carries to its nest, on which the fungi develop.

The Roman naturalist, Pliny, gives an account of some ants in India which extract gold from mines during the winter. In the summer, when they retire to their holes to escape the heat, the people steal their gold. McCook has found that we have ants who are mineralogists, as they cover their hill with small stones, bits of fossils and minerals, for which they go down like miners more than a yard deep into the earth.

That some kinds of ants are architects has been clearly proven, for an observer saw an ant architect order his workmen to alter a defective arch, which they did, apparently to suit his views of how arches should be constructed!

The ants who act as sculptors work in wood. The red ants of the forest build storied houses in trees with pillars for support. There is a little brown ant which makes a house forty stories high; half the rooms are below ground. There are pillars, buttresses, galleries, and various rooms with arched roofs. This ant works in clay. If her material becomes too dry she is compelled to wait for moisture.

The blind ant is a remarkable builder. She makes long galleries above ground. She does not use cement as some ants do, so she builds rapidly and her structure is flimsy.

The Saiiva ants of Brazil are skillful masons. They construct chambers as large as a man's head that have immense domes, and outlets seventy yards long. The Brazilians say that the Indians, in cases of wounds, when it was necessary to close them as with stitching, used the jaws of the Saiiva ant. The ant was seized by the body and placed so that the mandibles were one on each side of the cut. Then, when pressed against the flesh, the ant would close the mandibles and unite the two sides of the cut as firmly as a good stitch would do it. A quick twist of the ant's body separated it from the head. After a few days the heads were removed with a knife and the operation was complete.

In view of this we are tempted to say that ants are also *surgeons*, but die themselves instead of having their patients do so!

A friend who has lived long in Brazil tells me that the Saiiva ants are so large the nuns in the convents use their bodies to dress as dolls, making them represent soldiers, brides and grooms, and so forth.

One species of ants do nothing except capture slaves. These are not able to make their own nests, to feed their larvæ, or even to feed themselves, but are so helpless they would die if neglected by their servants. There are three species that keep slaves, but these are not the only ones who go to war, as the usually peaceful agricultural ants sometimes get short of seed and go forth to plunder each other's nests.

It is stated that a thousand species of ants are known. No doubt there is much of interest about each kind. The "Driver Ant" is so choice of time and labor that, when building its covered roads, if a crevice in a rock or a shady walk is reached, it utilizes these, then continues arching its path as before. If a flood comes these ants form into large balls with the weak ones in the middle, the stronger on the outside, and so swim on the water.

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The ant benefits man by acting as a scavenger, by turning up the subsoil, and in various other ways. But flowers prefer the visits of moths and butterflies; as ants are of no service to them in scattering pollen, they do not wish them to get their honey. Some of the flowers have found out that ants, though so industrious by reputation, are lazy about getting out early in the morning for they dislike the dew very much. Hence by 9 o'clock these wary flowers have closed their doors. Others take the precaution to baffle ant visitors by holding an extra quantity of dew on the basins of their leaves, while still others exude a sticky fluid from their stems which glues the poor ants to the spot.

Campanula secretes her honey in a box with a lid. Cyclamen presents curved surfaces, while narcissus makes her tube top narrow. Other flowers have hooks and hairs by which the ants are warned to seek their honey elsewhere.

THE CHARITY OF BREAD CRUMBS.

THE recent "cold wave," which with its severity and length has sorely tried the patience of Denver's citizens, has had its pleasant features. Perhaps chief of these has been the presence in our midst of scores of feathered visitors driven in, doubtless, by pangs of hunger, from the surrounding country.

Flocks of chickadees have flown cheerily about our streets, chirping and pecking industriously, as if to shame those of us who lagged at home because of zero temperature. They were calling to one another as we stood at the window watching them last Saturday morning.

Suddenly, down the street with the swiftness and fury of an Apache band, tore a group of small savages, each armed with a weapon in the shape of a stick about two feet long.

"What can those boys be playing?" inquired someone, and the answer to the question was found immediately as in horror she saw the sticks fly with deadly exactness into a group of the brave little snowbirds, and several of them drop lifeless or flutter piteously in the frozen street.

"How can boys be so heartless!" said the lady, rising in righteous wrath to reason with them.

"Thoughtless is nearer the truth," remarked a friend who had witnessed the scene. "Their hearts haven't been awakened on the bird question and it would be better to try and stir up their mothers and teachers than to fuss at the boys themselves."

But the Denver birds have plenty of friends and this has been proved many times during the past week.

At the surveyor-general's office Saturday morning there was held a large reception at which refreshments were served and the guests were largely house finches—small, brown birds with red about their throats. For a number of seasons the ladies and gentlemen employed there have spread a liberal repast several times each day upon the broad window ledges for these denizens of the air. The day being very cold, someone suggested that perhaps if the window were opened and seed scattered inside also, the birds would come in and get warm.

The feast was arranged with bits of apple, small cups of water, and a liberal supply of seed. And the invitation was accepted with alacrity. A swarm of busy little brown bodies jostled and twittered and ate ravenously of the viands provided, while thankful heads were raised over the water cups to let that cool liquid trickle down thirsty throats. It was a lovely sight and everyone in the room kept breathlessly still, but at last some noise outside alarmed the timid visitors and they whirred away in a small cloud, leaving but a remnant of the plenteous repast behind.

Several of the tiny creatures becoming puzzled flew about the room in distress, trying to get away, and one little fellow bumped his head violently against a glass and fell ignominiously into a spittoon. He was rescued and laid tenderly on the window sill to dry, a very bedraggled and exhausted bit of creation. It was interesting to watch the effect of this disaster upon every one in the office, including Mr. Finch himself.

Gentlemen and ladies vied with each other in showing attentive hospitality to the injured guest. He had his head rubbed and his wings lovingly stroked, and being too ill to resent these familiarities, he soon became accustomed to them. He was finally domiciled in a small basket and grew very chipper and tame indeed before his departure, which was after several days of such luxury and petting as would quite turn the head of anything less sensible than a finch.

It is said the gentleman who makes these birds his grateful pensioners buys ten pounds of seed at a time, and another gentleman and his wife, who reside at the Metropole, deal out their rations with so lavish a hand that their windows are fairly besieged with feathered beggars clamoring for food.

In a neighbor's yard I noticed always a small bare spot of ground. No matter how high the snow might drift around it, this small brown patch of earth lay dark and bare.

"Why do you keep that little corner swept?" I inquired.

"Oh, that is the birds' dining-room," was the answer, and then I noticed scraps of bread and meat and scattered crumbs and seeds. And as many times as I may look from my windows I always see from one to five fluffy bunches at work there stuffing vigorously.

Many of our teachers have made the lot of our common birds their daily study and delight. In the oldest kindergarten in the city the window sills are raised and the birds' food scattered upon a level with the glass, so that every action of the little creatures can be watched with ease by the children within.

In numbers of homes and in many of our business offices the daily needs of our little feathered brothers are thoughtfully cared for.

Let this feeling grow and this interest deepen in the hearts of Denverites, especially in the children's hearts. It will make this city a veritable paradise as the summer approaches, "full of the song of birds." It will make of it a heaven in the course of time, for not only the humble finch and snowbird, but for nature's most beautiful and aristocratic choristers.

"To-day is the day of salvation." To-day is the very best day of the best month in which to consider

the needs of these poor which, thank God, "we have always with us."—*Anne C. Steele, in Denver Evening Post, Feb. 3, 1899.*

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FROM COL. CHI. ACAD. SCIENCES. HOODED MERGANSER. 3/7 Life-size. COPYRIGHT 1899, NATURE STUDY PUB. CO., CHICAGO.

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THE HOODED MERGANSER.

(*Lophodytes cucullatus*.)

LYNDS JONES.

EVEN the merest tyro in bird study need have no fear of confusing the male of this species with any other bird, as a glance at the picture will make evident. No other bird can boast such a crest, and few ducks a more striking pattern of dress or a more stately manner. The species inhabits the whole of North America, including Cuba, occasionally wandering to Europe and rarely to Greenland. It is locally common and even abundant, or used to be, in well watered and well wooded regions where fish are abundant, but seems to be growing less numerous with the advance of settlements in these regions. The food consists of fish, mollusks, snails, and fresh water insects which are obtained by diving as well as by gleaning.

The winter range of this "fish duck" is largely determined by the extent of open water on our lakes and streams. Thus it is regularly found in Minnesota wherever there is open water, even during the severest winters, but under other conditions it may be absent from regions much farther south. There can be little doubt that a large proportion of the individuals pass the winter well south, only a few being able to find subsistence about the springs and mouths of streams in the northern states.

Is it entirely due to individual taste, or may it be a difference in the food habits of these birds in different parts of the country that their flesh is highly esteemed in some regions but will scarcely be eaten at all in others? If it is true that the Michigan individuals eat snails, crabs, and mollusks rather than fish, and are therefore excellent for the table, while the California ones prefer fish and are therefore not fit for food, why have we not here a clear case of tendency to differentiation which will ultimately result in a good sub-species?

The nesting of the hooded merganser is even more erratic than its occurrence. It has been found nesting in Florida as well as in the more northern parts of the country, and here and there throughout its whole range, being apparently absent from many regions during the nesting season. It is unlike the other "fish ducks" in preferring still water and secluded streams, but resembles the wood duck in building its nest a short distance from the water in a hollow tree or stump or on the flat side of a leaning or fallen tree, often forty or more feet from the ground. The nest consists of weeds, leaves, and grasses with a soft lining of feathers and down. This warm nest must be intended to act as an aid to incubation rather than as a warm place for the young ducks, since they, like other ducks, are carried to the water in the beak of the mother-bird shortly after they are hatched. The nest complement ranges from six to eighteen eggs, the average being about ten. The eggs are variously described by different authors, both as regards color and size, from pure white, pearly white, creamy white, buffy white to buff-colored, and from 1.75×1.35 , to 2.25×1.75 inches. The average size is probably nearly 2.10×1.72 .

The downy ducklings are brown in color and, as they skim over the water, their pink feet churning up a spray behind, they present a bewitching picture. The male bird, like other ducks, assumes no share of the labors of incubation, but entertains himself hunting fish in some solitary stream where food is plentiful, and in proper season returns to assume the duties of the head of his lusty family.

The nesting season must necessarily vary greatly with locality. In Minnesota fresh eggs are found during the third week of April, according to Dr. P. L. Hatch. The date would probably be much earlier with the Florida birds. The locality selected for the nest is also variable with the different parts of the country.

The manner of flight of the different species of ducks is usually characteristic to the eye of the careful student. Thus the hooded mergansers fly in a compact flock of about a dozen birds with a directness and velocity that is wonderful. Dr. Hatch says, in his "Birds of Minnesota:" "Once in January, 1874, when the mercury had descended to 40 below zero, while a north wind was blowing terrifically, I saw a flock of six of this species flying directly into the teeth of the blizzard at their ordinary velocity of not less than ninety miles an hour." This may sound rather strong to some, but their flight is certainly very rapid, as any gunner will testify.

The "fish ducks," or mergansers, are an interesting group of three American species, of which the hooded is the smallest. The long, slender, toothed or serrated bill of this group provides a field character which will serve to identify them at a glance. It is to be hoped that their habit of feeding largely upon fish will prove a protection from entire extermination.

THE TRUMPETERS.

The winds of March are trumpeters,
They blow with might and main,
And herald to the waiting earth
The Spring and all her train.

They harbinger the April showers,
With sunny smiles between,
That wake the blossoms in their beds,
And make the meadows green.

The South will send her spicy breath,
The brook in music flow,
The orchard don a bloomy robe
Of May's unmelting snow.

Then June will stretch her golden days,
Like harp-strings, bright and long,
And play a rich accompaniment
To every wild bird's song.

The fair midsummer time, apace,
Shall bring us many a boon,
And ripened fruits, and yellow sheaves
Beneath the harvest-moon.

The golden-rod, a Grecian torch,
Will light the splendid scene,
When Autumn comes in all the pomp
And glory of a queen.

Her crimson sign shall flash and shine
On every wooded hill,
And Plenty's horn unto the brim
Her lavish bounty fill.

—*Andrew Downing.*

CLOVES.

(*Eugenia caryophyllata* Thunberg.)

DR. ALBERT SCHNEIDER,
Northwestern University School of Pharmacy.

Biron—A lemon.
Lang—Stuck with cloves.

—*Shakespeare, Love's Labor Lost, V. 2.*

CLOVES are among our favorite spices, even more widely known and more generally used than ginger. They are the immature fruit and flower-buds of a beautiful aromatic evergreen tree of the tropics. This tree reaches a height of from thirty to forty feet. The branches are nearly horizontal, quite smooth, of a yellowish grey coloration, decreasing gradually in length from base to the apex of the tree, thus forming a pyramid. The leaves are opposite, entire, smooth, and of a beautiful green color. The flowers are borne upon short stalks, usually three in number, which extend from the apex of short branches. The calyx is about half an inch long, changing from whitish to greenish, and finally to crimson. The entire calyx is rich in oil glands. The petals are four in number, pink in color, and drop off very readily. The stamens are very numerous. All parts of the plant are aromatic, the immature flowers most of all.

The clove-tree was native in the Moluccas, or Clove Islands, and the southern Philippines. We are informed that in 1524 the Portuguese took possession of these islands and controlled the clove market. About 1600 the Dutch drove out the Portuguese and willfully destroyed all native and other clove-trees not under Dutch protection. The plan of the Dutch was to prevent the establishment of clove plantations outside of their own dominions, but in spite of their great watchfulness other nations secured seeds and young plants and spread the cultivation of this valuable spice very rapidly. Now cloves are extensively cultivated in Sumatra, the Moluccas, West Indies, Penang, Mauritius, Bourbon, Amboyne, Guiana, Brazil, and Zanzibar—in fact throughout the tropical world. Zanzibar is said to supply most of the cloves of the market.

The cultivation of cloves in Zanzibar is conducted somewhat as follows: The seeds of the plant are soaked in water for two or three days or until germination begins, whereupon they are planted in shaded beds about six inches apart, usually two seeds together to insure against failure. The young germinating plants are shaded by frameworks of sticks covered with grass or leaves. This mat is sprinkled with water every morning and evening. The young plants are kept in these covered beds for nine months or one year, after which they are gradually hardened by removing the mat from time to time, and finally left in the open entirely for a few months, after which they are ready for transplanting.

Transplanting must be done carefully, so as not to injure the roots. The plant is dug up by a special hoe-like tool, lifted up in the hand with as much soil as possible, placed upon crossed strips of banana fibres, which are taken up by the ends and wrapped and tied about the plant. The plant is now carried to its new locality, placed in a hole in the soil, the earth filled in about it, and finally the banana strips are cut and drawn out.

The transplanted clove plants are now carefully tended and watered for about one year, but they are not shaded as during the first year of their existence. Usually many of the transplanted plants die, which makes replanting necessary. This great mortality, it is believed by some, might be reduced very materially by shading the recently transplanted clove-trees for a time.

The clove-tree may attain an age of from 60 to 70 years and some have been noted which were 90 years old and over. The average life of the plantation clove-trees is, however, perhaps not more than 20 years. The trees begin to yield in about five years after planting. The picking of the immature flowers with the red calyx is begun in August and lasts for about four months. From two to four crops are harvested each year. Each bud may be picked singly by hand, but those of the higher branches are more generally knocked off by means of bamboo sticks. After picking the flowers are placed upon grass mats and dried in the sun, this requiring from six to seven days. In the night and during rains they are placed under cover. Drying changes the red color of the calyx to a dark brown. The dried cloves are packed in gunny bags and carried to Zanzibar where an internal revenue of 25 per cent. is paid in cloves. From Zanzibar the cloves are exported in mat bags.

We know that cloves were used by the ancient Egyptians, for a mummy has been found with a necklace of them. The Chinese used them extensively, 226 B. C. Plinius briefly described "Caryophyllon," which, according to some commentators, referred to cloves and according to others to cubebs. Cloves appeared in Europe about 314-335 A. D., evidently introduced by way of Arabia. Emperor Constantine, who ruled about that time made Pope Sylvester of Rome, among other things, a present of 150 pounds of cloves. In Grecian literature cloves are first mentioned about the Sixth century. Trallianus recommended them in stomach troubles and in gout.

The Germans designate cloves as *Gewürznägelein*, which means spice nails, because of their resemblance to a nail, the corolla forming the head and the calyx tube the nail. The aromatic odor and pungent aromatic taste is due to an ethereal oil present in large quantities (18 per cent.) in the calyx tube. This oil is used for various purposes; as a clearing reagent in microtechnique, for toothache, as an antiseptic, stomachic, irritant. It destroys insects and keeps them away. When

freshly extracted its color is pale amber but it gradually assumes a reddish brown coloration. It is one of the least volatile of ethereal or essential oils. It is also used by soapmakers and perfumers.

Cloves are variously used as a spice. They are often stuck into pickled fruits, as peaches, apples, apricots. The opening quotation from Shakespeare suggests such a use with lemons. Some persons acquire an inelegant and undesirable habit of chewing cloves. The pungent oil deadens or benumbs the nerves of taste and touch and the persistent mastication of cloves, is said to produce an excessive development of fibrous tissue of the liver, a condition akin to "nutmeg liver" which shall be referred to in our next paper.

Other parts of the clove-tree are also used occasionally, as for instance the flower stalks known as clove stalks. They possess the odor and taste of cloves but in a lesser degree. Formerly the leaves were also used but it is said that they do not now appear in commerce. The dried fruit known as mother of cloves is used more or less. They contain far less oil than cloves and are comparatively less valuable. Even the wood of the tree has been used as a spice. The dried and ground flower stalk, the fruits and the wood are often used to adulterate ground cloves. We would therefore advise housewives to purchase the cloves and grind them at home. It is reported that cloves have been adulterated with false cloves made from starch pressed into the form of cloves and roasted. It is, however, not at all likely that such a practice is carried on to any great extent. Sometimes cloves are placed on the market from which the oil has been extracted.

The cultivated cloves are richer in essential oil than the native cloves. The Zanzibar cloves are quite large. The principal market varieties are English cloves, Amboyne cloves, Bourbon cloves, Cayenne cloves, Zanzibar cloves, and others.



FROM KEHLER'S
MEDIZINAL-
PFLANZEN.

CLOVE.

EXPLANATION OF PLATE.

A, flowering branch, nearly natural size; 1, floral bud; 2, floral bud in longitudinal section; 3, stamens; 4, pollen grains; 5, ovary in transverse section; 6, fruit, about natural size; 7, fruit in transverse section; 8, embryo; 9, part of embryo.

A VEIN OF HUMOR.

ELANORA KINSLEY MARBLE.

NOT only human beings, it is said, but all other animals of earth, air, and water have their play spells. To the question of how man can know this, one can only say that man being also animal, must certainly understand something of the nature of his lower brethren. Our mental composition is of the same substance as theirs, with a certain superstructure of reasoning faculty, however, which has enabled us to become their masters. The various emotions and faculties, such as love, fear, curiosity, memory, imitation, jealousy, etc., of which man boasts, are to be found, often in a highly developed state, among the lower animals, so that it is not at all surprising that among both birds and mammals we find individual species possessing a more or less keen sense of humor.

The question of why animals play is by no means new to philosophical inquiry. Herbert Spencer says animals play in their early or youthful stage of life because of their "surplus energy," the same reason that we ascribe to the child, referring more particularly to the strictly muscular plays, in contra-distinction to vocal recreation. An eminent philosopher, however, disagrees with him in this, contending that play in animals is not a mere frolicksome display of surplus energy, but a veritable instinct and a matter of serious moment as well as necessity.

However that may be, the fact remains that they do play and, as the writer can aver, in a spirit not at all serious, but with all the happy abandon of a child.

Among the wags of the feathered tribe the mockingbird and blue jay deserve special mention, though the raven, crow, catbird, jackdaw, and magpie may, from the point of mischief, be numbered in the list. In looking at the ungainly pelican one would smile to hear him called a "humorist," but as the seal is the buffoon of the aquarium, so the pelican plays the part of the clown in the zoo. His specialty is low comedy and generally the victims of his jokes are the dignified storks and the rather stupid gulls, companions in captivity. The stork's singular habit of standing on one leg affords the pelican a rare chance for a little fun, so he watches until a stork, in a meditative mood, takes up his favorite attitude beside the tank. Then up waddles the pelican and, with a chuckle, jostles against him, and sends him tumbling into the water. It is a question whether the stork enjoys the sport, but the pelican evidently does, for he leaps about evincing the utmost delight, flapping his wings, and squawking, or laughing, in triumph. The gulls he treats in a different fashion. No sooner does he see one seize a piece of bread, or some dainty contributed by a spectator, than up he rushes with a squawk and prodigious flapping of wings, forcing the gull to take refuge in the water, while he with much satisfaction devours the morsel.

"Our Animal Friends" tells of a pelican who made friends with a tiny kitten. When in a lively mood the pelican, perhaps recalling how his parents, or himself, in a wild state, were wont to catch fish, would pick up the kitten, toss it in the air, and stand with his huge mouth wide open as if intending to catch it as it came down. Puss seemed to consider it excellent fun, as with a quick motion she turned over in the air, alighting every time uninjured upon her feet; then off she would scamper to the pelican, running about his long legs as though seeking to knock him down. Watching his opportunity he would grasp her again, toss her into the air, and thus the sport would go on till the bird himself tired of it.

The mockingbird, that prince of song and mimics, possesses a sense of humor highly diverting and very humanlike—the male bird that is, for the female views life from a more serious standpoint, her domestic duties, it would seem, weighing heavily upon her mind. We speak of the "thieving" instinct of this bird, as well as of the blue jay, and other kindred species, because of that mischievous spirit which leads them to seize any small bright article which comes in their way, and, when unobserved, to secrete it. That they never purloin or hide these objects when observed is thought to be proof conclusive that it is done from the pure love of stealing and nothing else.

"I hide and you seek." In that childish game does not the one who is to secrete the article insist that the "finder" close his eyes till the object sought is carefully hidden? What amusement would be afforded the jay, or the mockingbird, should he attempt to secrete an article while you are looking? If we could only interpret the sparkle in their bead-like eyes, as we can that in a child's when engaged in the same game, how much mischief we would read there as the owner of these secreted articles hunts "high and low" for them in presence of the fun-loving birds!

"Where did you hide it, Jay?" pleaded a lady, who had left her silver thimble upon a table, and after a few minutes' absence returned to find it gone. "There has been nobody in the room since I left, so you must have taken it."

Mr. Jay, the pet of the household, hopped into his cage, and, standing upon his perch, looked demurely at the questioner.

"You are a naughty bird," said his mistress, who had in remembrance finger-rings, watch-keys, collar-buttons, and similar articles, which, from time to time, had as mysteriously disappeared, "and I am going to shut you in," which she did, fastening the insecure door of his prison with a stout piece of string.

Jay gave a shrill shriek, as of laughter, when his mistress continued the search, turning up the edge of the carpet, searching the pockets of garments hanging on the wall, anywhere,

everywhere, that articles, one-time missing, had been secreted. But look where she would the thimble could not be found.

A month went by, and still Jay remained an unwilling, if not a subdued, prisoner. As his mistress one morning sat sewing in the room, Jay gave a final peck at the string which confined him, and at once, without a word, hopped to a chair from which one rung was missing. His mistress was watching him, and to her intense amusement saw him very deftly extract from the hole in the leg her lost thimble.

In the same household came, as visitor, a little boy named Johnny, of a very peevish and fretful disposition. When refused anything he especially desired, the whole house was made to resound with shrieks of: "Ma, ma, ma-a-a-a!"

Jay listened very attentively at first, but in a few days had not only caught the words but the very intonation. Johnny never entered the room without the bird crying in a peevish tone, in a very ecstasy of mischief: "Ma, ma, ma-a-a-a!"

"I hate that bird," said the boy one day, when Jay had greeted him with an unusually whining cry: "He ought to be killed. He makes me nervous."

"Then I would stop whining if I were you," suggested his mother, and Johnny wisely concluded he would.

A mockingbird which frequented the grounds of a gentleman in Virginia was noted not only as a most mischievous fellow, but as one of the most divine songsters of his tribe. So heavenly was his music, and so superior to that of his fellows, that at eventide in the general chorus his voice soared above all the rest. Men, women, and children gathered—for his fame had traveled far and near—to hear him sing, but in the very midst of his divine strains, Jip—for so they named him—would suddenly cease, and flying away, conceal himself behind a chimney on the housetop. Presently he would sneak down to the eaves and peer cautiously over, to see if his self-invited audience had scattered. If they were still there he would again hide himself, returning shortly to peer over the eaves again. As soon as the back of his last auditor was visible down he would fly to his chosen perch and resume his glorious song, tempting his audience to return. This time he would regale them with the choicest of his trills, breaking off in the midst as before and mischievously flying away to hide himself. This little comedy he would repeat three or four times during an afternoon or a moonlight night.

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A black cat of the household was a recipient of his practical jokes. When she was passing Jip found it exceedingly amusing to spring upon her back, give her a sharp dig with his beak, and then spring nimbly to a low branch, exulting over the cat's vain effort to locate her tormentor.

A favorite joke of a mockingbird in Richmond, Va., was, when espying a dog, to utter a shrill whistle in exact imitation of a man summoning that animal. Thus peremptorily called, the canine would suddenly halt, prick up his ears, look up and down the street, then, seeing no master, trot on his way. Again the bird would whistle, but in a more mandatory tone than before. The dog would stop, gaze about in a puzzled manner, then, in response to another whistle, dash forward in the direction of the sound. The mystification of the dog appeared to afford the mockingbird the most delight, more particularly when not only one dog, but several would collect under his cage, whining and barking, vainly seeking to locate their masters.

Among the mammals, the elephant, in general estimation, possesses the drollest sense of humor. The writer never will forget the mischievous pranks of a huge fellow among a herd of elephants tethered in a pen in Central Park, New York. Only those beyond his reach escaped his teasing, his sinuous trunk tickling those near, now here, now there, his little pig-like eyes twinkling with genuine humor. His companions did not respond in kind, not feeling perhaps in a playful mood, which fact seemed in no way to diminish the big fellow's amusement, for he continued the sport at intervals much to the edification of the spectators.

Even when engaged in piling up huge slabs of lumber in the sawmills in India, these huge animals while away the tedious hours of labor by many a little prank or joke at the expense of their drivers. A favorite one is, after disposing of one load and returning for another, to fill their trunks with odds and ends as they move leisurely along, a stray nail, three or four pebbles, a tuft of grass with a bit of earth still clinging to its roots, a discarded cheroot, or other small articles which may lie in their paths. These are collected, and when the trunk is packed to their satisfaction, quietly curled upward and the mass blown against the naked stomachs of the drivers dozing upon their backs.

TAMING THE SMALLER WILD ANIMALS.

ALDA M. MILLS.

HERE is a great difference in the dispositions of the small wild animals, some quickly responding to care and petting, while others seem incapable of being tamed. It is the same with birds. I have found owls, hawks, and other species very easily tamed, while prairie chickens and quail appear to be incapable of domestication even in a small degree. They will lose considerable fear of human beings if left in their freedom to become accustomed to their near approach, but if placed in captivity they pine away and die, or, finding some avenue of escape, wander away and are lost. The nearest approach to domestication in the prairie chicken tribe I ever noted, was that of a young bird that grew up with a flock of young turkeys. We noticed it among the turkeys when they were quite small. The prairie chicken must have been considerably older than the turkeys, as at first it was larger than they were, but they rapidly gained on it and were soon much the largest. However, the little wildling clung to its adopted family and in the fall, when the turkeys came and roosted in the plum trees near the buildings, it came too and after a time lost most of its shyness and, strangest of all, adopted the turkeys' mode of roosting in the trees. Later on, however, it disappeared, probably joining a flock of its own kind.

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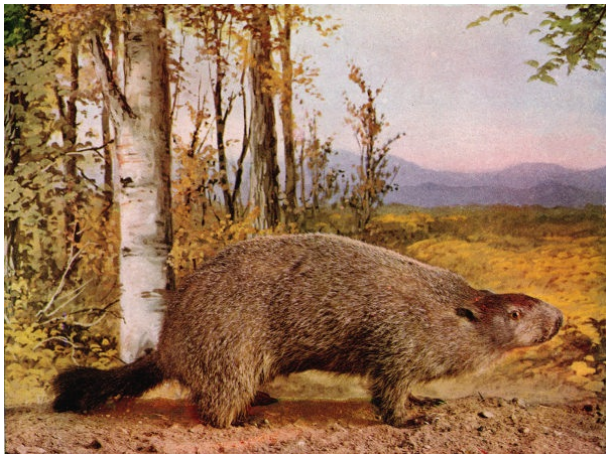
The common striped ground-squirrel is very easily tamed if taken while young and will soon learn to come if called by name, and will learn many little tricks. The gray squirrels, though much prettier than the striped ones, are naturally shy and harder to tame. Rabbits of the several species inhabiting the United States are capable of domestication in a degree, though of all I ever owned but one would return at my call when allowed its liberty out-of-doors. Western jack-rabbits when young make most interesting and beautiful pets, and, while confined, seem to lose all fear. Notwithstanding their prettiness and their soft cuddling ways, they are stupid little things, all their knowledge seeming to come through the calls of their appetites.

Minks and weasels have too fierce a nature to accept domestication, and, so far as I have observed, show not the slightest degree of affection for the one who feeds them. That odorous animal, the skunk, however, is very susceptible to kindness, and will become as tame and tractable as a pet dog. One of the most interesting pets I ever had was a skunk taken when very young. It was allowed its full freedom and would follow me around, come at my call, do many little tricks at command, and was as playful as a kitten. Being thoroughly tamed it did not make use of its objectionable means of offense and defense, though when frightened it often "threatened" to. As in the case of the prairie chicken, my pet skunk also disappeared when it was nearly grown, thinking, perhaps, that it could make a better living for itself than I could furnish it. Its favorite food was insects such as May-beetles and their larvæ, grass-hoppers, and almost every kind of bug, worm, or beetle; even hairy caterpillars were devoured after being rolled or moulded with its paws to rub off most of the hairs. This little pet of mine was never troubled with dyspepsia or indigestion and crammed its capacious stomach with a vast amount of food—mostly insects—though small mammals, eggs, birds, and once a young chicken were devoured with relish. Mice of many species can be tamed to some extent though I have found one of the shyest species when in a wild state to be the most readily and thoroughly tamable. I refer to the deer mice. They are pretty, yellowish brown creatures, white underneath, and have large, dark, brilliant eyes and erect ears giving them a very handsome expression. Their hind legs are much longer and stronger than those of the ordinary mouse and they are capable of making extraordinary leaps like the animals from which they get their common name.

When tamed they will learn little easy tricks such as sitting erect and "begging" for food, coming when called by name, etc., and are not so ready to use their teeth on the slightest provocation, as are their cousins, the blue field mice.

By making pets of wild animals much can be learned of their habits, dispositions, and characteristics. Especially their food habits, which, in the wild state, exert so much influence in the economy of nature as checks to the undue increase of other species of animals, insects, or plants.

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FROM COL. CHI. ACAD. SCIENCES. COMMON GROUND HOG. $\frac{1}{4}$ Life-size. COPYRIGHT 1899, NATURE STUDY PUB. CO., CHICAGO.

THE WOODCHUCK.

VERY similar in its bodily structure to the marmot, of which it is said to be the nearest American relative, is the woodchuck or ground-hog (*Arctomys monax*). It is about eighteen inches in length, including the tail. The body is stout, the head broad and flat, the legs short and thick, the fur blackish or grizzled on the upper portion and of a chestnut red on the under surface of the body.

The ground-hog is found in all parts of the region extending from the Atlantic coast west to the Missouri, Iowa, and Minnesota. It inhabits woods, prairies, and meadows, lives on roots, vegetables, and herbs, and is especially fond of red clover. Its burrows are large excavations, and in the early autumn it busies itself in storing provisions for its long winter retreat. It is said to be one of the first hibernating animals to retire to winter quarters and one of the earliest to come forth in the spring, the length of its retirement varying with the locality, and being shorter in the south than in the north. In the northern United States it usually retires about the first of October and reappears about the middle of March. A recent writer and close observer says that woodchucks hibernate in pairs, but he never knew one of these proverbially sleepy creatures to leave its hole until warm weather came—in spite of the alleged practice it has of coming out invariably on the second day of February to fix the weather for the rest of the winter. He took the trouble once to dig into a woodchuck's burrow on a Candlemas day—and a warm, cloudy day it was; just such a day as the ground-hog is said to choose to come out of his hole and stay out. He found two woodchucks in the burrow, with no more sign of life about them than if they had been shot. From all outward appearances he could have taken them out and had a game of football with them without their knowing it. When the animal begins its hibernation it carefully closes the entrance to its burrow. Dr. Bachmann, who had marked a burrow to which he knew a pair of woodchucks had retired, caused it to be opened early in November, and found the two animals, perfectly dormant, lying coiled up close together in a nest of dry grass, twenty-five feet from the entrance.

The young woodchucks, of which there are from four to six in a litter, are born about the end of April. The mother takes tender care of them until they are able to shift for themselves.

The woodchuck, when taken young, is easily tamed, and becomes an interesting pet. The little animal can be taught to come when called, to run for food when whistled to, and to answer to a name. One called Chuck was very fond of bread spread with butter and sugar. If plain bread were offered to him he would taste it, make a wry face, spit out the bit in his mouth, and throw away the piece he held, and then he would straighten himself up and hold out his shining black hands for bread *with sugar* on it. He always sat up stiffly on his hind legs when eating, and it was a comical sight to see him holding a long banana in his arms, until he had eaten the whole of it, blinking his bright black eyes with satisfaction. Chuck was taught many tricks, to balance a stick on his nose, swing in a trapeze, draw a toy cart, and the like. He was very affectionate and tractable.

Early in September Chuck began to eat voraciously and soon became very fat, but in the first week in October his appetite failed; he ate at first once a day, then once in two days, and after awhile he became quite restless and stupid. He was given his liberty, and watched closely to learn his habits. He began gnawing grass, gathering dry leaves and tucking them in various corners. At length he found a place that suited him to dig, and then he began making his nest. When the excavation was complete Chuck disappeared for several days. One evening he tapped on the kitchen door. When the door was opened he ran to a basket of apples and ate one, then ate a slice of bread and sugar. He appeared crazy with haste, and as soon as he was through eating he scampered off, to be gone a long time. On the first day of February Chuck crept out of his hole, and sat for a moment in the sun. Before he could be reached, however, he had returned to it. In six weeks and three days he again came out, and what was surprising, he did not appear to have forgotten any of his friends, of whom he had many among the cats, dogs, and rabbits of the neighborhood, trotting about among them on his hind legs. A cruel boy and a savage dog ended the life of this harmless little animal.

C. C. M.

FLOWERS WITH HORNS AND CLAWS.

E. F. MOSBY.

THE milkweed is best known to most of us by its pods—long, rough cases, packed close with shining white silk attached to little brown seeds. The lightest wind that blows can carry these a stage or two on their journey with such lovely silken sails. But perhaps everyone has not noticed one rather strange thing about them. Almost always there are two pods, one vigorous of growth, large and full; the other stunted and ill-formed. They are like the two brothers or sisters of Fairy Tales, one fair and well-favored and gracious, the other ill-grown and dwarfish. But *why* this is so, is one of the many secrets of the milkweed.

It is quite a large family of flowers, or weeds, as you may choose to call them. There is the gorgeous orange-colored butterfly weed, always surrounded by hovering or fluttering butterflies, most of them also orange or yellow in their coloring; the fragrant, rose-colored milkweed of June, the purple milkweed and its cousin of the marsh. But it is the common milkweed that is called the horned herb. It was once thought possessed of many healing virtues when the business of gathering and drying herbs was more important than it is now. Yet one needs no idea of this kind to look with interest on this curiously formed plant which grows in such profusion by the dusty roadside or by our very doorstep. A milky juice exudes from the stem whenever a flower is gathered, and the pollen is in such sticky masses that a feeble insect is often caught and cannot escape with its fatal treasure.

The blossom cluster, reflexed so oddly, is pretty and quaint at first sight, but as we look deeper we find some unknown law of fives has ruled its structure—the recurved calyx is five-parted, so too the deeply recurved corolla; five stamens there are surrounding, like a circle of courtiers, a fairy king and queen, the two pistils in the center, above which hangs "a large five-angled disk," an awning of state. But oddest of all is the crown of five-hooded nectaries above the corolla, each nectary enclosing *an incurved horn*. Is not this a strange honey-cup with the horn concealed under the silky flower-hood? The insects love the banquet thus spread for their delight and no doubt they know the secrets of the blossom.

There is another family of wild flowers that abounds in horns and claws, especially the latter—the large crowfoot family. The hook-beaked crowfoot has little one-seeded fruits with long and hooked beaks, like those of birds of prey, collected into a head. The wild columbine, nodding so merrily from the high rocks, and the larkspur, have hooked spurs and claws and the larkspur hides its long spurs in its calyx. But the monk's-hood is the more interesting of all.

In early days, before stamens and pistils are ready for open air and wandering insects or pattering showers, you may find a dark blue bud in the meadow. The calyx is large and showy and blue like a flower, and its curved front sepals close the entrance before while the hindmost sepal, like a soldier's helmet, or a monk's hood, comes down over all as a covering. Then the sun shines and the blossom ripens and it is time to open.

Wide fly the little doors, back falls the blue hood, and the golden heart of stamens and pistils is ready with a welcome. But where are the petals? Hidden under the hood are two tiny hammer-like claws, the only petals this flower possesses.

THE COMMON AMERICAN MOLE.

THIS mole (*Scalops aquaticus*) is the most common species in the eastern portion of the United States. Moles are considered as animals of a fairly high order, on account of their forelegs' being developed into perfect scoops for digging. They live almost entirely in underground retreats, where they lead a very peculiar life. They are found over nearly all Europe, a great part of Asia, southern Africa, and North America, and their habits are in almost every respect similar. Their varieties are not numerous, but it is possible that there are still a great many species as yet unknown to naturalists. They are all shaped and endowed, says Brehm, in so striking a manner as to be instantly recognizable. The body is stout and of cylindrical shape, and merges into a small head without the intervention of a distinct neck. The body is supported on short legs; the forward pair appear to be relatively gigantic digging tools, while the hind limbs are longer and resemble those of the rat. The teeth are from thirty-six to forty-four in number.

Moles all delight in fertile plains, though they are also found in mountains. As the effect of light is painful to them, they seldom come to the surface, and even in the depth of the earth they are more active by night than by day. Their movements in their underground passages are much more rapid than when on the surface of the ground, where they can scarcely walk. They are also good swimmers when compelled by necessity to resort to the water.

Of the senses of the moles it is said those of smell, hearing, and touch are especially well developed, while that of sight is deficient. All moles are quarrelsome, are addicted to vicious biting, and they take pleasure in devouring their own kind. They eat only animal food, all kinds of insects living under ground, worms, and the like, though they also feed on small mammals and birds, frogs, and snails. They are exceedingly voracious, and as they can endure hunger only for a very short time, they do not hibernate. They are undoubtedly useful as exterminators of insects, though on account of their digging habits they are considered a nuisance by the farmer.

It was long thought that moles were blind, or had no eyes. The eyes, however, are about the size of a small seed lie midway between the tip of the snout and the ears, and are completely covered with the hair of the head. They are protected by lids, and may be projected or retracted at will.

Once or twice a year the female mole gives birth to from three to five young. They grow rapidly, and remain with the mother for one or two months. Then they begin digging on their own account and require no further attention. They have been found to be very difficult to keep in captivity by reason of their insatiable appetite.

As the mole is obliged constantly to construct new hillocks in order to secure its food, it cannot long hide itself from its enemies. It digs horizontal shafts at a slight depth from the surface, and in order to remove the earth it has dug up, it throws up the well-known hillocks. Many a beautiful lawn has been nearly ruined by the handiwork of this little creature, who likes to bore its snout into loose soil and throw it backward with its powerful forepaws. In a single night it can undo much of the labor of the gardener. In loose ground the animal is said to work with really admirable rapidity. Oken kept a mole in a box of sand for three months, and observed the animal work its way in it nearly as rapidly as a fish glides through the water, snout foremost, using the forepaws to throw the sand to the side and the hind limbs to push it backward. Lecourt, wishing to investigate the speed of a mole in its conduits, set up in a row a number of heavy straws in the main conduit, arranged so that the mole could not run along the passages without touching them. To the tops of these straws he fastened small paper flags, and when the mole was occupied in its hunting ground, he frightened it with the sound of a bugle, and thus caused it to run into the main conduit. Then the little flags fell down one after another, the instant the mole touched them, and the observer and his assistants had an opportunity to correctly record the speed of its course for a short distance.

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C. C. M.



FROM COL. CHI. ACAD.
SCIENCES.

COMMON MOLE.
¾ Life-size.

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THE OAK.

What gnarled stretch, what depth of shade is his!
There needs no crown to mark the forest's king;
How in his leaves outshines full summer's bliss!
Sun, storm, rain, dew, to him their tribute bring,
Which he, with such benignant royalty
Accepts, as overpayeth what is lent;
All nature seems his vassal proud to be,
And cunning only for his ornament.

• • • • •

So, from oft converse with life's wintry gales,
Should man learn how to clasp with tougher roots
The inspiring earth—how otherwise avails
The leaf-creating sap that sunward shoots?
So every year that falls with noiseless flake,
Should fill old scars up on the stormward side,
And make hoar age revered for age's sake,
Not for traditions of earth's leafy pride.

—*Lowell.*

"Had I wist," quoth Spring to the swallow,
"That earth could forget me, kissed
By summer, and lured to follow
Down ways that I know not, I,
My heart should have waxed not high,
Mid-March would have seen me die,
Had I wist."

"Had I wist, O Spring," said the swallow,
"That hope was a sunlit mist,
And the faint, light heart of it hollow,
Thy woods had not heard me sing;
Thy winds had not known my wing;
It had faltered ere thine did, Spring,
Had I wist."

—*Swinburne.*

SKIN.

W. E. WATT.

One said he wondered that lether was not dearer than any other thing. Being demanded a reason: because, saith he, it is more stood upon than any other thing in the world.—*Hazlitt*.

What! is the jay more precious than the lark,
Because his feathers are more beautiful?
Or is the adder better than the eel,
Because his painted skin contents the eye?
—*Shakespeare*.

A GILDED live pig is a sight rarely seen. The rarity of putting gold leaf all over a living animal of any kind comes from the fact that the animal dies so soon after the operation. It has been tried several times and always with the same result.

The idea arose from an experiment unfortunately performed upon a child on the accession of Leo X. to the papal chair. The child was gilded all over to represent the Golden Age. The people of Florence were delighted with the idea, but the death of the child took place so quickly that some thought the brief duration of the Golden Age was miraculously represented as well as its great glory.

The experiment has never been repeated upon a human subject, but men of science cautiously tried to find out the secret of the child's living but a few hours after the operation, and so gilded pigs and varnished rabbits and other small animals. From such tests of the value of an open skin to animal life they found that all things that have breath must have open skin pores in order to maintain life.

Closing the pores of the skin causes the temperature to fall directly and the heart and lungs become gorged with blood. The circulation of the blood is seriously interfered with and death follows with the usual symptoms of asphyxiation.

Strange as it seemed to those who first witnessed such experiments, the life of an animal is more directly dependent upon the action of the skin than upon that of the stomach, the liver, or even the brain. Monstrosities have been born without brains; but they have frequently lived for some time, taking their food regularly and having the appearance of as much comfort as others of their kind with brains. They died early, but their life was uniformly longer than the time which elapsed after the application of a coating which stopped the skin of other animals until death ensued.

A man will live much longer without stomach action than without the proper functions of the skin. In fact, the skin may take the place of the stomach in sustaining life for awhile, where the act of swallowing has been prevented by disease or accident. Feeding the patient through the skin has been accomplished with varying degrees of success. A bath of warm water or milk and water assuages thirst. Sailors deprived of fresh water wet their clothes with salt water, and the absorption of moisture sustains them where salt water taken into the stomach might have resulted fatally.

The health of the skin is closely connected with that of the whole system. Its appearance and condition as to moisture and dryness, as well as its temperature and color are regularly examined when the system is out of order. Since the skin is so important to the general health and its condition is placed so completely within our control, it is wise to care for it judiciously. We often find other organs of the body in an unsound condition and begin to doctor them when the whole trouble has arisen from bad treatment of the skin. The skin needs more care than the liver or the stomach, and many of the troubles laid at the door of one or both these organs may be avoided by proper care of the one organ over which we have entire control, the skin. Where the skin is prevented from doing its proper work other organs try to carry it on, and the result is that those organs which are really beyond our control, and which will work properly without any attention from us, become diseased by our bad treatment of the organ that comes first in the natural order of attention.

The skin throws off waste matter from the system. Two and one-half pounds of watery vapor is poured out daily from the average man. A clogged skin retains certain salts in the system supposed to have something to do with such diseases as rheumatism and gout if left in the blood by too little exercise of perspiration.

Besides the sweat glands there are glands which exude fatty substances upon the skin, keeping it suitably lubricated and somewhat impervious to water. In some animals this secretion is so abundant that the skin cannot become wet in swimming. Beneath the skin are frequently cushions of fat to protect the soles of the feet and the outside of the larger joints. The blubber of the whale, the thickest skinned of all animals, is of this sort, and is evidently intended to make his tremendous weight less destructive when brought in contact with other objects. The hide of the swifter ones is peculiarly fitted with large papillæ of feeling which are supposed to warn them of the presence of rocks and other objects by the action of the water while swimming near them.

Insects, not having lungs, receive air into their bodies through holes in the skin. These are called spiracles. They are so protected by hairs within the holes that water will not enter them. This is why it is so difficult to drown an insect. But if you touch the abdomen of one of these skin-

breathing creatures, for instance the yellow part of a wasp, with a drop of oil, the minute openings become almost immediately clogged and the insect falls dead as if choked completely.

The skin consists of two layers, both of which are exceedingly interesting. The outer or scarf skin is called the cuticle on the outside of the body, while wherever the skin dips into the body it is modified into what is called mucous membrane. This outer skin is not what is rubbed off the surface in a Turkish bath manipulation or what is brought off by the rubbing one gives the body with a rough towel. These rubbings bring off merely the dead outer surface of the cuticle which should be out of the way because no longer useful. In man it continually wears off, in serpents it is shed annually in one slough.

The cuticle is the portion of the covering of the body which may best be noticed when a blister has been raised in the skin. The blister is an accumulation of fluid between the cuticle and the true skin.

The cuticle, or epidermis, is modified in many other ways than the one in which it becomes mucous membrane. Where the habits of the animal make warmth desirable the epidermis dips into the skin and without any break in its connection rises in the form of wool, which covers the body of the sheep so effectually. Where the animal is designed for flight there is the same characteristic dip into the material of the body, and out of the little sac so formed rises the feather which gives the bird its beauty and powers of flight. The feather is a modification of the scarf skin.

Where protection is needed for the body beneath the surface of the water this changeable substance covers the true skin with hard scales that make the friction of the water as slight as possible, while giving a firm and light resisting surface to prevent wounds. Horns and hoofs are modifications of the scarf skin. Where claws or talons are needed in the business of fighting or tearing food in bits or digging holes in the ground or elsewhere, the scarf skin changes itself at the extremities of paws and feet and produces nails, talons, and claws, whose powers are both marvelous and varied. For the protection of most mammals the whole of the body is favored by this power of the scarf skin to produce whatever seems necessary for the comfort of the individual, and the body is indented with innumerable minute holes called hair follicles into which the scarf skin dips and rises again to the surface transformed into hairs of varying degrees of fineness and color, beautifully arranged in order, and all pointing in such directions as will add to the beauty or comfort or terrifying aspect of the animal.

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Not only are our hairs numbered, but each particular hair is furnished with a little individual muscle of its own running from the base of the follicle to the inner surface of the true skin, so that when the proper occasion arises for erection of that individual hair the muscle contracts apparently of its own accord, and up stands the hair along with its fellows, ready to frighten the animal that dares to approach in hostile attitude the owner of the precious coat. Similar muscles erect the feathers of the owl, and the gorgeous tail of the peacock dazzles us in the sunlight moved in like manner, while to those more powerful dermal appendages, the claws, talons, and nails, are attached more powerful muscles still, with proper nerve connections for the most effective use of the weapons nature has formed out of the soft outer skin, which is usually so mild and yielding as to have earned the name of scarf skin.

This outer skin is formed of cells, flat on the surface, but near the true skin where they originate, rounded and in many cases even tall and apparently reaching out towards the surface. It gives the color to the person by means of pigment cells which lie in its midst.

The black man is dark because of the abundance of pigment cells in his scarf skin. The albino is light because of their absence. The colors of hair and feathers are due to these cells in their receptacles, but white and iridescent feathers are doubtless so partly because of their absence and partly because of hollow spaces which catch and reflect or refract the light.

This arrangement of cells into scarf skin has much to do with the healing of wounds. In cases of old sores that refuse to heal, or where the skin has been extensively destroyed, the doctors have found that good, healthy skin may be grafted upon the sores in such a manner as to invigorate and perfect the process of healing. Small particles of fresh skin taken from a healthy subject or from some other part of the patient's body are placed upon the sore, the portions used being about the size of a small pinhead, and new life seems transplanted in the deadened part. The skin of a black man grafted upon that of a white man shows afterwards no trace of its origin, but becomes the same shade as that which it adjoins.

Several animals change their tints to correspond with their surroundings. This subject has been exaggerated by observers of an imaginative turn of mind, but the fact remains that there is a decided change in the coloring of certain crabs and shrimps as well as in soles, chameleons, tree-frogs, and two kinds of horned toads wherever they are found against any well-defined shade or color. Some have maintained that man takes on a tint somewhat resembling the soil of the territory where he abides in an uncivilized condition, but Beddard considers Schweinfurth's statement that the Bongos have a reddish-brown skin similar to the soil of their country, and the Dinhas, their neighbors, are as black as their alluvial ground, merely as an account of what is purely accidental in the instances given.

The coloring of most fish so that they cannot readily be seen by looking down into the water because of the blackness of their backs, is highly protective. And the fact is more apparent when we note that an enemy looking at the same fish from below is hindered in discovery because the

white under parts of the fish are hard to distinguish against the light of the sky above. Nearly all the protective color markings of animals are modifications of the scarf skin.

The true skin is of great interest both because it is the seat of what is called the sense of touch and because it is used so extensively in the arts in the form of leather.

Nerves of sensation expand over the whole surface of the body, and their minute branchings in the skin make contact with other substances highly discernible. But the sense of touch is peculiarly developed in few of the lower animals, and we may almost regard it as an attribute of man alone. Our ability to turn our fingers about things and move our hands over their surface gives us a power that is rare in nature. We can tell whether things are hot or cold, rough or smooth, sharp or blunt, wet or dry, and gather many other items of interest which the other senses are incapable of compassing.

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A monkey can wind his tail about a nut and tell by the sense of touch whether it is worth his while to crack it. The elephant moves the tips of his trunk carefully over the surface of what he wishes to examine and gets knowledge he can depend upon. But it is the hand of man that shows the highest order of development of touch. By it blind men know their friends and read their books, bank clerks detect the qualities of the notes they handle, and a thousand deft acts in the arts are accomplished.

The true skin is covered with minute projections called papillæ. They may be traced in the palm by the ridges of the scarf skin. They are arranged there in rows so that while the naked eye does not discern the projections individually the rows of them may be noticed on the surface of the scarf skin. Some of these papillæ contain blood vessels and others corpuscles of touch. Some papillæ are small and simple, others compound. In one square inch of the palm have been counted 8,100 compound and 20,000 smaller papillæ arranged in regular rows. There seem to be different end organs for different sensations. There are different spots which may be touched with a fine pointed pencil of copper which is quite hot and no feeling will result. Perhaps the same identical spots touched by the same point, after having been immersed in ice water, will give sensations of cold. Hot spots and cold spots may be found and marked upon the skin. There are more hot spots than cold ones. Either of these when disturbed electrically will give sensations of heat or cold when neither heat nor cold is applied.

Ashe mentions an experiment which shows that the body is not equipped exactly alike on both sides, for when both hands are placed in hot water the heat seems greater to the left than to the right hand. Aristotle wrote of the peculiar feeling produced by placing the ends of the first and second fingers upon a small substance like a pea. With the fingers in their natural position you feel one small round body. Place the same fingers upon the same pea, but with one finger crossed over the other so as to touch the pea on the other side, and you distinctly feel two peas. Another of the freaks of touch may easily be tried by placing the palms together so that fingers and thumbs are against their fellows. Close the hands partly and open them again repeatedly and in a short time instead of each finger's feeling another finger there will seem to be an oiled pane of glass between the hands keeping the fingers about a quarter of an inch apart. The delusion subsides when you look at your hands.

Leather was very early known in Egypt and Greece, and the thongs of manufactured hides were used by all nations for ropes, harness, and other instruments. The renowned Gordian knot, 330 B. C., was of leather thongs. A leather cannon was made in Edinburgh at the time of the American revolution. Although it was fired three times and found to answer, and other firearms were made of this material, it never became common. Had it not been for Mother Goose the leather gun might have dropped from the memory of man.

Leather is made from the true skin and tannic acid. The processes of tanning have recently undergone such changes and improvements that it is out of the question to follow them briefly. The union of the white fibres of gelatin, gluten, and kindred substances with the tannic acid, forms insoluble compounds which have great resistance and strength. This acid is found in oak and hemlock bark, and also in that of many other trees such as willow, ash, larch, sumac, and terra japonica. Tea is one-fourth tannic acid.

Deer skin makes the finer kinds of morocco, while sheep and goat skin make the grades that are used in book-binding. Seal skin makes a superior kind of enamelled leather for boots, bags, dressing-cases, and ornamental articles. Hog skin is so full of oil that it resists the tannic acid, yet saddles are made from it, and it has other uses. The French glove makers produce a very good kid glove from rat skin which can be distinguished from the real article only with a microscope.

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The tanner applies the term, skin, to the smaller product taken from calves, dogs, rats, cats, and small game, reserving the dignified name of hide for that of the full-grown ox or horse, while the skin from a two-year-old steer is called a kip.

The highest use of skins is in the form of parchment and vellum on which are printed and engrossed the most valuable documents prepared by man.



AZALEA.

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THE AZALEA.

Fill soft and deep, O winter snow!
The sweet azalea's oaken dells,
And hide the bank where roses blow,
And swing the azure bells!

—Whittier.

THE azalea is a genus of plants belonging to the natural order *Ericææ* and to the sub-order *Rhodoreæ* named in allusion to the dry places in which many of the species grow, and consists of upright shrubs with large, handsome, fragrant flowers, often cultivated in gardens. The genus comprises more than a hundred species, most of them natives of China or North America, having profuse clusters of white, orange, purple, or variegated flowers, some of which have long been the pride of the gardens of Europe. The general characteristics of the genus are a five-parted calyx, a five-lobed funnel-form, slightly irregular corolla, five stamens, a five-celled pod, alternate, oblong, entire, and ciliated leaves, furnished with a glandular point. Most of the species differ from the rhododendrons in having thin, deciduous leaves. Some botanists unite the genus azalea to rhododendron. North America abounds in azaleas as well as in rhododendrons, and some of the species have long been cultivated, particularly *A. nudiflora* and *A. viscosa*, which have become the parents of many hybrids. Both species abound from Canada to the southern parts of the United States. *A. calendulcea*, a native of the South, is described as frequently clothing the mountains with a robe of living scarlet. All the American species are deciduous. In cultivation the azaleas love the shade and a soil of sandy peat or loam. Works on horticulture give specific and elaborate direction for the cultivation of the various species.

C. C. M.

COMMENDABLE BOOKS.

W. E. WATT.

Chapters on the Natural History of the United States. By Dr. R. W. Shufeldt. Studer Brothers, Publishers, 114 Fifth avenue, New York.

The man who is able to go out into the fields and see things is a good man to know. Whether he has the gift of telling well what he sees or not, we are glad to be with him, for he is full of the things we desire much to know, and we can get them out of him. If he is a rare story-teller, with marked powers of description, so much the better. But if he combines these elements with the practice of an expert photographer and uses all his arts to get the secrets of nature down exactly as they appear, he is a prince of good fellows to all who worship at the shrine of nature.

Dr. Shufeldt has done all this, and his enterprising publishers have brought out the matter in a large octavo volume of about four hundred pages, solidly bound, with gilt tops. The price is only \$3.50, net, and any lover of nature having the half tones he gives would not part with them for ten times the cost of the book.

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Catching good negatives of live birds in the open is not easy. One needs to know photography and bird habits extremely well, and then be satisfied with a thousand failures along with a few successes. This knowledge and patience have been remarkably displayed by the author in the profusion of full-page reproductions of his valuable work.

The meadow lark's nest containing young birds is a most artistic plate. The tree toads clinging to their tree and the mother spider caught in the act of carrying her young in a silken ball are deserving of special commendation. His pair of cedar birds look particularly happy as they balance upon their twigs and eye the camera as if they knew all about it.

Horned toads and whales, dragon flies and opossums, as well as many other forms of life, both common and rare, have their turn at entertaining the reader, and their inmost thoughts seem to have been read by this enthusiastic and peculiarly successful scientist.

It is a good book for children of all ages, but wherever it is introduced into any family the younger children will uniformly have to wait till their elders have enjoyed it, for no age can be proof against its charms.

Birds of North America. Illustrated Descriptive Manual to Beard's Natural History Charts. Potter & Putnam Company, 63 Fifth Ave., New York.

This convenient little pamphlet contains brief descriptions of some of the most common birds, the eagle, the owl, the parrot, the crow, the turkey, the quail, the ostrich, the heron, the swan, and the penguin. It is closely printed with numerous illustrations of the structure and forms of the typical birds of each sort, and gives in language that can well be understood by children, the principal facts of interest.

It is sold at 20 cents, and will be found valuable to a large class of teachers who are in search of material to interest their pupils in the common birds of our country.

Nests and Eggs of North American Birds, by Oliver Davie, author of "Methods in the Art of Taxidermy," etc. The Landon Press, Columbus, Ohio.

This is the fifth edition of an excellent work that has already won wide recognition as an exposition of how the birds build and lay. It has been revised and enlarged considerably, and now contains a profusion of cuts that will be highly appreciated. Recognizing the difficulty the mind has in grasping the entire meaning of a written description, the author has added to his text a large number of well-executed drawings of the birds most difficult to describe and has given their nests and eggs the attention their importance to the naturalist demands.

The book consists of over five hundred pages octavo, closely printed, and arranged so as to constitute a convenient and exhaustive encyclopedia of the birds of this country and their nests and eggs. Although the title of the book would lead one to think the matter does not pertain to the habits of the birds, nor their appearance, it is more complete in this respect than many books written ostensibly to describe the birds themselves, and in many of its articles almost complete life histories are to be found. The nesting habits and the hatching of the eggs have led the author on till the work has become a very readable one for those who are by no means specialists on eggs and nests. The writer has modestly disclaimed attempting to cover so much ground and refers his readers to the works of Coues and Ridgway for further particulars.

The numbers of those who do not let a summer pass without looking into the lives of the birds which visit their country residences are rapidly growing, and this growth of interest on the part of thousands who do not wish to become experts but desire to enjoy their feathered neighbors and their products most fully, has made room for a large sale of this work. It has but to become known to be possessed by all cultured households where trips to the country are annually made.

To know the birds of one's locality by name and to be able to identify their nests and watch their doings with some degree of intelligence is an accomplishment which many desire and are annually attaining. With this work in one's possession few birds can remain in the vicinity without being identified. The gladness and loss of selfish thoughts and motives that are the reward of all those who lose their hearts to the birds and their growing families do far more good in the world than any amount of drugs and dieting.

Few people go to the country without having something they wish to gain in the way of health. A prescription of bird life taken regularly before meals has been found one of the greatest cure-alls the world has produced. There is no work in existence better calculated to promote this sort of convalescence than this one on the nests and eggs that we so often run past in our ignorance of the joy a bush or stump or tree has in store for those who have a mind to find it.

Transcriber's Note:

- Minor typographical errors have been corrected without note.
- Punctuation and spelling were made consistent when a predominant form was found in this book; otherwise they were not changed.
- Ambiguous hyphens at the ends of lines were retained.
- Mid-paragraph illustrations have been moved between paragraphs and some illustrations have been moved closer to the text that references them.
- The Contents table was added by the transcriber.

*** END OF THE PROJECT GUTENBERG EBOOK BIRDS AND ALL NATURE, VOL. 5, NO. 3,
MARCH 1899 ***

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