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BIRDS AND NATURE

ILLUSTRATED BY COLOR PHOTOGRAPHY.

VOL. VIII. NOVEMBER, 1900. NO. 4.

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SONNET—NOVEMBER.

Yet one smile more, departing, distant sun,
   One mellow smile through the soft vapory air,
Ere, o'er the frozen earth, the loud winds run,
   Or snows are sifted o'er the meadow bare.
One smile on the brown hills and naked trees
   And the dark rocks whose summer wreaths are cast,
And the blue Gentian flower, that, in the breeze,
   Nods lonely, of her beauteous race the last.
Yet a few sunny days, in which the bee
   Shall murmur by the hedge that skirts the way,
The cricket chirp upon the russet lea,
   And man delight to linger in thy ray.
Yet one rich smile, and we will try to bear
The piercing winter frost, and winds, and darkened air.

—William Cullen Bryant.

   Oh, Autumn! Why so soon
Depart the hues that make thy forests glad;
Thy gentle wind and thy fair sunny noon,
   And leave thee wild and sad!

   Ah! 'twere a lot too blessed
Forever in thy colored shades to stray;
Amid the kisses of the soft southwest
   To rove and dream for aye.

—William Cullen Bryant.

SOME FACTS ABOUT THE WESTERN WILLET.

(*Symphemia semipalmata inornata.*)

The Western Willet is one of the largest of the Limicolae or Shore Birds. The body is about the size of a common pigeon, the long neck, legs and extent of wings making it appear much larger. The feet are only about one-half webbed and only when great danger makes it necessary will it go into the water beyond its depth. The bill is straight and in summer the color of the bird is gray above, with many small but rather distinct black marks. On the sides and breast these marks are arrow-shaped. In the plumage of winter and of the young these markings are absent.

I am inclined to believe that this species has a more extended range than any other of the order. It has become quite abundant of late years in the Calumet Region in Northern Indiana, near Chicago. Mr. E. W. Nelson, in the Natural History Survey of Illinois, says, that in the seventies this species was a rare summer resident on the wet prairies of Northwestern Illinois, although I can find no authentic record of the taking of the nest and eggs. Captain Charles Bendire found it abundant and resident in Southeastern Oregon when he procured several sets of its eggs. It is said to breed from the coast of Texas to Manitoba. Straggling flocks of from five to fifty may be found along the shores of our larger fresh water lakes, particularly Lake Michigan, during the fall migration, which takes place from about the fifteenth of August to the last of September.

This bird might well be called the clown of the Limicolae. I have often been amused by the antics of a flock of Willets on the shore of Lake Michigan. They would droop their necks and wings in an absurd fashion, taking short runs and jumps as the waves rolled in upon them. I have never seen a bird which at times could be so wary and hard to approach, and again, if a number are shot from a flock, the remaining birds will seem to lose their senses, and I have frequently walked within a few feet of the survivors before they would take flight. This trait is noticeable among a large number of shore birds and the terns, but more especially so with the Willet.

On the plains bordering the Brazos river, near the Gulf coast of Texas, during the months of April and May, I have found the Willet proper (Symphemia semipalmata), a smaller and darker form, breeding in abundance. The Willets usually select for a nesting site a thick tussock of salt marsh grass on the borders of a small pond, where they can command a good view of the vicinity. In the center of this they hollow out a space of about six or eight inches in diameter, and simply line it with the grass they have matted down. In this nest are laid four pyriform eggs of a greenish white, or a light olive brown ground color, marked with large, irregular blotches or brownish black and faint purple; the eggs are immense for the size of the bird, being about two inches in length by one and one-half in width.

The illustration faithfully portrays three birds taken at Miller's, Indiana, on the beach of Lake Michigan. The color of the legs, which are obscured by the shadow of the body, is a pale, slaty blue.

FROM COL. CHI. ACAD. SCIENCES.

THE WESTERN WILLET
(Symphemia semipalmata inornata.)
¼ Life-size.

Though the Willets are restless and noisy birds, they are much less so, and, indeed, quite unconscious of their surroundings when nesting. Regarding their habits at this time, Dr. Coues has told us that if they "become thoroughly alarmed by too open approach, particularly if the setting bird be driven from her nest, there is a great outcry, violent protest and tumult where there was quietude. Other pairs, nesting near by, join their cries till the confusion becomes general. But now, again, their actions are not those they would show at other times; for, instead of flying off with the instinct of self-preservation, to put distance between them and danger, they are held by some fascination to the spot, and hover around, wheeling about, flying in circles a little ways, to return again, with unremitting clamor. They may be only too easily destroyed under such circumstances, provided the ornithologist can lay aside his scruples and steel himself against sympathy."

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It is to be hoped that all the States, frequented by the Willets, will enact proper legislation which

will amply protect these interesting waders.

Frank M. Woodruff.

Autumn once more begins to teach;
Sere leaves their annual sermon preach;
And with the southward-slipping sun
Another stage of life is done.
The day is of a paler hue,
The night is of a darker blue,
Just as it was a year ago;
For time runs fast, but grace is slow!

Thou comest, autumn, to unlade
Thy wealthy freight of summer shade,
Still sorrowful as in past years,
Yet mild and sunny in thy tears,
Ripening and hardening all thy growth
Of solid wood, yet nothing loth
To waste upon the frolic breeze
Thy leaves, like flights of golden bees.

—Frederick William Faber.

CRUEL TREATMENT OF BIRDS DEMANDED BY DAME FASHION.

All of my readers probably know in a general way that Dame Fashion is responsible for the destruction of the lives of many birds, but they may not know to what extent this is true.

Why do we say that any cruel treatment of the birds is chargeable to fashion? It can hardly be necessary to remind ourselves that there is in almost every boy's nature a touch of the savage instincts which find expression in the desire to kill something. Traces of this instinct do not entirely disappear with the development into manhood, but show themselves there in the love of hunting and fishing. Let these remnants of savagery be appealed to by the promise of gain and they are immediately fanned into flame in the natures of those persons who are naturally more strongly drawn to this primitive occupation of men. In short, place before the professional hunter an easy means of profiting by his skill as a hunter, and in far too many instances he will smother any humane instincts which he may have for the sake of the gain. It is the demands of fashion for plumes and feathers for hat trimmings which place before these hunters the temptation to kill. Have we not a right, therefore, to place the blame at the door of Fashion?

But what are the practices which we call cruel? In the first place it is cruelty to cause the destruction of life without good and sufficient reason. Unnecessary sacrifice of life is cruelty. Certainly no one will say that it is necessary to trim hats with feathers. Fashion decrees that feathers must be worn, and presto! feathers are worn. In the second place, it is cruel to kill birds who are feeding young ones in the nest, leaving them to starvation. Yet this is just what has happened and does happen every year. Plume hunters are no respecters of times and seasons. With them there are no closed seasons. The birds which they are after gather in large rookeries during the nesting season and are therefore much easier to capture then than at other times.

Most of the herons and similar plume-bearing birds are hunted and killed for the plumes alone, or, at most, for a very small part of the whole plumage. The part wanted is taken and the rest left to waste, while the bird's body is never used for anything. If nothing worse, it is an unpardonable waste. In Florida alone whole rookeries of herons and ibises numbering hundreds and even thousands of individuals have been wholly destroyed. Now the insatiable plume hunter, in his effort to supply the demands of a no less insatiable fashion, is pursuing the unfortunate birds into the fastnesses of Mexico and South America. There is but one way to stop this work of extermination, and that is to take away the demand. This remedy lies wholly in the hands of women. Unless they are willing to take a firm stand against the use of feathers for purposes of ornament the birds are doomed. This may seem like a strong statement, but a little reflection will prove it true. When the birds which are now hunted for plumes and feathers are gone, there will be a modification of the demand to include birds of different plumage, just as the aigrette is giving place to the quill. After the quill and the long-pointed wing will come the shorter wing, and after that the plumage of the small birds, and the cycle of destruction will be complete.

Some one may ask why it is that the birds are so foolish as to allow the hunter to kill hundreds in a single day from one rookery. Why don't they leave the region when the shooting begins? The plume hunter has learned cunning. He no longer uses a shot gun, but a small caliber rifle or a wholly noiseless air gun. The rifle makes no more noise than the snapping of a twig, and will therefore not frighten the birds. By remaining concealed the hunter may kill every bird that is within range. Since each bird is worth from twenty-five cents to five dollars, according to the kind, a single day's work (or slaughter) is profitable. The temptation is certainly great, and becomes almost irresistible to him who loves hunting for its own sake.

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The most cruel part of the whole business I have already stated, but it will bear repeating. It is the killing of the breeding birds before the young are able to care for themselves. There is abundant evidence that the breeding time is the favorite time for hunting among plume hunters, because then the old birds are more easy to kill, and because then the plumage is the most perfect, for then the wedding garments are put on.

It should not be an impossible task to stop this whole cruel business. But laws will not do it without a wholesome public sentiment behind it. Women are notably foremost in all good works, and many of them are doing nobly in this work, but it is painfully evident that many are not. Let us make "a long pull and a strong pull and a pull all together," and then we shall drag this growing evil back and down forever.

Lynds Jones.

THE FALL MIGRATIONS.

A rush of wings through the darkening night,
A sweep through the air in the distant height.

Far off we hear them, cry answering cry:
'Tis the voice of the birds as they southward fly.

From sea to sea, as if marking the time,
Comes the beat of wings from the long, dark line.

O strong, steady wing, with your rhythmic beat,
Flying from cold to the summertime heat;

O, keen, glancing eye, that can see so far,
Do you guide your flight by the northern star?

The birds from the North are crossing the moon,
And the southland knows they are coming soon.

With gladness and freedom and music gone,
Another migration is passing on.

No long, dark lines o'er the face of the moon;
No dip of wings in the southern lagoon.

No sweet, low titter, no welcoming song;
These are birds of silence that sweep along.

Lifeless and stiff, with the death mark on it,
This "Fall Migration" on hat and bonnet.

And the crowd goes by, with so few to care
For this march of death of the "fowls of the air."
—Mary Drummond, in the Chicago Times-Herald.

THE WAYS OF SOME BANTAMS.

Last summer, when I was out in the country, I made the acquaintance of a kind-hearted little bantam rooster, who was as funny as he was kind-hearted.

An old speckled hen, who looked as if she might be a good mother, but wasn't, had brought up a family of chickens to that stage where their legs had grown long and their down all turned to pin-feathers.

Very ugly they were; there was no doubt of it. Perhaps this queer mother thought so. At any rate, she turned the poor things adrift and pecked them cruelly whenever they came near her.

Little "Banty" saw this unkind behavior. He was small, but his heart was big, and he set Madam Speckle an example which ought to have made her hide her head in the darkest corner of the hen-house for shame.

He adopted those chickens!

Each one of them was about half the size of "Banty," and to see that loving little father-bird standing on tiptoe with his wings spread, trying in vain to cover all eight of his adopted children, was a pathetic as well as a ludicrous sight.

They loved him and believed in him fully. They followed him all day long, and seemed to see nothing amusing when he choked down a crow to cluck over the food he found for them, and at night they quarreled over the privilege of being nearest to him.

I think bantams perhaps are more interesting than other fowls. When I was a little girl father brought three of them home. Dandy and his two little wives were all pure white and very small.

We had other fowls, the aristocratic Spanish kind, each as large as two or three of Dandy, and the Spanish rooster hinted very strongly that Dandy's presence in that barnyard could be dispensed with. But Dandy was a brave little fighter, and he soon settled it once for all with Grandee as to what the rights of the former and his family were.

In a month or so one of the little hens was missing. After a long time we found her, and in such a queer, cozy place! Upon the foundations of the old red farmhouse where we lived, rested great squared beams. An end of one of these beams had decayed, out of sight, under the clapboards on the south side of the house, until there was a large, soft-lined hollow. Here the little hen had stolen her nest, and when we found her she was just ready to lead off twenty-one tiny white fluff-balls of chickens, every egg having hatched.

Dandy's bravery saved his little life one day, and made him forever famous in the annals of our pets. On this most eventful day of his life, a shadow flitted over the barnyard, and a wail went up from us children as a chicken-hawk swooped down upon our beloved Dandy and carried him off before our indignant and tearful eyes.

Up they went! But in a moment or two we saw that the thief was having trouble, as somehow Dandy had managed to turn in those wicked talons, and the little fellow was using his sharp beak and spurs with all his might.

The battle was brief, and then Dandy dropped at our feet. He was bleeding and had lost the sight of one of his eyes, but otherwise he was little hurt. All the rest of his days Dandy carried himself proudly, as one who has been tried as a hero and not found wanting.

May H. Prentice.

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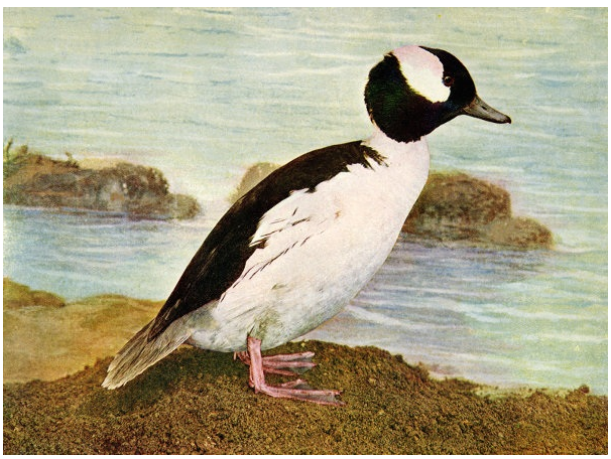


BUFFLE-HEAD.
(Charitonetta albeola.)
Nearly ½ Life-size.

THE BUFFLE-HEAD.

(*Charitonetta albeola.*)

This small and wonderfully beautiful duck is a native of North America, wintering in the latitude of Cuba and Mexico and breeding from Maine to Montana and northward. It is said that a favorite place for its nesting is along the banks of the Yukon river, and other streams of the boreal regions, yet it is reported that the young have been captured in the Adirondack mountains. Though classed with the "sea ducks" (Fuligulinae) it is one of the most common of our fresh-water forms, and, like many other animals, as well as vegetable forms, of wide distribution, it is the recipient of numerous popular names, nearly all of them being more or less suggestive of its characteristics or habits. In the North it is frequently called the Butter-ball, the Butter-box, the Butter duck, the Spirit duck and the Dipper. In the South some of the same names are heard, but perhaps more often the Marionette, the Scotch dipper, or duck, the Scotch teal and the Wool-head. However, no more appropriate name could be selected than that of Buffle-head, having reference to the showy, ruffled or puffed plumage of the head. The technical name, albeola, meaning whitish, was given this species by Linnaeus in 1758, on account of the pure white on the side of the head.

The adult males vary but little. The plumage of the head is puffy and, with that of the upper half of the neck, is a "rich silky, metallic green, violet purple and greenish bronze, the last prevailing on the lower part of the neck, the green on the anterior part of the head, the purple on the cheeks and crown." A beautiful pure white patch extends from the eyes, meeting on the top of the head. The lower portion of the neck and nearly all the feathers of the under side of the body, as well as the wing coverts, are also showy white. The lining of the wings is dark, and the upper side of the body is black.

The head of the female is less puffy and of a brownish or dark gray color. The white head patch is not so prominent or pure and the plumage of the under side of the body is more or less tinged with gray. In both sexes the iris is dark brown, the bill bluish or lead color, and the legs and feet pinkish.

There are few birds that are more expert in diving or swimming, while on land, owing to their larger feet and shorter legs, they are more awkward and waddle more than many of the ordinary ducks. Their graceful attitude while floating on the water, moving apparently without any motion of the body and scarcely causing a ripple on even a placid surface, has given them the name Spirit duck.

The Buffle-head, like nearly all the sea ducks, feeds on mollusks and other animal-forms found in the water. As a result, their flesh is usually coarse and quite too rank for use as a food. The canvas-back is a notable exception, for during the winter months it feeds on the wild celery (Vallisneria) of the Middle Atlantic coast, and thus its flesh receives the flavor so appreciated by those who relish game food.

AN HOUR WITH AN ANT.

If you want to know how to accomplish a hard task, come with me and watch a little ant for an hour.

She was a small, black ant, and, seeing a brown worm eight times as large as herself, she was seized with the ambition to take it home in triumph.

Now will you tell me how she knew that she could have no power over the worm while he was on his ten feet, that stuck to the sidewalk like glue? Before she attempted anything, she fastened her mandibles into his side and turned him over on his back just as you see Bridget turn the mattress. Then running to his head she again fastened her mandibles and dragged him for a couple of inches. While pausing to get her breath, the worm took the opportunity to get on his feet once more. The ant did not seem to notice the change in position till she tried again to drag the body. As soon as she felt it sticking, around she ran to the side, over went the worm in a trice, and once more the two started on their journey. Now they were close to a crack in the broad sidewalk, and I, thinking to help the little worker, in whom by this time I was quite interested, lifted the worm across the crack.

Did you ever try to help some one and find too late you had done exactly the wrong thing? Then you know how I felt when that little ant began rushing around as if she were crazy, and when she got hold of the worm again, began to drag it back across the very crack I had lifted it over. Can you guess why? She was taking a bee-line to her house, and I had changed the direction. But how was she to get that big body across a crack that could swallow them both? That was what I waited anxiously to see. Soon the worm felt himself going down, down into a dark abyss, and of course caught hold of the side to save himself, and when he once felt he had a hold on life how he did hold on! The ant was not to be daunted; balancing herself on the edge, and holding on by her feet, she reached down her mandibles and dragged him by main force straight up the perpendicular wall to the top; nor did she stop till he was carried far enough from the edge not to get down again.

In this way three cracks were safely crossed, and it was plain to see the worm was losing heart, although every time the ant paused for breath he would get over on his feet and have to be tossed back again.

And now a new difficulty arose. The worm had been dragged about eighteen inches over the boards. Fourteen inches more would bring them to the ant's house, or, rather, hill. But the way was now off from the sidewalk, and no sooner did the worm feel the stubble under him than he gathered all his strength, turned over on his feet, and held on to every spear of grass for dear life.

Indeed, it was his last chance, and I felt tempted to snatch him from the certain death awaiting him, but curiosity to see how this new obstacle would be overcome induced me to wait. The ant now felt justified in calling for assistance, and soon a dozen ants had come to help. Only five could work to advantage, so the rest, for ants never like to do the "heavy looking on," left to find other employment.

The first thing to be done was to get the worm on his back, and this proved no easy task. He could fasten his feet just as fast as the ants could unfasten them. At last two ants went to one end and two to the other. Each one of the four seized a foot in her strong mandibles and held it out as far as possible, while the fifth one turned the captive. It was the funniest sight! It was easy now to drag him two or three inches, but breath had to be taken, and again the worm fastened. In vain they tugged and pulled. He had evidently learned their tactics and knew how to defend himself. [Pg 157] Suddenly his body moved along an inch and a half, as if by magic. Was it magic? Not at all. One little ant had run up on an overhanging blade of grass, and, reaching down, holding on by the wonderful feet spoken of before, and grabbed the poor creature in the middle, raised it right up from the ground, and keeping hold, ran along overhead till the end of the spear of grass was reached.

This was the last struggle of any importance. The worm gave up discouraged; it was only now a question of time till they had dragged him through the stubble up to the door of the house in the hill, and I saw only a faint quiver as of dread as his body passed through the mysterious opening. I could not help wondering if the ant who started the capture received all the praise she deserved, or if the other four took the glory to themselves.

At any rate, no one could take away her own satisfaction in overcoming and winning in the struggle.

Harriet Woodbridge.

SONG.

Day is dying! Float, O song,
  Down the westward river,
Requiem chanting to the Day—
  Day, the mighty Giver.

Pierced by shafts of Time he bleeds,
  Melted rubies sending
Through the river and the sky,
  Earth and heaven blending;

All the long-drawn earthly banks
  Up to cloud-land lifting:
Slow between them drifts the swan,
  'Twixt two heavens drifting.

Wings half open, like a flow'r,
  Inly deeper flushing,
Neck and breast as Virgin's pure—
  Virgin proudly blushing.

Day is dying! Float, O swan,
  Down the ruby river;
Follow, song, in requiem
  To the mighty Giver.
—George Eliot, in the Spanish Gypsy.

THE AMERICAN EARED GREBE.

(*Colymbus nigricollis californicus.*)

The American Eared Grebe belongs to the order of Diving Birds (Podicipedes) and the family of Grebes (Podicipidae). The order also includes the loons and auks, having in all about thirty-six species that frequent North America. Closely related to the loons, the Grebes differ from them in having the head incompletely feathered near the nostrils, which are not lobed. The feet also are not completely webbed, as are those of the loons.

Owing to the inadequately developed wings, the Grebes are poorly provided with means for protracted flight. Locomotion on land is equally difficult, due to their short legs and the fact that they are inserted far back on the body, necessitating a partially erect position in walking. However, they are expert swimmers and divers and will, when alarmed, sink quietly back into the water, swimming long distances with only the bill above the surface of the water. The popular name "Hell-diver," by which these birds are frequently known, has reference to the rapidity with which they dive.

The apparent lack of a tail and the ruffs, frequently composed of variously colored feathers, give the grebes a peculiarly characteristic appearance. The plumage of the breeding season differs greatly from that of the adult in winter and that of the young.

The grebes are abundant throughout the world, seemingly preferring lakes and rivers as a foraging ground rather than the seacoast.

The American Eared Grebe has an extensive range, including that part of North America west of the Mississippi Valley and from the Great Slave Lake south to Guatemala. It breeds in nearly all parts of this territory.

A few years since Professor Henshaw published in the American Naturalist some very interesting facts concerning the nesting habits of this bird, and they especially well illustrate some of its characteristics. He says, "In a series of alkali lakes, about thirty miles northward of Fort Garland, Southern Colorado, I found this species common and breeding. A colony of perhaps a dozen pairs had established themselves in a small pond four or five acres in extent. In the middle of this, in a bed of reeds, were found upwards of a dozen nests. These in each case merely consisted of a slightly hollowed pile of decaying weeds and rushes, four or five inches in diameter, and scarcely raised above the surface of the water upon which they floated. In a number of instances they were but a few feet distant from the nests of the coot (Fulica Americana) which abounded. Every Grebe's nest discovered contained three eggs, which in most instances were fresh, but in some nests were considerably advanced. These vary but little in shape, are considerably elongated, one end being slightly more pointed than the other. The color is a faint yellowish or bluish white, usually much stained from contact with the nest. The texture is generally quite smooth, in some instances roughened by a chalky deposit. The eggs were wholly concealed from view by a pile of weeds and other vegetable material laid across. That they were thus carefully covered merely for concealment I cannot think, since, in the isolated position in which the nests are usually found, the bird has no enemy against which such precaution would avail. On first approaching the locality, the Grebes all congregated at the further end of the pond, and shortly betook themselves through an opening to the neighboring slough; nor, so far as I could ascertain, did they again approach the nests during my stay of three days. Is it not, then, possible that they are more or less dependent for the hatching of their eggs upon artificial heat induced by the decaying vegetable substances of which the nests are wholly composed?"

The food of the Grebe consists of fish to a great extent, which are dexterously caught while swimming under water. They also feed upon the insects floating upon the surface, and will, when other food is lacking, feed upon mollusks.

FROM COL. CHI. ACAD. SCIENCES.

AMERICAN EARED GREBE.
(Colymbus nigricollis californicus.)
½ Life-size.

THE GEOGRAPHICAL DISTRIBUTION OF FISHES.

There are known at the present about twenty thousand species of fishes, which are distributed throughout the creeks, rivers, lakes, seas and oceans of the world. A few species of the open sea are cosmopolitan; the others are more or less restricted in their range. Northern Asia, Europe and North America have in common a few species of fresh water fishes. There are many others of close relationship, which indicates a somewhat common origin of the fish faunas. The same is largely true of the salt water shore fishes, which live well to the north. The fresh water fishes of South America, Africa and Australia are all different from each other, none being even closely related as are those we find in the countries of the northern hemisphere.

The fishes of our Atlantic coast are different from those of the Pacific, very few species being common to both coasts. The fishes of the Ohio river are entirely different from those of the Columbia, not a single species being common to both streams. The fishes of the Missouri river are very different from the Ohio, many of the larger species, as catfishes, buffalo fishes, black basses, and some of the sun fishes are common to both rivers. The difference between the fishes of these two rivers is chiefly in the smaller kinds, which do not migrate to any great extent, and is greater as you go toward their sources, or confine yourself to their smaller tributaries.

There are many reasons why the fishes of one region are not the same as those we find in another. Some of these reasons we may learn by making a careful study of the fishes of each region, and their environment. In addition we must learn all we can about the past history of the country, finding which streams were formed first, and how they became inhabited from the old ancient fish faunas of our earlier geological periods. If you visit streams in the Alleghanies, the Ozarks and the Black Hills you will find them much alike. All have clear, cool water, flowing over sand or gravel. The black bass, speckled trout, channel cat, and the eastern pickerel will live quite as well in streams of each locality. If you spend a day at each place collecting fishes all your catch will not be the same species. In the Alleghany region you will obtain about forty species, and a like number in the Ozarks. Of these quite one-fourth, or one-fifth, will be the same species, and the others closely related. A large portion will consist of sunfishes and very small, perch-like fishes, which are called darters. These are spiny-rayed fishes; that is, nearly all of the fins are made partly of strong, sharp spines, such as you find on the back of sunfishes, black bass and the like. In the streams of the Black Hills you will not find more than fifteen species, and not more than one or two, if any, will be the same as in either of the other two catches. There are none of the spiny-rayed fishes in the Black Hills, and no trout, though the streams seem in every way well suited for them. The fishes of the Black Hills consist of two catfishes, four suckers, eight minnows, and one member of the cod family. Why are there no spiny-rayed fishes? If you examine a map you will find that the Black Hills is an isolated region, about seventy-five by one hundred miles in extent. It is covered with heavy pine forests and drained by a dozen or more good-sized creeks, which find, through the north and south forks of the Cheyenne, an outlet into the Missouri river. Surrounding the Black Hills is a broad plain one hundred or two hundred miles in width. It has no forests, and only a scant vegetation. Its streams are alkali and contain much solid matter in suspension. None of these streams flow over rocky or gravelly beds. Like all the streams of the great plains they are overloaded with sediment. All the streams can do with this sediment is to deposit it in places during falling or low water, and in time of freshets, pick it up, shift it about and redeposit it farther down the stream. Such streams are like the Platte, narrow and deep in a few places, but mostly wide and shallow, with a bottom of quicksand. The streams of the plains have in them but few species of fishes; especially is this true of the upper Missouri, [Pg 162] and these are such species as we find in the Black Hills. It is thus evident that the fishes of this region migrated there, and only such fishes as were able or willing to live in the muddy, alkaline streams of the great plains could have ever reached the Black Hills. The minnows and suckers are ever preyed upon by sunfishes, bass and the like, and to escape them evidently sought retreat in the alkaline water, which was too much disliked by their enemies for them to follow. Once there and accustomed to such water they would migrate farther up stream until they reached the clear, cool streams of the Black Hills. If we compare the fishes of two rivers whose mouths are near each other, as the Ohio and the Missouri, those fishes found near the mouths will be the same species and the two river faunas will differ most as you go toward their sources. On the other hand, if you select two rivers whose sources are near each other, as the James and tributaries of the Ohio, then the fish faunas will differ most as you go towards their mouths. The same is true of the Missouri and the Columbia. In such cases it often happens that during high water some fishes are able to pass from the head waters of one river basin to the other, just as we see the trout from the Columbia at the present time colonizing the upper Yellowstone through the Two Ocean Pass. Near the head waters of many mountain streams there is usually a pass, which contains a strip of meadow land where the small streams from mountains unite, forming the sources of two great rivers flowing in opposite directions. This is the case both at the Two Ocean Pass, the source of the Missouri and the Columbia, and at the point where the Canadian Pacific Railroad crosses the divide, forming the source of the Frazier and Saskatchewan rivers.

Many mountain streams whose sources are at present in no way connected may have been so at no very remote period. All of our streams which have their sources within the glaciated area were no doubt connected as the ice receded. The drainage of Lake Champlain and the lakes in central New York was southward at the close of the glacial epoch. It is said that in times of high water one may pass in a skiff from the head waters of the Mississippi to the Red River of the North. With such facts before us we can easily understand why the fishes of two rivers whose sources are near each other should be most nearly alike nearest the divide. If the two rivers were formed

about the same time, as no doubt were the James and the Ohio, they would naturally have several species in common. In other words, the two fish faunas will resemble each other throughout their whole extent. In the case of the Missouri and the Columbia, the former is much the older stream, and while their sources have fishes common to both streams, in the lower parts of the rivers the fish faunas are entirely different. The upper Missouri river and its tributaries are for the most part inhabited by Rocky Mountain fishes, practically the same fauna as we find in the Columbia, but few species characteristic of the Mississippi valley have been able to even cross the great plains and none have ever passed the Rocky Mountain divide.

In the study of the geographical distribution of our fresh water fishes, we are able to make a few generalizations as follows: Two rivers in the same latitude, and belonging to the same great drainage basin, and draining similar areas, will have similar fish faunas. Thus we find a great similarity in the fishes of the Washita and the Tennessee rivers, a much greater similarity than we do in the fishes of the Washita and the Cedar rivers. If the stream is a large one, the fishes near its source will be much unlike those near its mouth. The fishes of Minnesota differ greatly from those of Louisiana, though the drainage of these two States is in the Mississippi river basin. Limestone streams have in them more species of fishes than do sandstone. All things being equal, the larger of two or more streams will contain the most species of fishes. There are few, if any, rivers as rich in species as the Mississippi river and its tributaries. It drains one slope of each of our two great mountain systems, besides an immense area of wood-land and prairie, and [Pg 163] numerous swamps and marshes. Its upper course and many of its upper tributaries lie in the region once covered by glaciers, though now traversed by great moraines. Its fishes are as diversified as the area it drains. In its mountain streams we find such fishes as the trout, darters, minnows and suckers. In the upland streams are darters, shiners, suckers, sunfishes and small-mouthed black bass. In the channels of the larger tributaries are found the large suckers, buffalo fishes, gar pike, channel catfish, drum, pike and pickerel. The lowland streams contain the dogfish, pirate perch, some sunfishes, the large-mouthed black bass, some suckers, catfishes and other species. Minnows, darters, suckers and sunfishes are found in lowland, upland and mountain streams, though not the same species in each. These fishes belong to families which are made up of many species, some being strictly upland, others strictly lowland, each having a limited range. In the same way we have fresh water fishes and salt water fishes; some fishes, as the trout and salmon and eel, live in both salt and fresh water. Many other fishes, as the killifishes, thrive best in brackish water. Each species of fishes is best fitted for a particular region into which it has been forced to live, either to escape its enemies or to be able to get a living easiest. In its migrations it has moved along lines of least resistance, and has colonized those streams where Mother Nature has been able to do the most for it. The darters are small, perch-like fishes, which seldom exceed a length of six inches, the average being about three. All are active and swift swimmers and well suited for a life among the rocks and swift water of our smaller streams. All countries have small, swift, rocky streams, but few have darters. In their stead we find loaches, gobies, characins, sculpins, and the like. These fishes have "become dwarfed and concentrated, taking the place in their respective habitats which the darters occupy in the waters of the Mississippi valley. By the same process of 'analogous variation' the cichlids of South America parallel the sunfishes of the United States, although in structure and in origin the two groups are diverse."

Dr. Jordan tells us that the trout of the Pacific coast came to America from Asia, and gradually spread eastward and southward until now it is found in all the streams of the Rocky Mountains, the Sierra Nevada, the Cascades and the Coast range. It is but a short distance from Kamchatka to Alaska, and this distance is traveled by trout to this day; once over, a fish able to spend much of its time in salt water could easily colonize all our coast streams. Whether or not all of our Pacific trout are descendants of one species, the cut-throat trout, is more or less uncertain, though it is quite certain that all have descended from not more than two or three species. In many places they have been able to pass from the head waters of one river to that of another, just as they now pass from the head waters of the Columbia to the Missouri by the way of Two Ocean Pass. The ancient lakes, Lahontan and Bonneville, no doubt assisted them in their migrations. Since these have disappeared each colony has had to remain more or less isolated. In time they have become somewhat changed, to better adapt themselves to their new environment. These changes have developed certain peculiar characters, by means of which we can distinguish one kind of trout from another, just as the farmer distinguishes his Berkshire from his Poland China. Spread, as the trout are, over such a large area, in such an immense variety of streams and lakes, and with a vertical range of over one thousand feet, we would certainly expect as large a number of species and varieties of trout to be developed as we find at present in the streams of our west coast.

Fishes are found in the deepest parts of the ocean. Some of these are peculiar to the deep waters, none of the shore fishes resembling them. On the other hand, many deep sea fishes belong to families well represented in the shallow water. The flounders are found in water at all depths, and the same is true of the bat fishes, rock fishes and other shore fishes. It is easy to understand how these fishes have found their way to the deep water. It was either to escape their [Pg 164] enemies or to extend their range for some reason; as Mr. Garman puts it, "They have slid down," as it were to the bottom of the ocean.

In general, animals migrating will always move along lines of least resistance. Some deep-sea fishes have a considerable vertical range. It is thought that some move into shallower water to deposit their eggs or place their young in warmer water, and where the peculiar kind of food they need early in life is the most abundant. To study deep sea fishes is difficult, and so little has been

done that we not only know them imperfectly but also know very little concerning their life histories.

In February, March and April of 1891 the United States Fish Commission steamer Albatross explored a portion of the region between the coasts of Mexico and Central America and the Galapagos Archipelago. Besides obtaining a large number of shore fishes, about nine hundred specimens of fishes were secured, ranging from a depth of one hundred to twenty-two hundred and twenty-three fathoms. This collection was carefully studied by Professor Garman, of Harvard. He found the collection to contain one hundred and eighty species, eighty-five per cent. of which were new to science. The bottoms of the oceans are far from level, and each deep basin has its own peculiar fauna. The shallower parts of the sea prevent migration of the deep water forms and no doubt living as they do in eternal darkness and in a temperature near the freezing point, there is little to induce them to much activity. The fact that they are easily captured in nets of comparatively small size would indicate that they move about slowly.

Dr. Jenkins, who has lately studied the fishes of the Sandwich Islands, informs me that less than five per cent. are found on our American coast, while a large per cent. is found all the way to the Red sea. In other words, the fishes of the Sandwich Islands are East Indian rather than American. This is no doubt caused from the fact that the deep water between the islands of the American coast forms a barrier which has always prevented the two fish faunas from mingling with each other. Between Africa and the Sandwich Islands this has not been the case. A recent study of the fishes of the Galapagos Archipelago shows its fauna to be American, though in what respect its fishes differ from those of our west coast they resemble all the more the fishes of the Sandwich Islands. Two fish faunas will usually differ from each other if separated by an impassable barrier; especially is this true if the barrier be older than the two faunas.

Any barrier which prevents or hinders fishes in their movements from one body of water to another will separate two more or less well-marked fish faunas. These barriers may be mountains, or shallow water, as in the case of deep sea fishes; deep water, as in case of shore fishes; muddy or alkaline water, or water of different temperature. Temperature no doubt has far more influence in governing the movement of fishes than is generally believed. It plays an important part in guiding salmon up stream to their spawning beds. It explains why they reach the head waters of some streams and spawn earlier than in similar streams not far distant, but of different temperature. If you would know to what extent fishes of one region differ from those of another, study well the barriers between the two regions, learn to what extent and how long they have existed, consider the age geologically of the two regions, and how fishes may have migrated to one or the other, and in a general way you will have the key to the situation, which a careful study of the fishes is quite sure to verify.

Seth E. Meek.

[Pg 166]

FROM COL. CHI. ACAD. SCIENCES.

LOUISIANA TANAGER.
(Piranga ludoviciana.)
Life-size.

THE LOUISIANA TANAGER.

(*Piranga ludoviciana*.)

The family of Tanagers is remarkable for the number of species, the gaudy coloring of many and the interesting fact that they are confined to the Americas and the adjacent islands. Dr. Ridgway says, "that the five families of Neotropical birds, which are represented by the greatest number of species, are absolutely peculiar to America, these families being the Tanagers, Tyrant Flycatchers, Wood-hewers, Ant Thrushes and Humming-birds. None of these families have even true representatives in any part of the Old World."

The family of Tanagers includes approximately three hundred and eighty species, of which not more than ten per cent. have a range extending as far north as Southern Mexico, and only four, or at the most five, species are known to the United States. Of these only two, the Scarlet Tanager and the Summer Red-bird, are generally known as far north as Canada.

The Tanagers make their home in the trees, and, being of a retiring disposition, are more numerous within the bounds of the forest. During the breeding season they retire still further into the interior. No wonder that they are more numerous in tropical regions, where the luxuriant foliage of the forests furnishes them with a safe retreat, and where there is an abundance of food suited to their taste. This tendency to avoid the society of man has made the study of their habits much more difficult, and but little has been recorded except that which pertains to the more northern forms.

The food is chiefly insects, especially in the larval form, and berries. To some extent they also feed upon the buds of flowers. Mr. Chapman tells us that "the tropical species are of a roving disposition, and wander through the forests in search of certain trees bearing ripe fruit, near which they may always be found in numbers." Their nests are shallow and the eggs, usually three to five in number, are greenish-blue in color, speckled with brown and purple.

The Louisiana Tanager is a Western species, ranging from British Columbia on the north to Guatemala on the south, and from the Missouri river to the Pacific coast. Our illustration well represents the male. The female, like its sister tanagers, is plainly colored, but still beautiful. It is olive green, with the underside yellowish. The feathers of the wings and tail are brown, edged with olive. It resembles the female Scarlet Tanager. The young are at first like the female. Then appears the black of the back, mixed with some olive and a slight tinge of red on the head.

It would seem that its name is a misnomer, as it is not found in the State of Louisiana.

CHATTER OF A CHAT.

I'm the "Chat." You've heard me if you haven't seen me. But there isn't a better lookin' bird in our wood, either. My olive-green coat is a beauty. My yellow satin vest would dazzle your eyes. And my white china spectacles are heirlooms in our family. My wife dresses just as handsome as I do. I'm a prey to high spirits. Some folk call me a "wag." Don't know what that is, but I don't see the use in bein' doleful. Why, when I get back from Mexico, I feel obliged to holler. So I just holler. The way old Mother Earth rigs up in the Spring makes me full of life. I get down and cool my legs in the deep grass. It brings my appetite back a-whizzin'. My! If I don't eat a thousand bugs a day. "Juicy" don't describe 'em. Then I climb a tree-top and holler. If I eat a thousand bugs seems like I have to give two thousand hollers. I holler straight through a moonlight night. You see, I hate to let old Whippoorwill think he's the only bird alive. Mornin' after folks stop talkin' 'bout how bad they slept and say, "What's that?" somebody says, "That's the Chat." Then they always laugh. And I laugh, too—a very Falstaffian laugh, as if I'se shakin' great fat sides out of their accordion plaits. Then I give a beautiful whistle. And they say, "Now, what's that?" The fellow I know says, "That's the Chat." Then I give a surprised whistle, just as if you stepped on a tack or took a drink of red-hot coffee. And they say, "And what's that?" And the wise man says, "That's the Chat again." Well, says the other fellow, "I'll never know that bird." But the bad sleeper says, "Well, you would if he kept you awake all last night as he did me. He never knows when to stop." But even that fellow will never know when I've said my last word!

These rag folks are awful stupids, anyhow. I call 'em "blunderers." Do more harm than good wherever they're at. My wife knits our house among thorns just to plague 'em. They hate to get their rags torn. Then they'd better keep scarce of our door. If it ain't in blackberry jungles it's in catbrier tangles. I could yarn from sun-up to sundown 'bout how rag folks come blunderin' round interferin'. Barrin' o cat's, they've got the most meddlesome forefeet I ever saw. But it ain't often they find us. Cause why? We keep still. Our next-door neighbor's Dame Indigo. Can't a body go by she don't pop up scoldin' like a house afire. Then they blunder round till they find her nest-eggs, too! Lots of other feather-heads just like her! There's Topknot Cardnal makes such a fuss anybody'd know he's got something to hide. Sure enough, he's had such lots of kin behind the bars it makes him scary. But I'd show more pluck, anyhow.

Once this summer a blunderer smarter'n common came along by us. We had a nice place, too, in a dreadful blackberry tangle. A small sassafras threw a nice shadow over it when the sun got hot. Well, I shut up quick, I tell you. Was just tellin' Mrs. Chat a few things while she kep' an eye on our four eggs like. We kep' still as mice. But didn't that blunderin' rags march right up to our door and push and scratch till she saw what we had? Had a little rag blunderer with her. An' she held her up to look in, too. Every single feather we had stood on end! It was good riddance when they went along. Couldn't believe my specs when I saw they had left our eggs alone. Seven suns after, big rags came back. We're in a peck o' trouble. Our four bairns just out the shell. We both had to scratch round with all our toes to feed and keep 'em breathin'. Been rainin' for a solid week. Dame Chat said she just knew they'd get a chill and die. But the blunderin' party didn't stay long.

Well, sir, we hadn't got rid of that blunderer yet. The nex' time she brought another, bigger one, along. Both crowded up and looked in our door. You never saw such beauties as our bairns that day. Just gettin' so plump and featherin' right along. But it meant a sight o' work for us. They just sat and took in every mouthful we could rake and scrape. They kep' us busy. Well, when these blunderin' rags shook the house the bairns all up and spread their jaws wide open. Rags thought it was awful cute, but I'm thankful they didn't offer to feed 'em anything. Did bad enough, anyhow. Big one said, "Why don't you take their picture?" First rags said she couldn't. Second rags said she'd try, anyhow. With that, first rags began to snap off our best defenses—without so much as by your leave. They scratched her good, anyhow; for she said so. Well, she put some kind of square black gun right up to our door. Dame Chat went into hysterics and those little Chats just boiled over like a teakettle and went out the nest in four different directions! The two blunderers went off in a hurry, both talkin' at once and one suckin' her paw. Thankful to say ain't ever seen 'em since. But Dame Chat's a nervous wreck from the fright they gave her; and I'm worked to skin and bone takin' care of the little Chats. I just wish all the town's fenced in so's blunderers couldn't get loose to meddle round in their bunglin', elephant, rhinoceros way!

[Pg 169]

Elizabeth Nunemacher.

He comes—he comes—the Frost Spirit comes! You may trace his
footsteps now
On the naked woods and the blasted fields, and the brown hill's
withered brow.

He has smitten the leaves of the gray old trees where their pleasant
green came forth,
And the winds, which follow wherever he goes, have shaken them down
to earth.

—John Greenleaf Whittier.

THE LUNA AND POLYPHEMUS MOTHS.

The two silk-worm moths which we figure this month both possess a point of excellence far in advance of any other of our native silk-worm moths; Luna on account of its graceful form and delicate colors, and Polyphemus for the silk of its cocoons.

It seems that most persons who speak of the Luna moth (Tropaea luna) feel called upon to give a more or less poetic description of it. This, I hope, has been rendered unnecessary by the colored plate, so that it will suffice simply to mention that the beautiful shade of green is of very rare occurrence among our larger moths, and that no other has the long, graceful "tails" on the hind wings, a characteristic which adds greatly to the beauty of this insect.

This moth does not seem to be very abundant anywhere, but when once seen will long be remembered on account of its great beauty. The green and yellow colors are evidently very closely related, because either one may, to a greater or less degree, replace the other, so that some of the moths have quite a strong, yellowish tinge. One of our common swallow-tail butterflies (Iphiclides ajax) possesses a very similar green color in its wings, but does not seem to show this tendency to replace the green by yellow. On the wings are four eyespots which are also found in Polyphemus. These are remarkable in that they are transparent in the center. This clear area in Luna is quite small, while in Polyphemus it is about as large as the entire eye spot of Luna. The legs are brown and colored like the front edge of the fore wings. The hairs on the body and at the base of the wing are very long and are white or yellow. The wing expanse ranges from three and three-fourths to five and one-half inches.

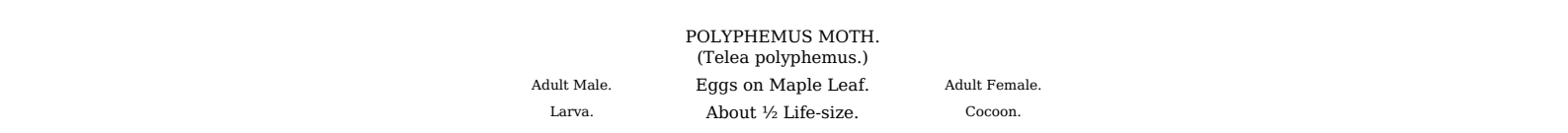
During April or May the mother moth lays her dark-brown or chocolate-colored eggs upon hickory, walnut, beech, oak, and a few others of our forest trees. The limited number of food plants is doubtless one reason for the rarity of the moths, as compared with such a common and almost omnivorous larva as Cecropia. A single moth may lay about one hundred eggs, which are smaller than those of Polyphemus. These hatch in about ten or fifteen days, the larva making its escape by eating a circular hole in the shell. Occasionally a young larva may be seen crawling about for a short time, carrying upon its head or tail the empty shell.

The adult larva is about three inches long, of a delicate pale green, a color very difficult to preserve in the dead larva. Those on the plate have lost this delicate green and have become yellow, but show the form perfectly. This larva is very much like that of Polyphemus, but may be distinguished from it by possessing a longitudinal pale yellow lateral line, which is not found in Polyphemus. Since the cocoon is quite thin and contains but little silk, it is considered of but little value. This cocoon is spun among two or three weaves, and is about two inches long. Some authors claim that the cocoon falls to the ground with the autumnal falling of the leaves; others that it transforms on the ground among the fallen leaves. The cocoon is quite similar to that of Polyphemus, but not so firmly attached when fixed to a stem. The moths emerge in April and May, there being only a single brood in the north, while there are two in the south. [Pg 173]

FROM COL. CHI. ACAD. SCIENCES.

LUNA MOTH.
(Tropaea luna.)

Adult Male. Pupa. Adult Female



The color of the cocoon seems to be influenced in some way by the kind of food eaten by the larva. Cocoons made by larva which have been fed on hickory leaves have a darker color. In the true silk worm moth this same influence has been noticed; larvae fed upon the vine producing red cocoons, on lettuce emerald green cocoons, while those fed upon white nettle produce yellow, green or violet cocoons. It is necessary in order to procure these results, that the larvae be fed upon the mulberry till about twenty days before the formation of the cocoon.

Polyphemus. The life history of this native silk worm (Telea polyphemus) is by far the best known, because many years ago it was very carefully studied with the hope that it would prove an important silk insect. This hope unfortunately has not been realized.

The moths, as shown by the plate, are really beautiful; the large eye spots on the hind wings contributing much towards this effect. The transparent, window-like centers in the eye spot are also of quite rare occurrence among our moths. These transparent areas do not possess the very minute scales found on the other parts of the wing. Almost all of the wonderful variety of colors found in the wings of butterflies and moths are due either to coloring matter in these scales, or to the breaking up of the white light by minute lines on these scales, such as are seen in the play of colors on a soap-bubble. These fine lines on the scales are only on the upper side, and are about one-sixteen-thousandth of an inch apart.

The eggs of Polyphemus are very much flattened, about the size of those of Cecropia, and are deposited on leaves and twigs singly or in small groups. These hatch in about ten days and usually in the morning. The young larva often devours the shell which a few moments before afforded it shelter. This larva feeds upon oak, hickory, apple, maple, elm and a variety of other trees, and thus has a larger range of food plants than the Luna larva. The rate of growth is prodigious, as has been shown by Mr. Trovelot. When the larva hatches it weighs about one-twentieth of a grain; in ten days it weighs one-half of a grain, or ten times its original weight; in twenty days it weighs three grains, or sixty times its original weight; when a month old it weighs thirty-one grains, or six hundred and twenty times its original weight, and has consumed about ninety grains of food; after fifty days it weighs two hundred and seven grains, or over four thousand times the original weight. At fifty-six days the larva has eaten eighty-six thousand times its original weight in food! It is therefore not surprising that these larvae can often be easily detected upon trees by the large number of leaves which they have devoured.

To provide for this great change in size, the larva moults five times, but the time between these moults is not always the same; there is usually about ten days between the first four moults and about twenty between the fourth and fifth. The larva stops eating a day before the moult, spins a few threads upon the leaf to which it attaches its hind legs, and waits for the transformation, which usually takes place in the afternoon. The larva, when mature and ready to spin its cocoon, is about three inches long. It is sometimes influenced in its color by the food plant; the normal larva being of a golden green, although it has been known to show more yellow coloring when found on red maple.

A short time before beginning its cocoon the larva ceases to eat and selects a place for its cocoon. These cocoons are usually found upon the ground among the leaves, but are frequently attached to twigs. After about a half day's work the larva spreads over the inside of the cocoon a gummy, resinous substance, which binds together the threads. After four or five days more of almost continuous work, another coating is smeared over the inside, which renders the cocoon practically air-tight. The silk fibres become considerably finer as the cocoon nears completion and the supply of silk begins to run low. For this reason the inner layers of the cocoon are only about half as strong as the outer ones. The larva, as the supply of silk diminishes in the silk glands, becomes perceptibly reduced in size. It has been estimated that the larva, in attaching the continuous thread of its cocoon, makes two hundred and fifty-four thousand back and forward movements. The cocoons are very strong and dense, of a dirty white color and generally coated with a white powder, the female being the larger. [Pg 174]

There is but a single brood in the north, while in the south there are two.

In order to see if the pupa needed air, Mr. Trovelot sealed up some cocoons over winter in shellac, but the moths emerged in due time after being in an air-tight space for nine months. He also delayed the emergence of the moth till twenty-one months after entering the cocoon by placing it upon ice.

The silk in the spinning glands before it is spun is a clear, transparent fluid. These glands seem to be of excessive size when compared with that of the larva, since, when fully expanded, they reach the great length of twenty-five inches, or about eight times the length of the full-grown larva. These glands are paired, one being found on each side of the body, are considerably folded and taper at each end. The ducts leading from the anterior end of the glands unite to form a single duct which opens below the mouth. The thread is double, being really composed of two different fibres, one from each gland, as may be shown by separating them. The silk in these glands is prepared and sold as silk "gut" to anglers. On account of its transparency when in water, it becomes invisible and thus aids in deluding the wary fish, who does not see any connection

between the line and the baited hook. The "gut" is prepared as follows: Larvae which are ready to spin their cocoons are cut open and placed in strong vinegar for eighteen hours; the glands are then taken out, stretched and dried in the shade.

Six or eight days after beginning the cocoon, the larval skin is moulted and the real chrysalic or pupal stage begins. This stage normally lasts till the following spring or summer. A few days before the time of emergence a pair of glands which open into the mouth become very active and secrete an acidulated fluid which escapes and wets the fore end of the cocoon, causing the resinous material binding together the fibres to become soft. Even cocoons sealed up in shellac and starch have been dissolved by this fluid, and thus the moths have been able to escape. When the cocoon has become sufficiently soft, the moth pushes its way between the fibres, but in doing so often breaks some of the threads, thus making the silk of such cocoons useless for commercial purposes. The moth at the time of emergence, with its folded and crumpled wings, is quite a forlorn-looking object. These wilted wings soon begin to fill up with fluids from the body, which is very large at this time. In some cases, the fluid is driven into the wings with so much force that they swell up, and if such a wing is punctured, thus allowing some of the fluid to escape, the mature wing will be of a smaller size than one from which no fluid has been lost. It must be remembered that it is possible to inflate a butterfly or moth's wing, because the wings of insects are not composed of a single layer, but are sacs of two layers which are closely applied. It is thus possible to split the wing into upper and lower halves, but this can only be done at the time of emergence, when these two layers are not so firmly cemented together as they are in a few hours after emergence.

The enemies of Polyphemus are numerous. Birds prey upon the larvae, in addition to numerous parasitic insects which are very similar to those which destroy Cecropia. The cocoon itself is not a complete protection because rats and squirrels plunder them. We thus see that the life of even an insect is full of dangers, and that it is really a wonder that so many are able to become mature and reproduce.

The silk-worm moths are excellent illustrations of what is called complete metamorphosis in insects. An insect like the grasshopper, when it hatches from the egg, is very much like the adult insect in its general form and appearance; the most evident difference being the lack of wings. An insect which shows such slight changes in its growth to maturity is said to have an incomplete metamorphosis. It is incomplete in the sense that the change is not of a very radical nature. But in the case of the silk worm moths, and moths and butterflies in general, the larva which hatches from the eggs has not even the most superficial resemblance to the adult insect, the fully-developed moth. This necessitates a complete change or metamorphosis in the form and structure of the insect before it can become mature. This great change is accomplished during the quiet pupal stage in the cocoon. Because the pupa is apparently passive when viewed from the exterior, one must not conclude that it is so internally; far from it; the digestive organs of the larva must be completely made over from those of a chewing leaf eater to those of a moth which can only take liquid food.

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Charles Christopher Adams.

CASTLES IN THE AIR.

In a little bend of the San Joaquin River, where the current, attempting to straighten its course, has left a bank a few feet wide, there is a small grove of tall cottonwood trees, perhaps a dozen in number, whose branches lean far over the stream and whose tops reach almost to the level of the bluff or rather the floor of the valley 250 feet above, for this swift river has, in the course of ages, cut thus deep a channel for itself.

The place is not easy of access, for the shore narrows above and below the bend to a few inches where one with difficulty keeps from crumbling away the sand with his feet and falling into the water, and the cliff is so nearly perpendicular that in many places it is inaccessible to a climber, being of soft sand whose different stratas are clearly defined where they have been sliced off by the cutting stream.

The valley above is a vast grainfield out almost to the edge of the bluff, and along the edge and face of the bluff, wherever root can cling or tendril hold, grow beautiful wild flowers in the early spring days—their last refuge between the cultivation and the deep sea, or rather, river.

In the tops of the cottonwoods live a number of baronial families in castles huge, gray and ugly, overlooking the sweep of the stream. They are the Great Blue Herons whose Latin title, (Ardea herodias), gives one some idea of their ancient lineage. They claim to be older than the storks of Egypt, and indeed, they look older as they stand humpbacked and sleepy on one leg by the side of their nests, the long fringe of light-speckled neck feathers underneath looking like a long gray beard sweeping over their recurved neck and breast. There is a wise look about them, too, for the black markings of the head sweep back over the eye and prolong into the appearance of a quill extending behind their ears.

Though they are almost four feet long and spread their wings to six feet and over, the herons' large blue-grey bodies are often almost indistinguishable from the bark of the cottonwood branches and the blue of the sky against which they are silhouetted so oddly. One's eyes open [Pg 176] with astonishment when these sticks or excrescences of the tree-tops slowly unfold an enormous sweep of sail and, extending their long stilts behind them, flap off across the stream with a creaking sound like the pulleys of a vessel when the halliards are running through them. Standing or flapping they are not handsome birds and one who comes suddenly upon a large heron for the first time as he stands in the shallow water of the brookside, will be convulsed with laughter, for if there is an utterly clumsy and awkward form or motion in bird-life it belongs to this heron.

Their homes are big baskets of nests made of twigs as large as a man's finger, closely intermeshed. From year to year they use the same nest or build over it until it has two or three stories or more and is bigger than a bushel basket. There are probably two dozen nests in the dozen cottonwood trees, some of the larger trees having three or four or even six away up in their tops where the branches seem scarcely strong enough to bear such heavy burdens. From the top of the bluff one can look down into the nests and in early March see the big blue eggs, almost as large as hens' eggs, reposing like amethysts in their rough brown setting. Some authors state that not over three eggs are laid, but I have seen four about as often as three and, on one occasion, five in a nest.

From their high-placed towers the herons watch the small fry in the river below and make forays among the young trout, pike and catfish and the frogs. They listen to the complaining voices in the twilight and in the morning give them cause for still further complainings. They keep in terror the big wood rats whose homes in the clumps of elder berries below surpass in size those of the herons. And the gophers and field mice of the grain fields never know at what moment an ungainly shadow shall fall upon them and end their harvestings. There was a conceited young frog who sang loud and shrill at sunset on the edge of the river and who had an ambition to be, not an ox like the one in the fable, but a Patti. And she had her wish after a fashion, for that connoisseur, the heron who dwelt on the farthest branch over the water, attracted by her vocal abilities, sought her out, and the little herons thought her the nicest *paté de foie gras* they had ever eaten.

There they dwell, this ancient race of high-born philosophers, stalking the shallows of sunny baylets, or dreaming in the breeze of the tree-tops of traditions old as the sequoias. What an authority would you and I be if we could read the unwritten history of their race!

Charles Elmer Jenny.

Boughs are daily rifled
By the gusty thieves,
And the Book of Nature
Getteth short of leaves.
—Hood, "The Seasons."

FROM COL. CHI. ACAD. SCIENCES.

PRONG-HORNED ANTELOPE.
(Antilocapra americana.)
Greatly reduced.

THE PRONG-HORNED ANTELOPE.

(*Antilocapra americana.*)

The antelope family comprises many of the most beautiful and graceful species among horned animals. When we behold the curiously twisted horns of the sasin, the long, sharp horns of the pasan, the large, spiral horns of the koodoo and the shorter horns of the eland, not to mention the graceful bodies and limbs of these animals, we are led to wonder at the extravagance of nature in furnishing such a variety of appendages to these creatures.

By far the larger number of species of this family live in Africa and Asia, where they have reached the highest development of structure. They are not, like some families of mammals, confined to any one particular locality, but are found on the plains and high up on the mountains; in a country sparsely covered with vegetation and in the thick forests; in marshes and bogs. In fact, they seem to inhabit all varieties of country. While the family is thus diversified in habitat, the different species are by no means so widely distributed, for while some species, like the sasin, live only on the open plains, others, like the chamois, live high up on the mountains, frequently above the snow-line.

The subject of our sketch, the Prong-horned antelope (Antilocapra americana), is not as large nor so strikingly horned as the other animals which have been mentioned. In fact, so different is its structure, having hollow, pronged horns which do not increase by continuous growth, as do those of the true antelopes, but are shed like those of the deer family, and having a somewhat different structure of feet and different texture of hair, that a family has been made for it known as Antilocapridae.

The Prong-horn ranges throughout the western part of North America from the Missouri river to the Pacific ocean, and from the Saskatchewan river south to the Rio Grande. It is not confined to the plains, but has been found in the wild valleys of the Rocky mountains to a height of over eight thousand feet above sea level.

The daily life of this interesting animal is thus described by Canfield, who made an exhaustive study of them and who also kept them in captivity: "From the first of September to the first of March one always sees them in larger groups composed of bucks, does and yearlings. Shortly afterward the does individually retire from these herds and give birth to their young. After a short interval they again unite with other suckling does and their little calves, possibly with a view to common defense against the wolf and coyotes. The adult bucks roam about singly or two together, leaving the mothers with their latest progeny to their fate, the young Prong-horns in the meantime gathering in groups of their own apart from the older animals. Apparently tired of the world and bored by society the old bucks wander about for one or two months, frequenting localities in which they are not ordinarily seen. Two or three months subsequently the adolescent bucks again join the old does and their calves, and finally the old bucks also put in an appearance, so that one can observe herds, numbering hundreds, or sometimes even thousands, after the first of September. A herd never leaves its native locality or roams over more than a few miles of range. In dry summer weather they seek water and go to drink regularly once a day or twice in three days; but if the grass is fresh and green, as is the case during the greater part of the year, the Prong-horns do not drink at all." [Pg 180]

The food of the antelope consists to a great extent of the short, succulent herbage of the prairie, of moss, and also, to a limited extent, of the young and tender branches of trees. Like many other ruminants, this animal is passionately fond of salt and they will remain about saline deposits for many hours, satisfying themselves by licking the salty ground.

The antelope is the swiftest runner of any animal in North America, though perhaps less agile and speedy than some of its relatives in the old world. It has been said by competent observers that so swiftly do they run that it is absolutely impossible to distinguish their limbs.

The senses of the antelope are unusually developed. Their sight is exceedingly keen and their hearing very acute. Their sense of smell is so well developed that no danger can possibly approach from the windward side. When a herd is feeding, sentinels are placed on the outskirts to scent any impending danger, and to give due warning to the herd. Their curiosity is one of their most peculiar qualities and seems to overshadow every other sense.

For a number of years this graceful animal has been considered royal game for the sportsman and a good round-up of antelopes is considered a great achievement among hunters. Mr. G. O. Shields, in his interesting book, "Hunting in the Great West," very vividly describes a hunt for antelopes, and we cannot better illustrate the peculiarities of the animal than by giving his pen sketch:

"We had heard from some ranchmen along the way that the buffalo herd was at this time grazing about fifteen to twenty miles up the Big Porcupine, and knowing that antelopes are nearly always found hanging on the outskirts of every large herd of bison, we were on the look-out for them, for it would not seem at all strange to find them near the stage trail on which we were traveling. We scanned the country closely with the field glass and were finally rewarded by seeing a number of small white spots on the dead grass away up the Porcupine, that seemed to be moving. We rode toward them at a lively trot for perhaps a mile, and then stopped to reconnoitre again. From this point we could plainly distinguish them, though they looked to be about the size of jack rabbits. We again put the rowels to our donkeys and rode rapidly up to within about a mile of them, when

we picketed our animals in a low swale, took out our antelope flag—a piece of scarlet calico about half a yard square—attached it to the end of my wiping stick, and were ready to interview the antelopes.

"I crawled to the top of a ridge within plain view of the game, and planted my flag. The breeze spread it out, kept it fluttering, and it soon attracted their attention. They were then near the bank of the river, grazing quietly, but this bit of colored rag excited their curiosity to a degree that rendered them restive, anxious, uneasy, and they seemed at once to be seized with an insatiable desire to find out what it was. An antelope has as much curiosity as a woman, and when they see any object that they don't quite understand, they will travel miles and run themselves into all kinds of danger to find out what it is. They have been known to follow an emigrant or freight wagon with a white cover several miles, and an Indian brings them within reach of his arrow by standing in plain view wrapped in his red blanket. Some hunters "flag" them by lying down on their back, holding one foot as high as possible, and swinging it to and fro. A piece of bright tin or a mirror answers the same purpose on a clear day. Almost any conspicuous or strange-looking object will attract them, but the most convenient, as well as the most reliable at all times, is the little red flag, such as we employed in this instance.

"Huffman went to the top of another ridge, to my right and some distance in advance, and Jack crawled into a hollow on the left, and well in advance, we three forming a half circle, into which it was our intention if possible to decoy the game. When they first discovered our flag they moved rapidly toward it, sometimes breaking into a trot, but when they had covered half the distance between us and their starting point, they began to grow suspicious and stopped. They circled around, turned back, walked a few steps, and then paused and looked back at the, to them, mysterious apparition. But they could not resist its magic influence. Again they turned and came toward it, stopped, and gazed curiously at it. The old buck who led the herd stamped impatiently, as if annoyed at being unable to solve the mystery. Then they walked cautiously toward us again, down an incline into a valley, which took them out of our sight, and out of sight of the flag. This of course rendered them still more impatient, and when they again came in sight on the next ridge, they were running. But as soon as their leader caught sight of the flag, he stopped, as did the others in their turn when they reached the top of the ridge. There were seven in the herd, two bucks, three does and two fawns. They were now not more than a hundred yards from me, and still less from the other two of our party. Their position was everything we could wish, and though we might possibly have brought them a few yards nearer, there was a possibility of their scenting us, even across the wind, which, of course, we had arranged to have in our favor, and I decided that rather than run the risk of this and the consequent stampede, I would shoot while I had a good chance. It had been arranged that I was to open the ball, so I drew my peep and globe sights down very finely, taking the white breast of the old buck for my bull's-eye, and pulled. Huffman's Kennedy and Jack's carbine paid their compliments to the pretty visitors at almost the same instant, and for about two or three minutes thereafter we fanned them about as vigorously as ever a herd got fanned under similar circumstances. The air was full of leaden missiles; the dry dust raised under and around the fleeing herd as it does when a team trots over a dusty road. Clouds of smoke hung over us, and the distant hills echoed the music of our artillery until the last white rump disappeared in the cottonwoods on the river bank.

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"When the smoke of battle cleared away, and we looked over the field, we found that we had not burned our powder in vain. Five of the little fellows, the two bucks and three does, had fallen victims to their curiosity. The two fawns had, strangely enough, escaped, probably only because they, so much smaller than their parents, were less exposed."

The antelope have a curious way of protecting their young, when on the open prairie. This is accomplished by placing a ring of sharp-pointed cacti about a spot which has been beaten smooth by their hoofs. Inside this ample protection the animal cares for its young and secures ingress and egress for itself by jumping over the ring of cacti. This serves to protect them from the majority of their foes, which inhabit the open country.

The antelope does not thrive well in captivity, the older ones soon killing themselves in their attempts to escape. The young taken soon after their birth generally die early, unless very special care is bestowed upon them, and even if they survive the juvenile state, they are very likely to die when three or four months old, from pyaemic sores or inflammation of the limbs.

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PLANT PROTECTION.

In the last number of this journal it was shown how plants seek to avoid the visits of unsuitable insects to their flowers. This is one means of protection, but there are many others which are even more striking and vital. It is supposed by many that plants are helpless beings, which must submit to all sorts of unfavorable conditions which come upon them. This is far from true, for while plants as a rule are fixed and unable to escape from danger by flight, still they have very many ways of helping themselves.

Prominent among the dangers which come to active green plants are those which arise from too intense light, which may destroy the delicate working substances. Since the leaves are the great working organs in the manufacture of food, they are especially equipped for protection. Those leaves which must work in exposed places have many details of structure which are evidently for guarding them against the ill effects of too intense light. The most striking adaptations, however, are those which have to do with protective positions. Under ordinary circumstances leaves are placed so that their flat faces are exposed to the most intense light. In some cases this is so great a danger that the leaves are set edgewise, the edges being directed upwards and downwards. When a plant assumes this habit, the leaves are said to be in a profile position, and the plants are sometimes called "compass plants." The latter name has come from the fact that such leaves usually point north or south, and once it was assumed that this position was in response to some mysterious magnetic influence. It is found, however, that it is merely an effort on the part of the plant to protect its leaves from the intense light of midday, and at the same time to expose them to the morning and evening rays of much less intensity. If a leaf is to be placed with its edge upwards and its flat faces east and west, it follows of necessity that it will point either north or south.

Some leaves, however, have the power of shifting their position according to their needs, directing their flat surfaces toward the light, or more or less inclining them according to the danger. Perhaps the most completely adapted leaves of this kind are those of the "sensitive plants," whose leaves respond to various external influences by changing their positions. The sensitive plants abound in dry and hot regions, and one of the best known is represented in our illustration. It will be noticed that the leaves of this Mimosa are divided into very numerous small leaflets, which stretch in pairs along the leaf branches. When the time of intense light and dryness approaches some of the pairs of leaflets fold together, slightly reducing the surface exposure. As the unfavorable condition continues, more leaflets fold together, then still others, until finally all the leaflets may be folded together, and the leaves themselves may bend against the stem. It is like a sailing vessel gradually taking in sail as a storm approaches, until finally nothing is exposed, and the vessel weathers the storm by presenting only bare poles. These are but a few illustrations of the very numerous devices for escaping too intense light and the dangers which accompany it.

PLANTS PRESENTED BY LINCOLN PARK COMMISSIONERS.

SENSITIVE PLANT. (Mimosa pudica.)

Awake.

Asleep

One common danger in temperate regions comes from the lowering of the temperature each night, which sometimes may chill the living substances to the danger point. This is particularly dangerous to seedlings, whose tender structures have not yet developed the ordinary protective coats. In the spring the seed leaves of numerous seedlings may be seen at the approach of night to rise upward and come together, just as the palms of the hand may be placed together over one's head. This reduces the surface of exposure and the danger of chill at least one-half. Darwin experimented upon these seedlings, and discovered that by preventing some of the seed leaves from moving, the seedlings were seriously injured. The leaves of very many plants assume a peculiar night position which tends to meet the danger of loss of heat. Often the three leaflets of the common clover, if growing in an exposed place, may be observed to fold together into a sort of tent-like arrangement.

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Many plants are also observed to protect themselves against rain, as it is necessary for leaves to avoid becoming wet. If the water is allowed to soak in, the work of the leaves is at once interfered

with. Hence it will be noticed that most leaves are able to shed water, partly by their position, partly by their structure. In many plants the leaves are so arranged that the water runs off toward the stem; in other plants the rain is shed outwards as from the eaves of a house. Some of the structures which prevent the rain from soaking in are a smooth epidermis, layers of cuticle, hairy coverings, etc. Interesting experiments may be performed with different leaves to test their power of shedding water. If a gentle spray be allowed to play upon different plants it will be observed that the water glances off at once from the surfaces of some leaves, runs off more slightly from others, and may be more or less retained by others.

Perhaps the most general preparation for protection in our region is that which is made for the coming of the winter's cold. In many cases plants do not attempt to protect their delicate structures from the severity of winter, but disappear entirely, leaving only well-protected seeds to carry them over into the next growing season. This results in the so-called "annual habit," which has been learned by many plants in order to escape a season of danger. Other plants do not disappear so completely, but everything above the surface of the ground dies, while the plant continues in the form of underground bulbs, tubers, or various thickened structures. This habit of seeking a subterranean retreat at the approach of some dangerous season is a very good one, and is found in many of our early spring plants. This subterranean habit has a great advantage over the annual habit, since a seed is very slow in bringing the plant back again, while a bulb can produce its plant very rapidly.

Still other plants preserve more of their structures than either the annuals or the ground-loving plants. For example, most of our trees have cultivated what is known as the deciduous habit, that is, they merely drop their leaves, which are the endangered structures, at the approach of the unfavorable season, and renew them again when the favorable conditions return. It should be remarked that these leaves do not fall because they are broken off, but that in a certain sense it is a process of growing off, which is carefully prepared for. One of the most prominent features associated with the deciduous habit is the autumnal coloration. The vivid colors which appear in the leaves of many trees just before the time of falling have attracted a great deal of attention, but although it is so prominent, the causes for it are very obscure. It will be noticed that this autumnal coloration consists in the development of various shades of two typical colors, yellow and red. It is known that the yellow is due to the breaking down of the green substances, so that it simply indicates a post mortem change, as may be noticed in connection with the blanching of celery in which the leaves and upper part of the stem may be green, the green may shade gradually into yellow, and finally into the pure white of complete blanching. The red coloring matter, however, is very different. Certain experiments upon plant colors have indicated that the presence of the red slightly increases the temperature by absorbing more heat. It is suggested that the red color may be a slight protection to the living substance which is ceasing to work, and which is in danger of exposure to cold. If this be true, it may be that the same explanation will [Pg 186] cover the case of the red flush so conspicuous in buds and young leaves in early spring. It must not be supposed that the need of protection has developed the coloring, but since it is developed it may be of some such service to the plant. Even the conditions which determine autumnal coloration have not been made out certainly.

It is instructive to notice how differently the so-called evergreens, as pines, spruces, etc., have answered the problem of protection against the cold of winter. The evergreens, instead of dropping their leaves, have undertaken to protect them, giving them a small surface and very heavy walls. In this way protection has been secured at the expense of working power during the season of work. Reduced surface and thick walls are both obstacles to leaf work. On the other hand, the deciduous trees have developed the working power of their leaves to the greatest extent, giving them large surface exposure and comparatively delicate walls. It is out of the question to protect such an amount of surface during the winter, and hence the deciduous habit. The evergreens are saved the annual renewal of leaves, but lose in working power; the deciduous trees must renew their leaves annually, but gain greatly in working power.

To obtain the most striking instances of protection, however, one must examine plants which belong to permanently dry regions, such as may be found in the United States along the Mexican border, or in the regions of tropical deserts. In the first place, it will be noticed that the plants in general produce smaller leaves than in other regions. That this holds a direct relation to the dry conditions is evident from the fact that the same plant often produces smaller leaves in dry conditions than in moist. One of the most striking features of an arid country is the absence of large leaves. These reduced leaves are of various forms, such as the needle leaves of pines, or the thread-like leaves of certain sedges and grasses, or the narrow leaves with inrolled margins such as is common in many heath plants. The extreme of leaf reduction has been reached by the Cactus plants, whose leaves, so far as foliage is concerned, have disappeared entirely, and the leaf work is done by the surface of the globular, cylindrical, or flattened stems. A covering of hairs is an effective sun screen, and it is very common to find plants of dry regions characteristically hairy. In such regions it is to be observed also that dwarf growths prevail, so that the plant, as a whole, does not present such an exposure to the drouth as in regions of greater moisture. One of the most prominent measures of protection in dry regions is the organization of what are known as water reservoirs. Nearly all plants of such regions have leaves which are known as fleshy, that is, they are thick and juicy, being reservoirs of stored up moisture which is doled out cautiously according to the needs of the plant, without any wastefulness.

The whole subject of plant protection is an immense one, and the illustrations given above are

merely intended to suggest that there is such a subject, and to lead to some observation of the various schemes of protection which are to be seen plainly on every hand.

John Merle Coulter.

Nature is but a name for an effect
Whose cause is God.
—Cowper, "The Task."

THE BIRTH OF A TREE.

Once I lay 'neath quilt of green,
  All unthought of, all unseen;
Little thinking of the world
  Out of which I had been hurled.

By and by, when quilt grew hot,
  Mother Nature touched my cot,
Whispered softly in my ear,
  "Higher, higher, higher, dear."

Painted lovely scenes for me,
  Saying, "Child, climb up and see."
I was lazy, so I said,
  "Please, ma'am, let me stay in bed."

Something whispered, "Child, I fear
  Life will be but meager here."
Golden sunbeams bade me start,
  And a purpose filled my heart.

I would leave my bed of ease,
  I would join the forest trees;
Shelter travelers passing by,
  Hide squirrels in the branches high.

Purpose, mighty power, led,
  Ever, ever on ahead,
Till I grew up here so high,
  Near the sunlight and the sky.

Mother Nature, mother dear,
  I am glad you called me here.
Thus the mighty forest oak
  From his wooded homeland spoke.

And I thought a lesson this—
  We, to reach the highest bliss,
Must arise from beds of ease,
  Growing like the forest trees.

Lucia Belle Cook.

THE ALMOND.

(*Amygdalus communis L.*.)

> And it came to pass that on the morrow Moses went into the tabernacle of witness; and behold, the rod of Aaron for the house of Levi was budded, and brought forth buds, and blossomed blossoms, and yielded *almonds*.—Numbers 17:8.

The almond is the fruit of a small tree (Amygdalus communis) belonging to the Rose family (Rosaceae). The plant is believed to be a native of northern Africa, Persia and Turkestan. It occurs wild in Sicily and Greece and is cultivated throughout temperate Europe, including England.

The leaves of the almond tree are simple, broadly lanceolate, margins serrate, bright green and stalked. The flowers are nearly sessile, mostly solitary, petals bright pink; otherwise similar to the flowers of the rose family as seen in the apple blossom, cherry blossom and the wild rose. The fruit is a drupe or stone fruit, resembling the peach in its general structural characters. It is, however, much smaller, measuring about one and one-half inch in length. As in the peach the outer portion of the fruit coat (sarcocarp) is fleshy, the inner portion (endocarp or putamen) is hard and encloses the kernel or seed to which the term almond is usually applied. The plant is very ornamental, producing its beautiful flowers in March before the leaves are developed.

Two natural varieties of almonds are quite universally recognized, the sweet (A. communis var dulcis) and the bitter (A. communis var amara). They resemble each other so closely in general appearance that it is practically impossible to distinguish between them. The principal difference lies in the chemistry of the kernels or seeds themselves. In the bitter variety amygdalin is found, which is practically wanting in the sweet variety. Some botanists describe quite a number of varieties. Karsten, for instance, describes five varieties of A. communis, namely, dulcis, amara, fragilis, macrocarpa and persicoides. Boissier in his Flora Orientalis describes as many as seventeen distinct species.

The almond tree is one of the oldest of the cultivated plants. It was a great garden favorite in and about Palestine. It is frequently mentioned in the books of Moses. In Exodus 25:34, we find that the "candlestick shall have four bowls made like unto almonds." As explained in the 8th verse of chapter 17 of Numbers the blossoming rod of Aaron was from an almond tree. Even to this day Jews carry rods bearing almond blossoms to the synagogues on great festival days. The Romans designated the almonds (the kernels or seeds with the hard endocarp or shell) Nuces graecae (Greek nuts), from which it is concluded that the almond tree was brought to Italy from Greece. Almond oil was known to the ancient Greek and Roman writers. Plinius and Dioscorides make reference to the gum which exudes from the bark. Karl der Grosse (Charlemagne) recommended the cultivation of almonds in Germany. In view of the fact that some authorities state that the sweet variety is a product of cultivation, it is interesting to note that the two varieties have been known equally long. The bitter variety was described by Scribonius Largus and Plinius. Alexander Trallianus described the medicinal virtues of the oil of bitter almonds. Palladinus gave directions how to convert the bitter variety into the sweet variety by methods of cultivation. Later experiments have, however, proven this to be a false conclusion. [Pg 191]

FROM KŒHLER'S MEDICINAL-PFLANZEN.

ALMOND.

CHICAGO: A. W. MUMFORD, PUBLISHER.

Description of Plate:—A, B, branch with flowers and fruit; 1, 1a, flowers from different trees; 2, 2a, petals; 3, stamens; 4, pollen; 5, stamen; 6, 7, ovary; 8, 9, seed with shell; 10, seed without shell; 11, 12, sections of seed.

The fruit and seeds of several other plants are known as almonds. The seeds of the African shrub Brabejum stellatifolium are known as African almonds. Country almonds is a name given to the fruit of the East Indian tree Terminalia Catappa. The fruit of Canarium commune is known as Java almonds.

At the present time the sweet almond is extensively cultivated in northern Africa, southern Europe and in the warmer parts of the United States, particularly in California. Climatic conditions and cultivation have a great influence upon the quality of the almonds and we have as a result quite a number of commercial varieties, just as we have commercial varieties of coffee, tea, oranges, etc. The more important commercial varieties are the Jordan, Valencia, Barbary and California almonds. These vary somewhat in size, form and thickness of the kernel and the hardness and thickness of the shell (endocarp). The Jordan almonds are imported from Malaga (Spain) and are said to be the finest. They differ from the others in the greater length of the kernel (seed), for which reason they are also known as long almonds. These are official in the English Pharmacopoeia because they are not readily confused with other sweet varieties and the bitter almond. The Valencia almonds come from the Balearic islands (Majorca); they are characterized by a comparatively soft shell and are less highly prized than the Jordan or the California almonds. The Barbary almonds from northern Africa are quite small and unsightly and for those reasons have comparatively little commercial value. In the United States the principal commercial variety is the California almond. The kernel is shorter and flatter than that of the Jordan almond, but almost equal to it in quality. It is extensively cultivated, about one hundred trees being planted to the acre. The trees attain a height of fifteen to twenty feet and begin to yield when three years old. In California it is customary to bleach the almonds by exposing them to the vapor of burning sulphur, which also destroys insect parasites which attack almonds very readily.

Other less important sweet commercial varieties are the Provence almonds of southern France, the Florence and Ambrosia almonds of Sicily, the Pitti almonds of Portugal and the small Puglia almonds of Italy.

The bitter almond seeds are as a rule somewhat shorter, broader and thinner than those of the larger, sweet varieties. Those found upon the market are largely from northern Africa, Sicily and southern France.

The principal constituents of sweet almonds are a fixed oil, sugar, some albuminoid substances, and perhaps a small quantity of amygdalin or a substance akin to it. The purified fixed oil from both varieties of almonds is a bland, thin, pale yellow liquid, having a faint taste and odor of the almond. When exposed to the air it becomes rancid quite readily. Medicinally it finds use as an emollient in external applications. Taken internally in small doses it is nutritious; in large doses laxative. Mixed with mucilage or yolk of eggs and sugar it is found useful in allaying troublesome coughs due to irritation of the throat. It also finds a table use similar to that of olive oil.

Bitter almonds contain a very poisonous volatile oil in addition to the fixed oil just described. In small quantities this oil finds a use for flavoring by the cook and confectioner, and by the perfumer for scenting toilet soaps and for other purposes. This oil is obtained by distillation after the fixed oil has been expressed. It is the product of the decomposition of amygdalin under the influence of emulsin and water. The poisonous properties of this oil are due to the hydrocyanic acid which is present. This acid may be removed and the oil is then known as purified oil of bitter almonds. Even the purified oil is not safe, as it decomposes quite readily unless all of the water is removed by the use of fused chloride of lime.

The symptoms of poisoning from the oil of bitter almonds, or from a quantity of the bitter almonds, are the same as from a dose of hydrocyanic acid. Medicinally the oil is used like hydrocyanic acid in various disorders of nervous origin, as whooping cough, spasmodic troubles, etc. [Pg 192]

Sweet almonds are variously employed. Roasted and salted almonds are very much liked by everybody. Almonds for the table must first be "blanched," that is, the outer, reddish brown, thin seed coat must be removed, as it contains irritant properties. They are used in making cake and other pastry. Cake or bread made from almond meal has been recommended as a substitute for ordinary bread in the treatment of diabetes, as it is free from starch, a food substance which proves harmful in this disease. Almond cake is a term applied to the crushed seeds from which the oil has been expressed. Finely-powdered this is used for washing hands and face. Almond paste is a cosmetic made from powdered bitter almonds, white of egg, rose water and rectified spirits. It is used to soften the skin and prevent chapping of hands. An emulsion of sweet almonds is also used as a substitute for milk in feeding infants.

Albert Schneider.

Nature, the Vicar of the Almightie Lord.
—Chaucer, "The Assembly of Foules."

All Nature is but art, unknown to thee;
All chance, direction, which thou canst not see;
All discord, harmony not understood;
All partial evil, universal good;
And, spite of pride, in erring reason's spite,
One truth is clear, whatever is, is right.
—Pope, "Essay on Man."

Nature is a frugal mother, and never gives without measure.

—Emerson, "Essays."

But who can paint
Like Nature! Can imagination boast
Amid its gay creations hues like hers?
—Thompson, "Seasons."

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.

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