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# BIRDS AND NATURE.

ILLUSTRATED BY COLOR PHOTOGRAPHY.

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Vol. IX

JANUARY, 1901.

No. 1

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**BIRDS and NATURE**

IN NATURAL COLORS

A MONTHLY SERIAL  
FORTY ILLUSTRATIONS BY COLOR PHOTOGRAPHY  
A GUIDE IN THE STUDY OF NATURE

TWO VOLUMES EACH YEAR  
VOLUME IX  
JANUARY, 1901, TO MAY, 1901

EDITED BY WILLIAM KERR HIGLEY

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## BIRDS AND NATURE.

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### THE OLD YEAR.

Ring out, wild bells, to the wild sky,  
The flying cloud, the frosty light:  
The year is dying in the night;

Ring out, wild bells, and let him die.

Ring out the old, ring in the new,  
Ring, happy bells, across the snow:  
The year is going, let him go;  
Ring out the false, ring in the true.

Ring out the grief that saps the mind,  
For those that here we see no more;  
Ring out the feud of rich and poor,  
Ring in redress to all mankind.

Ring out false pride in place and blood,  
The civic slander and the spite;  
Ring in the love of truth and right,  
Ring in the common love of good.

Ring out old shapes of foul disease,  
Ring out the narrowing lust of gold;  
Ring out the thousand wars of old,  
Ring in the thousand years of peace.

Ring in the valiant man and free,  
The larger heart, the kindlier hand;  
Ring out the darkness of the land,  
Ring in the Christ that is to be.

—Alfred Tennyson.

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## THE WHITE-WINGED CROSSBILL. (*Loxia leucoptera.*)

The Crossbills, together with the finches, the sparrows, the grosbeaks, the redpolls, the goldfinches, the towhees, the cardinals, the longspurs, and the buntings, belong to that large family of perching birds called the Fringillidae, from the Latin word Fringilla, meaning a finch.

Mr. Chapman tells us, in his "Birds of Eastern North America," that "this, the largest family of birds, contains some five hundred and fifty species, which are represented in all parts of the world, except the Australian region. Its members present a wide diversity of form and habit, but generally agree in possessing stout, conical bills, which are admirably adapted to crush seeds. They are thus chief among seed-eaters, and for this reason are not so migratory as insect-eating species." Many of the birds most highly prized for the cage and as songsters are representatives of this family and many of the species are greatly admired for their beautiful coloring. The White-Winged Crossbill is a native of the northern part of North America, migrating southward into the United States during the winter months. Its technical name, *Loxia leucoptera*, is most appropriate and descriptive. The generic name *Loxia* is derived from the Greek *loxos*, meaning crosswise or slanting, and the specific name *leucoptera* is from two Greek works, meaning white and wing, and has reference to the white tips of the feathers of the wings. The common name, Crossbill, or, as the bird is sometimes called, Crossbeak, describes the peculiar structure of the bill which marks them as perhaps the most peculiar of our song birds. The bill is quite deeply cut at the base and compressed near the tips of the two parts, which are quite abruptly bent, one upward and the other downward, so that the points cross at an angle of about forty-five degrees. This characteristic gives this bird a parrot-like appearance. The similarity is heightened by the fact that these hook-like bills are used by the birds to assist in climbing from branch to branch.

The Crossbills are even parrot-like in captivity. Dr. Ridgway, in the "Ornithology of Illinois," writes as follows regarding the habits of a pair: "They were very tame, and were exceedingly interesting little pets. Their movements in the cage were like those of caged parrots in every respect, except that they were far more easy and rapid. They clung to the sides and upper wires of the cage with their feet, hung down from them, and seemed to enjoy the practice of walking with their head downward. They were in full song, and both the male and female were quite good singers. Their songs were irregular and varied, but sweet and musical. They ate almost every kind of food, but were especially eager for slices of raw apple. Although while they lived they were continually bickering over their food, yet when the female was accidentally choked by a bit of egg shell her mate was inconsolable, ceased to sing, refused his food, and died of grief in a very few days."

Their peculiar bills are especially fitted for obtaining their food, which consists to a great extent of the seeds of cone-bearing trees, such as the pine, the hemlock and the spruce. The ornithologist Wilson says: "On first glancing at the bill of this extraordinary bird one is apt to pronounce it deformed and monstrous; but, on attentively observing the use to which it is applied by the owner and the dexterity with which he detaches the seeds of the pine-tree from the cone and from the husks that inclose them, we are obliged to confess on this, as on many other occasions where we have judged too hastily of the operations of nature, that no other conformation could have been so excellently adapted to the purpose; and that its deviation from the common form, instead of being a defect or monstrosity as the celebrated French naturalist insinuates, is a striking proof of the wisdom of the great Creator."



WHITE-WINGED CROSSBILL.  
(*Loxia leucoptera*.)  
About  $\frac{2}{3}$  Life-size.  
FROM COL. F. M. WOODRUFF.

As an accidental malformation this structure of the bill has been noted among other birds, and, it is said, with some frequency among the crows. A mediaeval legend gives as the cause for this conformation of the bill and the red color of the plumage that it was acquired "in recognition of the pity it bestowed on the suffering Savior at the Crucifixion." 5

Probably due to the nature of their food, which can usually be procured in any season, these birds are apparently not under the control of the usual laws that govern migration, but wander about in a seemingly aimless manner and are not influenced to any great extent by the changing seasons. They do not seem to be a constant inhabitant of any given locality for any length of time, but appear and disappear as if constantly dissatisfied with their surroundings.

The two sexes vary in color, the body of the male being a dull carmine-red, which is brighter on the rump, and that of the female is brownish, tinged with olive-green and with brownish yellow on the rump. The young males are similar in color to the females, but pass through a changeable plumage while maturing.

The Crossbill usually builds its nest in a cone-bearing tree and does not always choose the most inconspicuous locality. The nest is generally constructed of rather coarse twigs and strips of birch or cedar bark and lichens. This is lined with hair, the softer fibers of bark, fine rootlets, grass and feathers. The whole nest is saucer-shaped and about four inches in diameter, outside measurement, by one and one-half in depth. Authorities tell us that the eggs are usually three in number. In color they are a pale blue, nearly spotless at the smaller end, but at the larger end marked with irregular streaks or dots of lavender or reddish-brown. The eggs are small, about eight-tenths of an inch long by nearly six-tenths in diameter.

On account of their vagrant habits, Dr. Brehm was wont to call them the "Gypsies" among birds. While seeking food or flying from place to place, they continually utter a plaintive note and their song is soft and sweet.

## THE LEGEND OF THE CROSSBILL.

On the cross the dying Saviour  
Heavenward lifts his eyelids calm.  
Feels, but scarcely feels, a trembling  
In his pierced and bleeding palm.

And by all the world forsaken,  
Sees he how with zealous care  
At the ruthless nail of iron  
A little bird is striving there.

Stained with blood and never tiring,  
With its beak it doth not cease,  
From the cross 'twould free the Saviour,  
Its Creator's Son release.

And the Saviour speaks in mildness:  
"Blest be thou of all the good!  
Bear, as token of this moment,  
Marks of blood and holy rood!"

And that bird is called the Crossbill;  
Covered all with blood so clear,  
In the groves of pine it singeth  
Songs, like legends, strange to hear.

—From the German of Julius Mosen, Henry Wadsworth Longfellow.

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## THE STUDY OF BACTERIA.

The bacteriologist is working in a wonderland fully as remote to the average mind as that ever occupied by the astronomer or psychologist; and yet it is as real to him as though he were walking through a forest and noting the different kinds of trees. Such popular doubts as have been held regarding bacteriology and even the existence of bacteria are no longer justified. The evidence is too overwhelming not to be accepted by anyone who has sufficient interest to investigate. The methods used in bacteriologic studies are to-day giving us information fully as concise as that obtained by the general botanist in the study of higher plants. Indeed, the phenomena of bacterial activities and the chemistry of the products of growth of many species of bacteria have already received attention not equaled in the study of some of our most useful plants.

Bacteria are plants; not because of any absolute characteristic that separates them from animals, but because comparative study shows that they are more like plants than animals. They are single-celled organisms and each individual has the prime factors of life, assimilation, growth and reproduction. Each bacterium is an independent cell and although the cells in some species remain attached to one another, giving rise to characteristic groupings, they are mostly detached and free individuals. Bacteria can increase in numbers to a remarkable extent when favorable conditions exist. The mother-cell simply splits into two daughter-cells and these form a generation of four cells, while later generations, consisting of perhaps one million cells, can in fifteen or twenty minutes produce two million bacteria. But conditions must be favorable for this active growth, ample food stuffs, free from other bacteria, together with moisture and reasonable warmth are most essential. There are many circumstances constantly at work to prevent an overgrowth of bacteria; exhaustion of food supply, antagonism of species and fresh air with sunshine, are the most important. Bacteria are present everywhere in greater or less numbers, except within the bodies of healthy, growing plants and animals. It is for this reason that bacteria become so active and multiply with great rapidity when once established in the tissue fluids of larger organisms, either before or after they have died. Vital activities during health prevent the entrance of bacteria into our bodies. There are, however, times when the association of different species of bacteria and also the association of bacteria with higher plants is of mutual advantage. The association of decomposition and pathogenic bacteria frequently makes it possible for the latter to infect an animal, when alone it perhaps would not take place. Again, the growth of certain bacteria within the root-structure of plants greatly improves their functional activity. The leguminous plants are enabled to assimilate much larger quantities of nitrogen when associated with bacteria than when growing alone. No such mutually advantageous relationships are known to exist between bacteria and animals; the tendencies are rather destructive, leading to the infectious diseases. The general biologic function of the bacteria is very important and in a general way the need of their existence can be much better appreciated than that of many living beings. Decomposition may be stated as being their chief functional activity. Decomposition stands before life; without it the progress of the generations would terminate. The gradual and ever rapid disappearance of the substance of vegetable and animal bodies after death makes room for growing life. With an absence of decomposition the bodies of plants and animals would collect on the earth and cover it so deeply with organic matter that plants in particular would be entirely unable to obtain requisite nourishment. Higher plants having chlorophyll are able to feed on inorganic material, while bacteria require organic matter to sustain life. Bacterial food is then derived from the higher forms of life, while these higher forms feed on the end products of bacterial decomposition, with the addition of salts from the earth. An evolutionary query might then arise as to the early conditions in the history of organic life on the earth. It is certainly a fertile field for the theorist. Accepting the general rule that simplicity of structure indicates priority, what then was the food

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supply of the primordial bacterium before the advent of higher plants to supply requisite organic matter? We can hardly believe that there was already in existence sufficient ammonia-bearing compounds of suitable quality to sustain these lowest organisms until evolutionary conditions added organisms having the capacity of collecting nitrogen and carbon from purely inorganic sources. These general facts, as we now see them, would apparently strengthen the thought that different kinds of organisms became extant at the same time.

The methods used in bacteriologic study are based on a few very distinct principles. Successful cultivation of bacteria depends upon a knowledge of sterilization, preparation of culture media and isolation of species. It is in fact miniature gardening. A rod of platinum wire is the trowel and this is kept clean and free from undesirable organisms by heating it red hot in the gas flame. With it bacteria are lifted from tube or plate. The culture media required are mostly beef-tea and gelatine mixtures and are prepared with extreme care as to their composition and reaction. The decomposition of the culture medium is prevented by keeping it in test tubes or flasks plugged with cotton and sterilized by boiling. By means of the cotton plug the air passing in and out of the tube is filtered and the bacteria floating in the air are caught in the cotton and cannot get into the tube. It also prevents bacteria from the culture getting out of the tube and spreading infectious material. Each test tube represents a little greenhouse, but one that is free from all life; it is sterile when ready for use. To the media or culture soils in the tubes the bacteria are transplanted with the platinum rod, and active growth is obtained by placing the tubes in a suitable temperature. Such a growth of bacteria in a test tube can contain many millions of bacteria, while the resulting appearance of growth is due to the heaping up of the individuals. To the naked eye the cells are invisible, but the mass is recognized in the same way that one would know a field of wheat in the distance without being able to see each separate plant. Species of bacteria are separated by distributing a few organisms throughout a fluid and then planting upon solid media. The individual cells then grow in place and produce colonies. These are separate and distinct to the eye and each contains bacteria, all of the same kind. From colonies transplantations to tube cultures are made, and the species is propagated on different media. The observations from such growths, together with the microscopical study and sometimes inoculation experiments on animals are the data by which the species is recognized. Microscopic methods, although somewhat complicated have been so far developed that some species of bacteria can be as promptly recognized under the microscope as an acquaintance met upon the street.

Bacteriology is now being studied and investigated as a field of research in hundreds of laboratories, and in every university in Europe and America. Bacteriology has added as much to man's wealth and happiness as any of the applied sciences. All the methods of preservation of food depend upon bacteriological principles, while modern sanitary science is based on the recognition of the cause of infectious diseases. The presence of specific bacteria in the secretions or tissues of man and animals is now such a certainty for many diseases that the work of making bacteriologic diagnoses is in itself an extensive vocation. Within the next few years every city in America will have a diagnosis laboratory for infectious diseases. We can safely predict that the trained bacteriologist will be called upon to stand between each sick person or animal and the community to direct measures that will prevent infection of others. Hygienists are learning more every day as to the exact way in which disease bacteria pass from person to person, and the reasons for the occurrence of diseases. They have learned that the accidental and unusual circumstance is least important, but that there is a regular train of cause and effect, and in the 8 knowledge of how to break this chain is the key to the proper control of an epidemic. Veterinary medicine has been able to obtain benefits from bacteriology much beyond those already so important to human medicine. This is so because of the persistent prejudice opposed to bacteriology in medicine, while the veterinarian has been allowed to treat his patients practically as the experiment animals are treated in the laboratory.

Bacteriologists are frequently meeting demands made of their science that are beyond its present stage of progress. It is frequently forgotten that this is biology whose deductions are always subject to the variation of growing things, and not chemistry or mathematics, with their definite determinations and strict limitations. Bacteriology is now an established science, and it is as competent to render service in due proportion to its development and with the same integrity as any biological subject. There are now many known facts in bacteriology that cannot be made useful because intermediate steps in their study have not been learned. It will require long series of experiments in some cases, but when added to the present usefulness of bacteriology the results may be expected to satisfy the most severe critics.

Adolph Gehrman.

## **THE YELLOW-BREASTED FLYCATCHER.**

"Come here! come here! come here!  
My Philip dear, come here! come here!  
Philip, my dear! Philip, Philip, my dear!"

Poor mournful Mrs. Flycatcher,  
With ample breast of dainty buff,  
Now don't you think you've called your mate,—  
To say the very least—enough?

I'm sorry for you, plaintive one;  
I would be glad to make him fly  
From his long tarrying place to you,  
If that would stop your weary cry.



Can't you decide to give him up?  
All over town you've called his name;  
I heard you calling this week, last,  
The week before you called the same.

Perhaps some boy with "twenty-two"  
Has shot him for his sister's hat.  
Go! search the churches through and through;  
If he's not there, accuse the cat.

—Carrie B. Sanborn.



TOWNSEND'S WARBLER.  
(*Dendroica townsendi*.)  
About Life-size.  
FROM COL. CHI. ACAD. SCIENCES.

## **THE TOWNSEND'S WARBLER.** **(*Dendroica townsendi*.)**

Dr. Robert Ridgway, in the Ornithology of Illinois, uses the following words in speaking of that family of birds called the American Warblers (Mniotilidae), "No group of birds more deserves the epithet of pretty than the Warblers; Tanagers are splendid; Humming-birds are refulgent; other kinds are brilliant, gaudy or magnificent, but Warblers alone are pretty in the proper and full sense of that term."

As they are full of nervous activity, and are "eminently migratory birds," they seem to flit rather than fly through the United States as they pass northward in the spring to their breeding places, and southward in the fall to their winter homes among the luxuriant forests and plantations of the tropics. All the species are purely American, and as they fly from one extreme to the other of their migratory range they remain but a few days in any intermediate locality. Time seems to be an important matter with them. It would seem as if every moment of daylight was used in the gathering of food and the night hours in continuing their journey.

The American Warblers include more than one hundred species grouped in about twenty genera. Of these species nearly three-fourths are represented in North America at least as summer visitants, the remaining species

frequenting only the tropics. Though woodland birds they exhibit many and widely separated modes of life, some of the species preferring only aquatic regions, while others seek drier soils. Some make their homes in shrubby places, while others are seldom found except in forests. As their food is practically confined to insects, they frequent our lawns and orchards during their migrations, when they fly in companies which may include several species. Mr. Chapman, in his Handbook of Birds of Eastern North America, says, "Some species flit actively from branch to branch, taking their prey from the more exposed parts of the twigs and leaves; others are gleaners, and carefully explore the under surfaces of leaves or crevices in the bark; while several, like Flycatchers, capture a large part of their food on the wing."

The Townsend's Warbler is a native of Western North America, especially near the Pacific coast. Its range extends from Sitka on the north to Central America on the south, where it appears during the winter. In its migration it wanders as far east as Colorado. It breeds from the southern border of the United States northward, nesting in regions of cone-bearing trees. It is said that the nest of this Warbler is usually placed at a considerable height, though at times as low as from five to fifteen feet from the ground. The nest is built of strips of fibrous bark, twigs, long grasses and wool, compactly woven together. This is lined with hair, vegetable down and feathers.

The eggs are described as buffy white, speckled and spotted with reddish brown and lilac-gray, about three-fifths of an inch in length by about one-half of an inch in diameter.

## THE STORY OF SOME BLACK BUGS.

We were going to visit Aunt Bessie, and John and I like few things better than that. To begin with, she lives in the country, and there is always so much to do in the way of fun that the days never seem half long enough.

Then, besides, Aunt Bessie knows everything, and can tell such famous stories. So when she asked us one morning to go to the pond with her and see something interesting, you may be sure we were not slow in following her.

The rushes grew thickly along the sides, but the water was clear, and we could plainly see the black bugs she pointed out to us crawling, slowly and clumsily, over the muddy bottom.

"Those things!" said John, not a little disgusted. "I don't think they are much. Are they tadpoles?"

"Tadpoles!" I echoed. "Why, whoever saw tadpoles with six legs and no tail?"

"The absence of a tail is very convincing," laughed Aunt Bessie. "They are certainly not tadpoles. Now watch them closely, please, and tell me all about them."

"They are abominably ugly. That is one thing," broke in John. "They look black, and have six legs. But how funny their skin is. More like a crust, or lots of crusts laid one on the other. They are about the stupidest things I ever saw. They seem to do nothing but crawl over that mud and—Hello! they aren't so stupid, after all. Did you see that fellow snatch a poor fly and gobble him up quicker than you could say Jack Robinson? And there's another taken a mosquito just as quick. I'll take back what I said about the slow business. But really, Auntie, do you think them very interesting?"

"I'll ask you that question when you have learned something more about them," was her answer. "Tell me now what you think of that Dragon-fly darting over the water?"

"Oh, he is a beauty," we answered in a breath. "But please let us hear something about those things down there."

"Not to-day, boys. I wish you to see something for yourselves first. Watch here for a few days and your patience will be rewarded, I promise you. Then I will have a story to tell you."

I knew that Auntie never spoke without reason, so John and I kept a close watch on those bugs. For two days nothing happened. The old things just crawled over the mud or ate flies and mosquitoes, as usual.

But the third day one big fellow decided to try something new. It was nothing less than to creep up the stem of one of the rushes. I suppose it was hard work, for he took a long time to get to the surface of the water. Here he stopped a while and then seemed to make up his mind to go further. Soon he was quite out of the water and could breathe all the air and sunshine he wished. I believe he did not like it very well. He seemed so restless and uneasy. I was expecting to see him go back, when I heard John cry out:

"Look! oh, do look!"

I did look, and could scarcely believe my eyes.

His skin (the bug's, I mean), was actually cracking right down the back, just as though the air and sunshine had dried it too much.

Poor fellow, he seemed in great trouble about it. Then, to make matters worse, a part of his coat broke off at the top and slipped down over his eyes, so that he could not see. After a moment, however, it dropped further, quite under the place where his chin would have been, had he had a chin.

"Oh! he is getting a new face. A prettier one, too, I am glad to say."



It seemed as if John was always first to notice things, for it was just as he said; as the old face slipped away a new one came in its place.

I guess that by this time that old bug was as much astonished as we were. He was wriggling about in a very strange fashion, and at last quite wriggled himself out of his old shell. Then we saw two pairs of wings, which must have been folded away in little cases by his side, begin to open like fans. Next, he stretched his legs, and it was easy to see that they were longer and more beautiful than those he had had before. 13

Then, before we could admire his slender, graceful body, or fully realize the wonderful change that had occurred in him, he darted away before our astonished eyes, not a black bug, but a beautiful Dragon-fly.

“Hurrah!” we both shouted. The next second we were rushing at top speed to tell Auntie all about it; just as though she had not known all along what was going to happen.

She listened and then told us what we did not know.

How months before the mother Dragon-fly had dropped her tiny eggs in the water, where they hatched out the black bugs, which were so unlike their mother that she did not know them for her children, and had no word to say to them during the long hours she spent in skimming over the water where they lived.

These bugs were content at first to live in the mud. But soon came the longing for sun and air. And then followed the wonderful transformation from an ugly black bug to the beautiful dragon-fly.

If you will go beside some pond in the spring or early summer, and find among the water grasses such a bug as I have described, and will then watch long enough you will see just what John and I saw. Afterwards I am sure you will agree with us that it is very wonderful indeed.

Louise Jamison.

## **THE SOLITARY SANDPIPER.**

He is a curious little chap, the Solitary Snipe, and we used to call him Tip-up. He delights to “see-saw” and “teeter” down a clay bank, with a tiny “peep-po,” “peep-po,” just before he pokes in his long, slender bill for food.

He is very tough, and possesses as many lives as the proverbial cat. I have taken many a shot at him—fine sand-shot at that—and from a gun with a record for scattering, and I never succeeded in knocking over but one Tip-up while on a hunt for taxidermy specimens. I failed to secure even this one, though he flopped over in the water and floated down upon the surface of the shallows toward where I stood, knee-deep awaiting his coming. He was as dead as any bird should have been after such a peppering; yes, he was my prize at last, or so I thought as I reached out my hand to lift his limp-looking little body from the water. He was only playing possum after all. With a whirl of his wings and a shrill “peep-po,” “peep-po,” he darted away and disappeared up stream and out of sight beyond the alders. To add to my disappointment a red-headed woodpecker began to pound out a tantalizing tune upon the limb of a dead hemlock. No sand-shot could reach that fellow, desire him as much as I might. Then a bold kingfisher, with a shrill, saucy scream, darted down before me, grabbed a dace and sailed to a branch opposite to enjoy his feast, well knowing, the rascal! that I had an unloaded gun and had fired my last shell. How he knew this I am not able to say, but he did. Wiser fellows in bird lore than I may be able to explain this. I cannot.

The Solitary Sandpiper is well named. He is always at home wherever found, and always travels alone, be it upon the shelving rock-banks of a river or the clay-banks of a rural stream. He possesses, after a fashion, the gift of the chameleon and can moderately change the color of his coat, or feathers, rather. When he “teeters” along a blue clay bank he looks blue, and when he “see-saws” along brown or gray rocks he looks gray or brown, as the case may be.

The city boy who spends his vacation in the rural parts and fishes for dace, redfins or sunfish, knows the Solitary Sandpiper. To the country boy he is an old acquaintance, for he has taken many a shot, with stone or stick, at the spry little Tip-up, who never fails to escape scot free to “peep-po,” “peep-po” at his sweet content.

H. S. Keller.

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## **THE KNOT OR ROBIN SNIPE.**

*(Tringa canutus.)*

The Knot or Robin Snipe is a bird of several names, as it is also called the Red-breasted Ash-colored Sandpiper, the Gray-back and the Gray Snipe. It is quite cosmopolitan, breeding in the far north of both hemispheres, but in winter migrating southward and wintering in the climate of the southern United States and Central America. The Knot belongs to the Snipe family (Scolopacidae), which includes one hundred or more species, about forty-five of which are inhabitants of North America. Nearly all the species breed in the higher latitudes of the northern hemisphere. These birds frequent the shores of large bodies of water and are seldom observed far from their vicinity. Their bills are long and are used in seeking food in the soft mud of the shore.

The Knot visits the great lakes during its migrations and is frequently observed at that time. Its food, which consists of the smaller crustaceans and shells, can be as readily obtained on the shores of these lakes as on those of the ocean, which it also follows.

Dr. Ridgway tells us that "Adult specimens vary individually in the relative extent of the black, gray and reddish colors on the upper parts; gray usually predominates in the spring, the black in midsummer. Sometimes there is no rufous whatever on the upper surface. The cinnamon color of the lower parts also varies in intensity."

Little is known of the nest and eggs of the Knot owing to its retiring habits at the nesting time and the fact that it breeds in the region of the Arctic Circle, so little frequented by man. One authentic report, that of Lieutenant A. W. Greely, describes a single egg that he succeeded in obtaining near Fort Conger while commanding an expedition to Lady Franklin Sound. This egg was a little more than an inch in length and about one inch in diameter. Its color was a "light pea-green, closely spotted with brown in small specks about the size of a pinhead."

**VIOLA BLANDA.**  
**(Sweet White Violet.)**

Serene the thrush's song, all undisturbed,  
Its rows of pearls, a marvel of completeness,  
Then the soft drip of falling tears I heard,  
Poor weeping bird, who envied so thy sweetness!

—Nelly Hart Woodworth.



KNOT OR ROBIN SNIPE.  
(*Tringa canutus*.)  
About  $\frac{3}{4}$  Life-size.  
FROM COL. CHI. ACAD. SCIENCES.

**THE AUTOBIOGRAPHY OF A BIRD.**

My name is Dewey, and no bird was ever prouder of his name. I know if Admiral Dewey could see me he would feel proud of his namesake, as I am said to be an unusually handsome, intelligent bird. I have been laughing in my wings for many months, hearing people say what kind of a bird I am. Some say I am an oriole; some a male, others a female; another a meadowlark; another not a meadowlark, but some kind of lark. One thing they agree upon, that I go on a lark from early morn till "Dewey eve." I am said to have a little of the bluejay, and points like dozens of birds. When I was about six weeks old I was quite large and fluffy, but very much of a baby, for I knew nothing about feeding myself. My tail was long, olive on top, yellow underneath; wings black, with cream color on the edges—on the lower feathers just a line, on the upper ones quite a little wider, at the top short yellow feathers, making lovely little scallops; head and back olive-brown; rump more on the yellow; throat and breast light yellow,

with a tinge of blue under the wings, and belly only tinted. As I grew older I kept changing, and now at nine months old my breast is light-orange, belly light-yellow, head and back deeper olive, rump deeper yellow. I broke my tail all off in the fall, and when it came in, the upper feathers were black, with yellow a quarter of an inch at the rump; under ones yellow and black. On my head are almost invisible stripes of black, on my neck pretty broken wavy ones. My eyes are large and bright, my bill everyone says is the handsomest they have ever seen, very long and pointed as a needle. Underneath ivory white, on top black, with a white star at the head. The admiration of all are my legs and claws, as I keep them so clean, and they are a beautiful blue, just the shade of malachite. I am seven inches long, and for the last month have been getting black spots over my eyes and on my throat. Now what kind of a bird am I?

One June afternoon I thought I was old enough to take a walk by myself, so off I started, without asking permission of my father or mother. All went well for awhile, and I was having a delightful time, seeing many new strange things. Then all at once I began to feel very tired and hungry, and thought I would go home, but which way to go I knew not. I went this way and that and peeped as loud as ever I could, calling "Mother! mother!" but no answer came. Finally I sat down, tucked my head under my wing and went to sleep. The next thing I knew something was coming down over me and I was held very tight. I screamed, pecked, and tried my best to get away. Then someone said very gently: "Don't be afraid, little birdie; I am not going to harm you, but send you to a lady who loves little birds, and will take good care of you." I was dreadfully frightened, but I did not make another peep. We went a long way. Then I heard the little boy say: "Charlotte, will you please take this bird to Miss Bascom, for she was so kind to me when I was sick?" I changed hands, and off we went. Soon I heard some one calling out: "There comes Charlotte with a bird." Then another voice said: "I wonder if it is another sparrow;" but when she saw me she exclaimed, "What a perfect beauty!" took me in her hand and I knew at once I had found a good friend and new mother. Bread and milk were ordered. Of course, I did not know what bread and milk were, but I was so hungry I could have swallowed dirt or stones, so there was no trouble about my taking it, and I wished all birds could have such delicious food. I was taken up-stairs to my new home, where everything was in pink and green and looked so fresh I thought I was back in the clover field. My new mother (for that is what I mean to call her) took me up to what she called a cage and said: "Tricksey and Cervera, I want to introduce you to your new brother." Tricksey charmed me at once, for he was like a ray of sunshine in his dress of gold, but when I looked at Cervera I laughed right out in his face. It was very rude, but I know if any of you had been in my place you would have done the same thing. Of all the ugly specimens of a bird I had ever seen he was the very worst. He was Tricksey's size, but only had his baby feathers and one tail feather. He was dirt color, had big staring eyes, and such a bill, almost as large as his head, which was perfectly flat. He looked so common and ill-bred that I wondered how dainty Tricksey ever sat beside him. I was too sleepy to ask any questions and was soon fast asleep on my new mother's finger; then was put into a nice little basket filled with cotton. The next day Tricksey was very kind to me, but Cervera was cross and pecked me every time he got a chance. Tricksey said: "I have tried to be kind to that old Spaniard, Cervera, but I do not like him and will not have him snuggle close to me nights, so I fight him until he gets into the swing. If you will sleep in the cage you may put your wings close to mine, for you are so pretty and clean." When bedtime came my new mother said I was too large for the basket, and I might try sleeping in the cage, so she put me in and made Cervera get up into the swing. Just as Tricksey and I were going to sleep Cervera began swinging with all his might, and would reach down, peck us on the head and pull our feathers out. When he was caught he was taken out and made to sleep in the basket. In the morning we were all let out on the floor, and it was amusing to see Cervera mimic everything Tricksey did. If Tricksey took a drink Cervera did, and would follow everywhere he went. 18

About that time I saw coming into the room a large, striped thing, with shining, green eyes, and my heart beat so fast I could hardly breathe. Tricksey whispered in my ear: "You need not be at all afraid; that is only Taffy, the cat, and we are the best of friends." Taffy jumped into my new mother's lap, and we three stood on the table and ate bread and milk together. The first time I was left in the room alone I looked around to see what would be nice to play with. First I went over to the dressing table, carried two large cuff-buttons and put them into my drinking cup, another pair I put on the floor of the cage with two large coral hairpins, two shell pins, and some studs. I stuck all the pins on anything I could pick up and threw them on the floor; turned over a basket which was filled with ribbon and lace; some I left on the floor, and with the rest I trimmed the cage. When I heard my new mother coming I began to tremble. She stood speechless for a moment, then said: "You rogue of a bird; how shall I punish you?" Then took me in her hand and kissed me, and I knew the future was clear, and I could have all the fun I wanted. Tricksey had the asthma very bad, and sometimes a little whisky on some sugar would relieve him. It was funny to see that bad Cervera manoeuvre to get Tricksey off the perch so he could eat the sugar and whisky. Tricksey grew worse instead of better, and one morning my new mother was awakened early by his hard breathing. She took him off from his perch and found his claws ice-cold, and he was so weak he could hardly hold on. He lay in her hand a moment, then threw back his pretty head and all was over. We were all heart-broken and shed many tears, for we were powerless to bring back to life that little bird we loved so dearly. I really felt sorry for that horrid Cervera. He missed Tricksey, and for days seemed to be looking for him. One evening he went out the window, and we never saw him again.

I am very fond of sweet apples and generally whenever I want anything that is down-stairs I go and get it. I love grapes better than any other fruit. When I want one I hop back and forth on the back parlor table, then on top of a high back chair and tease until one is given to me. I like best to have my new mother hold a grape in her right hand while I perch on her left and suck all the rich, sweet juice next the skin out first; then I take the grape over on the table on a paper and knock it until all the seeds come out before I eat it. I like bananas, too, and go to the fruit dish and open one myself. Every morning I perch on the plate or finger-bowl and eat my orange. 19

We usually have our orange in our room, and sometimes I get so impatient I fly over to the bed, back to the orange, and beg my new mother to get up. I always take a drink out of the finger bowl and often said to myself, "What a fine bathtub this would make." When fall came I began going to bed at 5 o'clock, and at 7 was awakened and taken out to dessert. One night I became tired of waiting and went out into the dining-room very quietly, and the first thing I spied was a finger-bowl, so thought that was just the time for a bath. In I went. They heard the

splashing and looked up to see everything as well as myself soaking wet. Of course they thought it very cunning, but after I did it for three nights I was told two baths a day were too much for me. I made up my mind if I could not take a bath in the finger-bowl at night, I would in the morning and, as I refused to go near my old bathtub, the bowl was given me for my own. There was a bowl of Wandering Jew on the dining-table, and several times I took a bath in the center. All said I made a beautiful picture, but when they found I was tearing the vine all to pieces it was not so pretty and many lectures were given to me, but I heeded them not, and if taken away I would walk (for I can walk as well as hop) all over the table on the ends of my toes and look every way but towards the bowl; then, when no one was looking, grab a piece and take it up on top of a picture. One day I trimmed all of the pictures, and there was none left in the bowl, so I had to look up some other mischief.

When I go out to dinner I have my own little table cloth and plate put by my new mother's. I usually take a little of everything; chicken and cranberry jelly is very good. Sometimes I do not behave very well, for I go tiptoeing across the table to my grandmother's plate, hop on the edge, and see if she has anything I like. When dinner was ready to be served I went over on the sideboard, made holes in all the butter balls, then took some mashed potato and boiled onion and put them to cool in a big hole I had made in an apple. Few people know that birds are ever sick at their stomachs. I had been in the habit of eating a little shaved hickorynut that was put in a half shell and kept in a dish on the back parlor table. When I came down stairs I usually took a taste, and it seemed to agree with me. For a change I ate a little chestnut, and soon began to feel bad, so went off by myself and tried to go to sleep. When my new mother saw me she said she knew I was not well, for I never acted that way in the daytime. She put me in my cage, and sat down beside me. I would close my eyes and open my bill, and she thought I was dying until I opened my bill very wide and out came the chestnut in a lump a half inch long and a quarter wide.

My mother's writing desk is a favorite place of mine. I get into drawers, pigeon holes and ink; pictures and all sorts of small things I throw on the floor. Once I stole ever so many dimes and pennies. I can lift a silver dollar and often carry a coffee-spoon all about the room, so you see I have a very strong bill. If anything is lost all say "Dewey must have taken it." One day my new mother looked until she was tired for her thimble. When she asked me for it, I pretended I did not hear, but as she was going into the dining-room I dropped it down on her head from the top of the portiere. I often perch on a basket on top of the book case in the writing room. When I saw a new white veil beside me I went to work and made ten of the prettiest eyelet holes you can imagine, right in front; some were round and some star-shaped. As I grew older I said, "I will not sleep in my cage." For a few nights I insisted upon sleeping on the brass rod at the head of the bed, then changed to the top of the curtain. I have a piece of soft flannel over some cotton put on the ledge and on the wall, so I will not take cold. If it is very cold I get behind the fringe of the curtain, so no one can see me. If warm I turn around so my tail hangs over the outside. When my new mother comes in I open my eyes, make a bow, and, if not too sleepy, come down and sit on her hand. I never chirp or peep, and when I hide and hear "Dewey, Dewey," I do not answer but fly down on my new mother's head, shoulder or hand. Taffy gets so angry at me. I know he often feels like killing me. I wake up early mornings, and take my exercise by flying back and forth from a picture on one side of the room to the head of the bed. When Taffy is on the foot of the bed I fly very low, almost touching him with my wings, and say, "You lazy cat, why don't you wake up and hear the little birds sing to God Almighty; why don't you wake up?" I soon hear words that are not used in polite society, and next see the end of his tail disappearing around the corner of the door. Before I go to sleep at night I exercise again. One afternoon Taffy was trying to take a nap in a chair in the back parlor. I kept flying over him, making a whizzing sound with my wings. When he could endure it no longer he went into the writing-room and sat down by his mother. I went in to take a luncheon on the table. Taffy stood up on his hind legs, reached out a velvet paw, and gave me such a slap I fell upon the floor. I was not hurt in the least, flew up on a picture and shook with laughter at the punishment and scolding Mr. Taffy was getting. He said very naughty words, scratched and bit, but he was conquered at last, and has behaved like a gentleman ever since. The first time I saw the snow I was wild with delight, flew to the window and tried to catch the pretty white flakes. But when I heard the sleigh bells they struck terror to my heart, for I thought a whole army of cats was coming, as all I knew about bells are Taffy's. Not long ago my new mother was very ill and had to send for a strange physician, who knew nothing about me. When I heard him coming upstairs I hid behind the curtain and watched him fix a white powder in a paper. When he laid it on the table I swooped down, grabbed it and took it into my cage. After that I was kept busy, as my grandmother was ill for many weeks. I would carry off all the sleeping powders; one day I put them behind the bed, for I thought they would not taste so badly, and do just as much good.

It did not take more than a minute to get down there when I heard the doctor come in, for I had to see that the medicine was mixed all right. It was great fun peering into the tiny little bottles in his case. I would stand on the ends of my toes and crane my neck to watch him drop the medicine into the tumblers. The other day some Christmas roses were brought in. They looked so tempting I took several bites, and the next day took some more. I felt a little queer, and kept opening my bill. My new mother thought I had something in my throat and gave me some water. The next afternoon she found me on the floor panting, took me to an open window, gave me wine and the attack seemed to pass. We went up to our room, and apparently I was as well as ever when she went down to dinner. After she had gone another attack came on and I am too weak to write any more, and can only warn little birds never to taste of a Christmas rose, as they are said to be deadly poison.

When I went to my room late in the evening no little birdie peeped over the curtain to greet me. I looked on the floor, and there lay my darling Dewey, stiff and cold.

Caroline Crowninshield Bascom.



AMERICAN HAWK OWL.  
(*Surnia ulula caparoch.*)  
<sup>4/7</sup> Life-size.  
FROM COL. CHI. ACAD. SCIENCES.

### **THE AMERICAN HAWK OWL.** **(*Surnia ulula caparoch.*)**

The typical form of this owl (*Surnia ulula*) is a native of Scandinavia and Northern Russia, and incidentally is a visitor to Western Alaska. We are told by Mr. L. M. Turner, who was stationed by the United States Signal Service in Alaska from 1874 to 1881, that the natives assert that this form is "a resident, and breeds in the vicinity of St. Michaels; also that it is a coast bird, i. e., not going far into the interior, and that it can live a long time in winter without food, as it remains for days in the protection of the holes about the tangled roots of the willow and alder patches." Its true breeding range, however, is the northern portion of the Eastern hemisphere. It is somewhat larger and lighter in color than the American Hawk Owl.

The bird of our illustration, the American Hawk Owl, is simply a geographical variety of the Old World form, and is a native of northern North America, from Alaska to Newfoundland. This is its usual breeding range, though it migrates in winter to the northern border of the United States, and is an occasional visitor, during severe winters, as far south as Maine and Idaho. It is much more common in the northern portion of its range.

Unlike the other owls, as we usually understand their habits, it may be considered as strictly diurnal, seeking its prey, to a great extent at least, during daylight, usually during the early morning or evening hours. Its principal food consists of the various species of rodents, insects and small birds. Its southward migration is caused by that of its food species, especially that of the lemmings.

It is a tame bird and may be said to know no fear. We are told by Dr. A. K. Fisher that "specimens have been known to return to the same perch after being shot at two or three times. It is a courageous bird, and will defend its nest against all intruders. A male once dashed at Dr. Dall and knocked off his hat as he was climbing to the nest; other similar accounts show that the courage displayed on this occasion was not an individual freak, but a

common trait of the species.”

Not alone in its diurnal habits is it like the hawks, but it also resembles some of them in selecting the dead branch of a tall tree in some slightly locality from which to watch for its prey. From this position it will swoop down hawk-like. Like the hawks its flight is swift and yet noiseless, a characteristic which is common to all the owls.

As a rule its note, which is a sharp, shrill cry, is only sounded when flying.

As a nesting site, hollow trees are more frequently chosen. However, nests built of twigs and lined with grass are not infrequent. These are usually placed on the tops of stumps or among the branches of dense cone-bearing trees. The number of eggs varies from three to seven, and are frequently laid long before the ice and snow have disappeared. “The eggs vary from oval to oblong oval in shape, are pure white in color, and somewhat glossy, the shell is smooth and fine-grained.” Incubation begins as soon as the first egg is laid, and both sexes participate in this duty, and occasionally both are found on the nest at the same time. At the nesting season the courage of both sexes is very marked. The male will fight with its talons, and even when wounded will still defend itself. We are told by Mr. Gentry that “calmly and silently it maintains its ground, or springs from a short distance on its foe. So, bravely it dies, without thought of glory and without a chance of fame; for of its kind there are no cowards.”

This bird, like the other species of owls, though possibly not to so great an extent because of its diurnal habits, is looked upon by the Indian tribes as a bird of ill omen and by some tribes all owls are called “death birds.” As a whole, the hawk owls are perhaps more useful to man than any other birds that are not used as food. They cause but little trouble in the poultry yard and are of incalculable value to the farmer because of the large number of small rodents that they destroy.

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## A BIRD CALENDAR BY THE POETS.

January.

This is not the month of singing birds.

“Silently overhead the hen-hawk sails  
With watchful, measuring eye, and for his quarry waits.”

—Lowell.

February.

Sometimes a flock of strange birds descends upon us from the north—the crossbills. There is an old tradition that the red upon their breast was caused by the blood of our Saviour, as they sought to free Him with their bills from the cross.

“And that bird is called the Crossbill,  
Covered all with blood so dear,  
In the groves of pine it singeth  
Songs, like legends, strange to hear.”

—Longfellow.

March.

No birds are more closely associated with early spring than the swallows.

“Gallant and gay in their doublets grey,  
All at a flash like the darting of flame,  
Chattering Arabic, African, Indian—  
Certain of springtime, the swallows came.

“Doublets of grey silk and surcoats of purple,  
Ruffs of russet round each little throat,  
Wearing such garb, they had crossed the waters,  
Mariners sailing with never a boat.”

—Sir Edwin Arnold.

April.

“Winged lute that we call a Bluebird,  
You blend in a silver strain,  
The sound of the laughing waters,  
The sound of spring’s sweet rain,

“The voice of the wind, the sunshine  
And fragrance of blossoming things.  
Ah, you are a poem of April



That God endowed with wings.”

May.

This is the month of the Bobolinks.

“Merrily, merrily, there they hie;  
Now they rise and now they fly;  
They cross and turn and in and out,  
And down the middle and wheel about,  
With ‘Phew, shew, Wadolincoln; listen to me Bobolincoln!’  
Happy’s the wooing that’s speedily doing,  
That’s merry and over with bloom of the clover,  
Bobolincoln, Wadolincoln, Winterseebee, follow me.”

June.

“Then sings the Robin, he who wears  
A sunset memory on his breast,  
Pouring his vesper hymns and prayers  
To the red shrine of the West.”

July.

The full tide of song is on the ebb, but you still hear in the shadowy woods the silvery notes of—

“The wise Thrush, who sings his song twice over,  
Lest you should think he never could recapture  
That first fine careless rapture.”

—Browning.

August.

The humming-bird.

“When the mild gold stars flower out,  
As the summer gloaming goes,  
A dim shape quivers about  
Some sweet rich heart of a rose.

“Then you, by thoughts of it stirred,  
Still dreamily question them,  
‘Is it a gem, half bird,  
Or is it a bird, half gem?’”

—Edgar Fawcett.

September.

There is something wistful in the notes of the birds preparing to depart. In the woods we see—

“A little bird in suit  
Of sombre olive, soft and brown,  
With greenish gold its vest is fringed,  
Its tiny cap is ebon-tinged,  
With ivory pale its wings are barred,  
And its dark eyes are tender starred.  
‘Dear bird,’ I said, ‘what is thy name?’  
And thrice the mournful answer came,  
So faint and far and yet so near—  
‘Pewee! Pewee! Pewee!’”

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—Trowbridge.

October.

This brown month surely belongs to the sparrows.

“Close beside my garden gate  
Hops the sparrow, light, sedate.”  
\* \* \* “There he seems to peek and peer,  
And to twitter, too, and tilt  
The bare branches in between  
With a fond, familiar mien.”

November.

In cold weather the little gray Chickadee cheers us with his “tiny voice”—

“Gay and polite, a cheerful cry,  
Chick-chickadedee! Saucy note,  
Out of sound heart and merry throat!  
This scrap of valor, just for play,  
Fronts the north wind with waistcoat gray.”

—Emerson.

December.

The sleep of the earth has begun under the white, thick snow. The Owl is abroad by night—

“A flitting shape of fluffy down  
In the shadow of the woods,  
“Tu-wit! tu-whoo!” I wish I knew;  
Tell me the riddle, I beg—  
Whether the egg was before the Owl  
Or the Owl before the egg?”

Arranged by Ella F. Mosby.

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So when the night falls and the dogs do howl,  
Sing ho! for the reign of the horned owl.  
We know not always  
Who are kings by day,  
But the king of the night is the bold brown owl.

—Barry Cornwall.

## THE OYSTER AND ITS RELATIVES.

Of all the grand divisions of the Animal Kingdom, the subkingdom Mollusca is probably the least known to the ordinary observer, and if one were asked to enumerate as many different kinds of “shell fish” as he could, it is probable that not over six or eight different varieties would be named. The majority of people think of a clam, oyster, mussel, snail or Nautilus and their molluscan vocabulary ends with these names. And yet this group of animals is second only to the insects in number of different species, beauty of coloration and interest of habitat. They may be found everywhere, in salt and fresh water, in our forests and fields, our ponds, brooks and rivers; in the valleys and on the mountain tops, and even in the waters of the frozen north, while in the warm waters of the tropics they flourish in uncounted millions. In size they range from the little sea-snails hidden in the eel grass along the shore, with tiny shells scarcely an eighth of an inch in length, to the giant squid, which measures forty feet or more from the tip of its tail to the end of its long arms; and they range from the tide-washed beach to the abyssal depths of the ocean. It is to these lowly creatures that I would draw the reader’s attention.

In nearly all the species of the Mollusca the animal is protected by a hard shell, made of carbonate of lime, which is covered with a horny epidermis to protect the limy shell from being dissolved by the acids in the water. This shell is generally capable of containing the entire animal, thus affording, in most cases, adequate protection for the soft body. Those animals not provided with a shell, as is the case with the land slugs, are capable of covering themselves with a sort of mucus which encysts and protects them from both extreme heat and cold.

The lowest branch of Mollusca is known as class Pelecypoda, which comprises all of the different kinds of clams, mussels, quahaugs, etc., in which the body is protected by two hard, calcareous shells placed, generally, opposite each other and connected on the upper margin by a ligament, and the two valves work back and forth in teeth and sockets, making a kind of hinge. A set of stout adductor muscles keep the two shells or valves together and allow them to open and close at the will of the animal. The majority of clams live in the mud in a horizontal position, the anterior end being buried and the posterior end, containing the siphons which draw in and expel the water, being out of the mud, in the water. The clam progresses by pushing forward its strong, muscular foot, getting a firm hold of the mud and then drawing the shell after it. Some pelecypods, as the oyster, live attached to some object on the bottom of the water, as a stone, piece of wood or piling of an old wharf, and are not able to travel from place to place as are the true clams, examples of the latter being fresh water mussels and the marine quahaug or round clam.

Some bivalves also attach themselves by a byssus composed of a number of silk-like threads, which anchor their shells to stones, sticks, and other foreign objects. In one group (genus Pinna) found in the Mediterranean Sea, this byssus is so fine and silky that the Italians weave it with silk and make caps, gloves and other articles of wearing apparel.



WATER SHELLS.  
FROM COL. CHI. ACAD. SCIENCES.

First row:

- Sunrise Shell (*Tellina radiata*)
- Pearl Oyster (*Margaritiphora radiata*)

Second row:

- Coccle (*Cardium isocardia*)
- Spiny Oyster (*Spondylus princeps*)
- Scallop (*Pecten dislocatus*)

Third row:

- Mussel (*Mytilus edulis*)
- Oyster (*Ostrea lacerans*)

Fourth row:

- Fresh Water Clam (*Unio luteolus*)
- Spiny Venus (*Cytheria lupinaria*)

Another wonderful and interesting arrangement for the comfort of the animal is its breathing organs or branchiae. These are two or four in number, and are made up of numerous small chambers, covered with little whip-like organs or cilia, which keep up a constant motion, creating currents of water, bring thousands of minute organisms to the clam to serve as food. These little organisms, many of them microscopic, are caught upon the surfaces of the gills, rolled into little masses, and passed into the animal's mouth. Besides being food-gatherers, the gills serve to keep up a circulation by which fresh water is constantly brought in to purify and aerate the blood and also to expel the waste products. There is no head in this class, and the mouth is an oval slit surrounded by four lips or palpi, and leads almost directly into the stomach. 29

The currents of water spoken of above are controlled and directed in several different ways. In attached forms, and those living above the surface of the mud, like the oyster, mussel and scallop, the soft mantle which lines the shell is divided, forming a slit nearly the whole diameter of the shell, and the water is allowed to circulate freely through the open edges of the shells. But in those animals which burrow in the mud, as the common little neck clam, fresh water clam and quahaug, this mantle is closed and prolonged posteriorly into one double or two single siphons or tubes, one being fringed with little finger-like cilia and drawing in the water by their motion, and the other expelling the water after it has circulated through the animal.

One of the most attractive families of bivalve shells is the Veneridae, or venus shells, in which the shelly skeleton is ornamented by many bright colors, the patterns occurring in spots, dashes, zigzag lines and rays. Some varieties, as the spiny venus (*Cytheria lupinaria*) have the posterior end of the shell provided with long, sharp, curved spines, and the shell is also frilled in a beautiful manner. The common quahaug (round or hard-shelled clam), which is esteemed an article of diet on the Atlantic coast, and also to some extent in the interior, is a

prominent member of this family. The Veneridae comprise some five hundred species, found throughout the world, and ranging from the shore between tides to several hundred fathoms in depth.

The family Cardiidae, the heart-shells or cockles, comprise some of the largest and most attractive of mollusks. The name *Cardium*, signifying a heart, is given them because of the close resemblance to that organ when a shell is viewed from the anterior end. These animals live in sandy or muddy bays, and generally congregate by thousands. In England, the edible cockle (*Cardium edule*) is considered quite a delicacy and thousands are used for this purpose. In our own country they are not generally eaten, except by the poor in Florida and in some places along the Gulf of Mexico, but the waters of Florida furnish some very handsome species, among them the *Cardium isocardia* figured on our plate, and the large *Cardium magnum*, which grows to a length of five inches and whose shell is ornamented by beautiful color-patterns of brown and yellow. The foot of the *Cardium* is very peculiar, being shaped like a sickle, which enables the animal to pull itself along at a lively gait. A California cockle (*Liocardium elatum*) grows to a diameter of seven inches and would furnish a meal for several people.

In the family Tridacnidae size seems to have reached its limit. *Tridacna gigas*, found in the Indian Ocean, grows to a length of nearly six feet and weighs upwards of eight hundred pounds. Tryon records that a pair of these shells, weighing five hundred pounds, and two feet in diameter, are used as benetiers in the church of St. Sulpice, Paris. In some parts of the Indian Ocean, where pearl and sponge-fishing are carried on, this clam (known as the giant clam), is a source of great danger to the divers, many losing their lives by being caught between the great valves of the shell, by either hands or feet. Many times a diver has amputated his fingers, hand or foot, and thus saved his life at the expense of one or more of these members.

The Tellinas (family Tellinidae) number among its five hundred or more species some very beautiful and interesting animals. They live for the most part buried in sand or sandy mud and are found throughout the entire world. Our common *Tellina radiata*, familiarly called sunshell, is found in Florida and the West Indies, and a typical valve looks not unlike the horizon at sunrise, the brilliant rays of color spreading in different directions from a common center. At Newport, Rhode Island, the writer has gathered many thousand specimens of a beautiful little Tellen (*Tellina tenera*), whose shell measures scarcely half an inch in diameter and is tinted a lovely pink or pinkish white. The siphons of this family are very long and are separated, the upper one being half or three-quarters as long as the lower one, and the foot is rather long and pointed, admirably adapted for burrowing. The long siphons enable the animal to bury itself to quite a depth beneath the surface of the sand. 30

Closely related to the Tellinidae is the Psammobiidae, a characteristic form of which (*Psammobia rubroradiata*) is thus spoken of by Prof. Josiah Keep, in his interesting little book, "West Coast Shells:" "But I wanted to see more of him, so I took a large jar, filled it half full of beach sand, added as much sea-water as it would hold, and plunged my prize into the same. He rested quietly for a few minutes, and then began to open his shell and cautiously put out his two siphons. Soon afterward, from between the edges of his shells, came his big, white, spade-shaped foot. He drove it down into the sand, curved it a little to one side, gave a vigorous pull, and lo! his shell followed, though just why I could not clearly understand. Though the jar was large he reached the bottom before his shell was wholly covered with sand, and had to content himself with a half-above-ground tenement."

"Next morning his siphons were stretched out some six inches in length. \* \* \* I never thought before that there was any particular beauty to the siphons of a clam, but for this red-lined one my opinions quickly changed. Imagine two tubes made of the finest pink and white silk, stretched over delicate hoops arranged at regular intervals; then think of them as endowed with life, and waving with a graceful motion through the water, and you will have a faint idea of their exquisite texture and elegant appearance."

To those readers who live in the West, away from the ocean, the *Unio*, or freshwater mussel, is more or less familiar. What child in Chicago has not played on the sands of Lake Michigan and scooped up the little grains with the broken half of a clam shell? Or who, wading in the muddy water of Lake Calumet, has not wondered what the curious little hollow, fringed objects were which protruded from the surface of the mud? These latter were the siphons of the clam and if you were to dig under them a little way you would find the beautiful green-rayed shell of a river mussel. These are no less interesting than the marine shells already described and in beauty of ornamentation they frequently excel many of their salt-water relatives. Such excrescences as knobs, spines and rib-like undulations are common, while the colors of the interior range from pure silvery white through orange, pink and salmon to dark purple, and the rich, pearly iridescence rivals that of any of the marine shells. In many parts of the West mussels are collected by men in search of pearls, which are generally of an inferior quality, and thousands of shells are used annually in the manufacture of pearl buttons.

One of the most familiar objects to the seaside visitor is the huge banks of sea-mussels (*Mytilus*) which line the shore at low water. The shells are generally dark-colored, our common mussel (*Mytilus edulis*) being frequently jet black, and are more or less wedge-shaped in form. They attach themselves to mud banks and shore vegetation by a strong byssus made up of stout, more or less silky threads. The mussels are of great value economically, thousands of bushels of the edible mussel (*Mytilus edulis*) being consumed annually in Europe. They are also used as bait, and millions of the mussels are thus used every year. Although considered a delicacy in parts of Great Britain and Europe, it has not yet been adopted as an article of diet in this country, the clam and quahaug taking its place.

The family Aviculidae, comprising the wing-shells or pearl oysters, is of great interest, both scientifically and economically. At the present time there are a little over one hundred species living, but the family has been known from early geological times and over a thousand species have been found in the rocks. The pearl-oyster (*Melleagrina margaritifera*) is the most important member of this family, furnishing as it does the beautiful pearls of commerce. These animals are found at Madagascar, Ceylon and other parts of the Indian Ocean, several hundred tons being imported into Europe annually. These pearls are formed by some irritating substance, as a grain of sand or some parasite, getting in between the shell and the animal, or lodging in some soft part, which causes the animal to cover it with pearly matter to prevent irritation. The shells also furnish a considerable 31

part of the "mother-o'-pearl" which is so largely used for ornamental purposes. The *Margaritifera radiata*, figured on our plate, is a member of this family.

The scallop is an object well known to the tourist visiting New England summer resorts, who has reveled in "fried scallops." The family to which this belongs (*Pectinidae*) is composed of rounded shells, many with frills or ribs and nearly all ornamented with beautiful colors. Unlike the animals which we have been considering, these mollusks have no siphons and the shell is open all the way around save at the hinge, and the edge of the mantle is provided with little, round, black eyes. It is an interesting sight to observe a beach at low water, the receding tide having left on the shore or in little pools of water hundreds of these mollusks, attached by a byssus to bits of sea weed. As one is gazing wonderingly over this vast field of yellow sand and green weed, an object will suddenly move through a pool of water with astonishing rapidity, accompanying the movement by a quick snapping sound. This is the scallop, which is imprisoned in the pool and which desires to get out. The movement is effected by rapidly closing and opening the two valves of the shell, thereby causing a clicking sound. The noise of several hundred of these shells opening and closing and the sight of as many scallops with strings of sea weed attached to them, shooting through the water, looking not unlike a comet with a long tail, is quite bewildering. In Europe, the scallop is considered quite a delicacy and several tons are gathered annually. One species (*Pecten jacobaeus*) has been dignified as a badge of several orders of knighthood and it was also worn by pilgrims to the Holy Land a good many years ago. It was called "St. James' Shell."

The most common shell to the layman is the oyster (*Ostrea virginica*), the cultivation of which occupies the attention of a large number of men and the investment of considerable capital. The oyster is free and active when young, but becomes attached to some submerged object early in life. Oyster culturists take advantage of this habit by erecting poles in the water to which the young oysters attach themselves. The shells of the different species of oyster are not generally of much beauty, but a related family, the *Spondylidae*, or spiny oysters, are among the most beautiful of bivalves. In this family the shell is ornamented by many long spines and frills, and the colors are different shades of red, yellow and pink. The most beautiful species are found in the Gulf of California.

The space at our command is far too limited to adequately discuss the many curious and interesting animals which make up the class *Pelecypoda*. Much might be said of the Solen or razor-shell, with its curious foot which is so great a help in digging burrows; of the *Pholads*, which perforate and make burrows in clay, wood and even in the hardest rock; and of the strange *Teredo* or "shipworm," with a long, worm-like body which bores into ships, wharves and any wooden object within reach. But enough has been written and pictured to show the reader that the unpretentious clam, mussel or oyster and their relatives have many interesting habits, are encased in beautiful shells, and that some species are of great economic importance to man.

Frank Collins Baker.

32

## THE PASSING OF SUMMER.

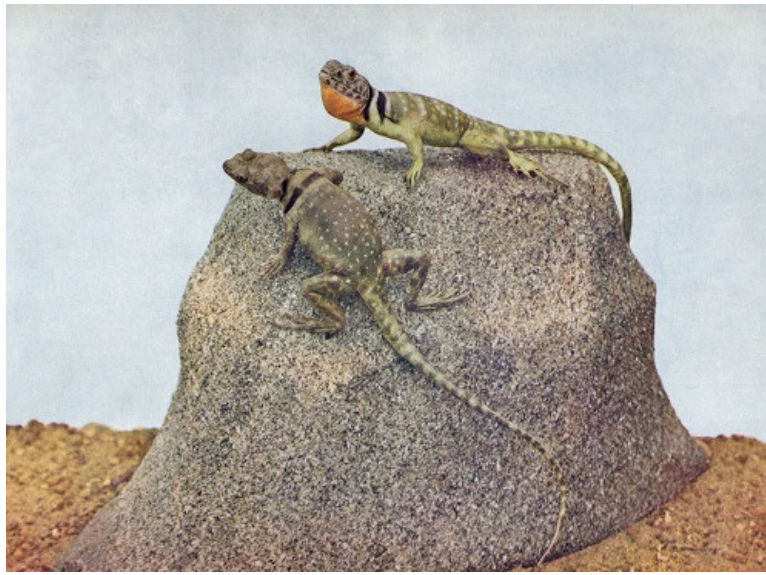
Where have the charms of summer gone?  
Part of its sunny, azure skies  
The bluebirds southward bore away,  
And how could sunset splendors stay,  
Or glory of the early dawn,  
When not a tanager now vies  
With orange-flaming orioles,  
And humming-birds no magic bowls  
Of nectar drain in gardens fair,  
Or flash like jewels through the air?

Where have the summer's beauties flown?  
Afar on swallows' purple wings;  
With blackbirds' iridescent throats,  
And with the thrushes' perfect notes  
Of rapture into music grown;  
With blue the indigo bunting brings,  
A sapphire set with emerald leaves,  
And finch-gold that June interweaves  
With silver from the kingbird's breast  
And studs with pearls of many a nest.

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When will the summer come again?  
When olive warblers northward fly,  
And to their hints of budding green  
The grosbeaks add a rosy sheen  
Of warming skies: O, not till then  
Will summer come and winter die!

—Benjamin Karr.



COLLARED LIZARD.  
(*Crotaphytus collaris*.)  
About ½ Life-size.  
FROM COL. CHI. ACAD. SCIENCES.

35

## THE COLLARED LIZARD. (*Crotaphytus collaris*.)

The Collared or Ring-necked Lizard may be found among the rocks and open woods of the plateau or in desert regions from southern Missouri southward into Mexico, westward to southeastern California and northward to southern Idaho. However, this is its general range, and it is not common over all this territory. Though it has been known to ascend to an altitude of nearly six thousand feet, yet it does not seem to have crossed the Sierra Nevada range, as it has not been observed at any point on the Pacific coast or the interior of California.

The Collared Lizard is so called because of the black bars, which resemble a collar, and are situated between the fore legs and extend across the back of the animal. They vary greatly in color, depending on their age or geographical position. The back is usually some shade of dull or rather dark green, or it may have a bluish cast, with numerous oblong or rounded lighter spots, which may be either whitish, or various shades of red, orange or yellow. These spots may be quite definite or they may form quite continuous bands. The variations in color are much more marked in the young.

Dr. Cope tells us that "it runs very swiftly, carrying the tail over its back. In its manners it is perhaps the most pugnacious of our lizards, opening its mouth when cornered, and biting savagely. Its sharp teeth can do no more than slightly cut the skin."

Mr. Frank M. Woodruff relates the following interesting account of his experiences with this lizard: "I found the Collared Lizard at three points in Missouri—Vineland, DeSoto and Pilot Knob. They are restricted to the rocky glades, where they live with the scorpions and the rattlesnakes. The only place where I found them abundant was between Vineland and the old Kingston mines. During the hot summer months they make their appearance upon the broad slabs of rock, often quite a distance from their lairs. When disturbed they make a dash to escape and usually in the direction that leads to their accustomed crevice, even though the intruder is in its path. I have had them run almost across my feet in their frantic efforts to hide. They are a somewhat terrifying object as they run toward you. At this time they apparently assume a partly upright position, looking for all the world like a small edition of Mephistopheles. The negroes are mortally afraid of them. They call them 'Glade Devils,' and the more superstitious believe that the souls of the very bad negroes reside in them. A negro will never go through a glade frequented by this species, and will make a long detour to avoid doing so. The only time I ever saw a negro 'turn gray' was when I brought one of these lizards to Ironton and asked for assistance in capturing it when it escaped. They are so swift in their movements that I found the best method of capturing them was by tying a noose of fine copper wire to a fish pole. This can be slipped over their heads, as they lie sunning themselves, as they seem to pay but little attention to the loop as it touches them. By exercising caution it is possible to approach from the rear to within eight or ten feet without exciting them. They make delightful pets, if a lizard can be considered such. By feeding them through the winter on meal worms and in the summer on flies and grasshoppers they can be kept for a year or more."

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## A NIGHT IN THE FLOWER GARDEN. A FAIRY STORY.

The day had passed and the sun had gone to sleep in a bed of crimson and gold. The wind blew softly, at which



the leaves on the great trees in the garden began to murmur; though it was evening they were not sleepy like some of the flowers who thought it time to go to sleep when the sun did. Sometimes the leaves were awake all night; you could hear them moving gently in the breeze. The clover leaves were folded close in sleep long ago and the Poppies declared they could not sit up a moment longer. But the tall white Lilies, who loved the night, were wide awake; they could not sleep when the garden was full of moonlight. They said the Crickets were so noisy and the Katydid's so quarrelsome that it disturbed them, so they stood fair and white gathering the dew in their silvery cups which filled the soft night air with sweet perfume. The Roses were looking pale and sad in the moonlight; they revelled in the golden sunshine and grew brilliant in the heat of day. But they were languid now and sometimes a little breeze would send their velvet petals floating to the ground to fade and die.

The Pansies nestled low with closed eyes. You would not have known where the Mignonette and Heliotrope were had you not breathed their sweet perfume, for they were fast asleep. The Nasturtiums, Hollyhocks, and Marigolds were still as bright and gay as if the sun, whom they loved, could see them and they felt like sitting up with the Four O'Clocks and Evening Primroses, who never went to sleep until very late.

But of all the flowers in the garden, the Sweet Peas were the widest awake. There they stood in rows, dainty and fair, never thinking of going to sleep, but trembling with excitement. You could see them whispering together, for they had heard that to-night the Fairy Queen was to come to the garden and would give a soul to some flower; which one they did not know but hoped it would be to them.

A little Humming Bird had brought the news and had told it only to the Sweet Peas, so they thought it must be for them that this beautiful change was to come. Had they not heard that years ago a sweet flower called Narcissus had been changed into a beautiful youth, who could wander where he wished? What delight that would be! And had they not also heard of Pansies changing into little children, and Larkspurs into larks that soared away into the bright blue sky? Of Water Lilies changing into maidens, who made their homes under the green waves? And they had always thought that myriads of brilliant flowers were changed into the daintiest of all things. The little Humming Birds must have been flowers at one time, for they were always hovering around them, kissing them and making love to them. Oh! if the Fairy Queen would only change them into birds, or velvet bees, or, better still, into the beautiful butterflies, that came to them so often and fluttered like a cloud around them. Yes, they would rather be butterflies than anything else.

Slowly the moonlight faded from the flowers, the shadows of the night deepened and the soft dew fell like a benediction. A Fairy form floated over the sweetest of blossoms, then disappeared, and all was dark and silent save a gentle flutter, as of wings.

But in the morning when the sunbeams had awakened the sleeping blossoms, a flight of bright-winged Butterflies floated in the air or lighted for a moment on the flowers, but the Sweet Peas had all disappeared and were nowhere to be seen.

Fannie Wright Dixon.

## RABBIT'S CREAM.

Everyone is well acquainted  
With the arts of Frosty Jack—  
With his etchings on the windows,  
With the tints that mark his track;  
But the quaint and merry artist  
Has a fancy of his own  
That is delicate and graceful,  
But is not so widely known.

When no green is in the forest,  
And no bloom is in the dell,  
Not a flower star to twinkle,  
Not the smallest blossom-bell,—  
Here and there, an herb he singles,  
Brown and dry, and round its stem  
Fastens, with his magic fingers,  
One great, silver-shining gem;

Shell-like, delicate and dainty,  
White and lucent as a pearl;  
Just as though he took a fragment  
Of the mist, and with a twirl  
Froze it into shape and substance—  
Such a fine and fragile thing,  
That the fairy queen might crush it,  
If she brushed it with her wing.

Then he steals away, delighted;  
He has planned a morning treat  
For a troop who soon will flutter

Through the wood, on dancing feet;  
All the little country urchins  
Love to see its silver gleam—  
Love to fancy it a dainty,  
And they call it "rabbit's cream."

—Hattie Whitney.

## THE APPLE.

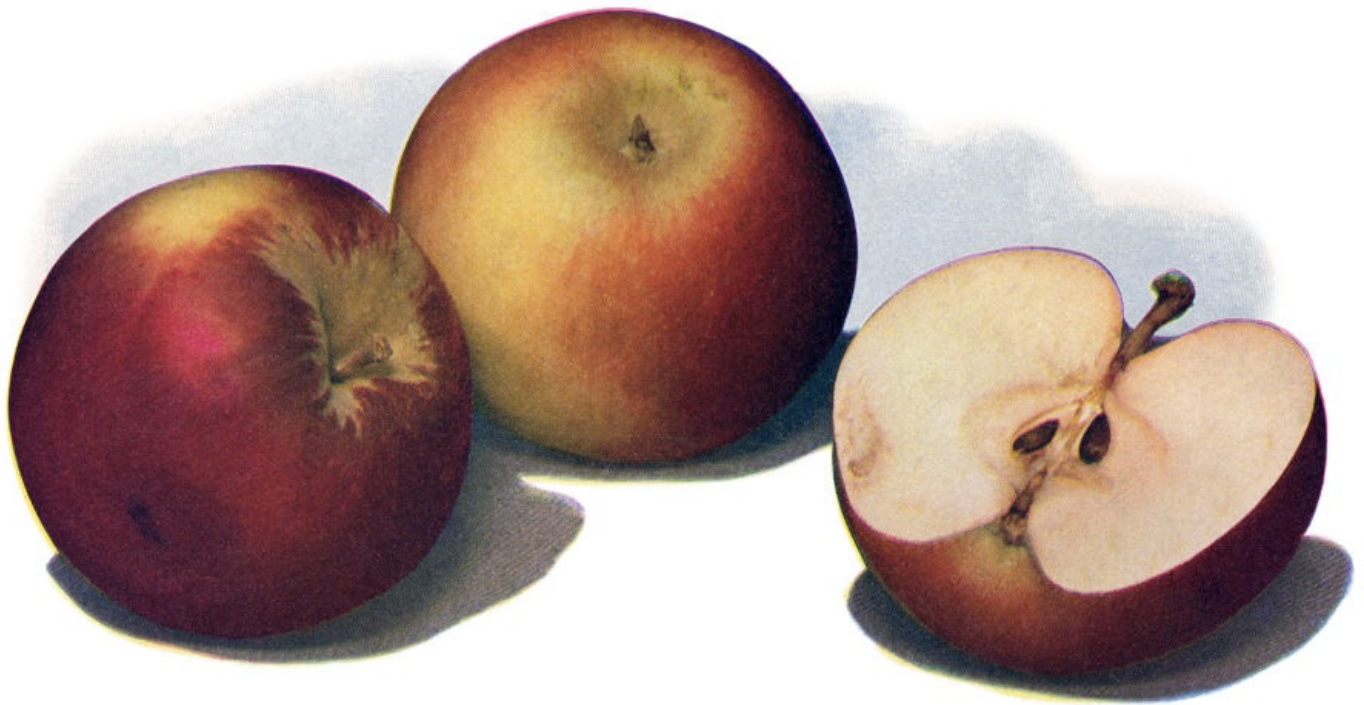
Both pagan and Christian mythologies have endowed the Apple with wonderful virtues. It has possessed a symbolism for man in all stages of civilization. Standing for the type of the earthly in its contrast with the spiritual, it represented the idea of that conflict between Ormuzd and Arimanes in which the evil principle is continually victor. The stories of Eve, of Paris, the Hesperides and Atalanta all emphasize this thought, showing the Apple to have been a reward of appetite over conscience.

The allegorical tree of knowledge bore apples guarded by the serpent, and the golden fruit of the garden of Hesperides was apples protected by the sleepless dragon, which it was one of the triumphs of Hercules to slay. The Assyrian tree Gavkerena, the Persian "Jima's Paradise," "Indra's heaven" and the Scandinavian ash tree Yggdrasil, all prefaced the story of Paris and the apple of discord which Ate brought to the banquet of the gods. In Greece it became the emblem of love, being dedicated to Venus. Aphrodite bore it in her hand as well as Eve, and it is said that Ulysses longed for it in the garden of Alcinous, while Tantalus vainly grasped for it in hades. The fruit was offered as a prize in the Grecian games given in honor of Apollo.

Among the heathen gods of the north there were apples fabled to possess the power of conferring immortality, which were carefully watched over by the goddess Iduna and jealously preserved for the dessert of the gods who experienced the enervation of old age. Azrael accomplished his mission by holding the apple to the nostrils of his victims, and the Scandinavian genii are said to have possessed the power of turning the fruit into gold.

The ancients better appreciated the importance of the apple than do the moderns, who treat it chiefly as "the embryonic condition of cider or as something to be metamorphosed into pies." It is said to be indigenous to every part of the inhabited globe except South America and the islands of the Pacific. It is equally at home in the fierce heat of the equator and among the frosts of Siberia. In olden times, the fig was the index of a native civilization. Later on, the vine was king, but at the present time there are many who maintain that the Apple is the only genuine index of civilized man, and claim that it flourishes best in those regions where man's moral and intellectual supremacy is most marked.

The Athenians made frequent mention of the cultivation of the Apple, and Pliny enumerates twenty varieties that were known in his day. It is generally supposed that the Goths and Vandals introduced the manufacture and use of cider into the Mediterranean provinces and references to it are made by Tertullian and the African Fathers. The use of cider can be traced from Africa into the Biscayan provinces of Spain, and thence to Normandy. It is supposed to have come into England at the time of the conquest, but the word "cyder" is said to be Anglo-Saxon, and there is reason to believe that it was known in the island as early as the time of Henghist. As the mistletoe grew chiefly on the apple and the oak, the former was regarded with great respect by the ancient Druids of Britain, and even to this day in some parts of England, the antique custom of saluting the apple trees in the orchards, in the hope of obtaining a good crop the next year, still lingers among the farmers of Devonshire and Herefordshire. During the middle ages, the fruit was made the pretext for massacring the oppressed tribes of Israel, as it was supposed that the Hebrews used apples to entice children into their homes to furnish their cannibal banquets.



APPLES.  
(Jonathan.)  
PRESENTED BY LOUIS KUNZE.

The different varieties of apples have all descended from a species of crab found wild in most parts of Europe. Although there are two or three species of wild crab belonging to this country, yet none of our cultivated varieties have been raised from them, but rather from seeds of the species brought here by the colonists from Europe—over two hundred varieties of apples are known at the present time. As a rule, the Apple is a hardy, slow-growing tree, with an irregular head, rigid branches, roughish bark, and a close-grained wood. It thrives best in limestone soils and deep loams. It will not flourish in wet soils or on those of a peaty or sandy character. As a rule, the trees live to be fifty or eighty years of age, but there are specimens now bearing fruit in this country that are known to be over two hundred years old. The wood is often stained black and used as ebony. It is also made into shoe lasts, cog-wheels and small articles of furniture, and is greatly prized in Italy for wood carving and statuary. 41

New and choice varieties of apples are derived from seeds planted to produce stocks. One stock in ten thousand may prove better than the original, and its virtues are perpetuated by layers, cuttings, graftings and budding. The tree is not subject to disease. Insects, notably the borer, the woolly aphis, the caterpillar, the apple moth and the bark louse, have to be guarded against, and several blights occasionally attack the foliage, but as a rule small loss is experienced from these sources.

Charles S. Raddin.

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Shed no tear!—O shed no tear,  
The flower will bloom another year.  
Weep no more!—O weep no more,  
Young buds sleep in the roots' white core.  
Dry your eyes!—O dry your eyes  
For I was taught in Paradise  
To ease my breast of melodies—  
Shed no tear!

Overhead!—look overhead  
'Mong the blossoms white and red.  
Look up! Look up!—I flutter now  
On this flush pomegranate bough.  
See me! 'Tis this silvery bill  
Ever cures the good man's ill.  
Shed no tear!—O shed no tear!  
The flower will bloom another year.  
Adieu!—adieu!—I fly, adieu—  
I vanish in the heaven's blue.  
Adieu!—adieu!

—John Keats.

## GEOGRAPHIC DISTRIBUTION OF SEED-BEARING PLANTS.

This is one of the most difficult and important subjects connected with the study of plants. Before it can be well organized it will be necessary to bring together very many more observations of plants in all parts of the world than is possible now. However, a few facts are known which are both interesting and suggestive. In order to make their presentation as definite as possible, this paper will be restricted to a brief account of the geographic distribution of seed plants.

One of the two great groups of seed plants is known as the Gymnosperms, a group which in our region is represented by pines, spruces, hemlocks, cedars, etc. In the tropics the group is represented by a very different type of trees, known as the Cycads. They resemble in general habit tree-ferns, or palms. The group of Gymnosperms with which we are acquainted have been called Conifers on account of the very characteristic cones which they bear. Several principles connected with geographic distribution may be illustrated by considering briefly these two groups of Gymnosperms.

The Cycads are absolutely restricted to the tropics, a few forms reaching into semi-tropical conditions, as in southern Florida. If a comparison be made between the eastern and western tropics, it will be discovered that the Cycads are almost equally divided between the two regions. For an unknown time, but certainly a very long one, these eastern and western Cycads have been separated from one another. As a consequence they have become so unlike that one kind of Cycad is never found in both hemispheres. Their long separation from one another, and their somewhat different conditions of living, have resulted in working out differences of structures which botanists recognize as species, genera, etc.

The Conifers, on the other hand, are characteristic of temperate regions. If the distribution of Conifers were indicated upon a world map, there would be shown a heavy massing of them in the northern region and a lighter massing in the southern region, the two being separated from one another by a broad tropical belt. This tropical belt is traversed in just two places; one is by means of the East Indian bridge, across which certain Australasian forms reach China and Japan; the other is the chain of the Andes mountains, along which a single northern type has worked its way into the southern part of South America. The two great masses of Conifers, therefore, lie in the northern and southern hemispheres, rather than in the eastern and western hemispheres, as is the case with the Cycads. This long separation has resulted just as it did with the Cycads; that is, the northern and southern Conifers are not any longer alike, but differ so widely from one another that botanists cannot discover any form which is common to both the northern and southern hemispheres, excepting the single one already mentioned, which has succeeded in crossing the tropics by means of the Andes bridge.

Another interesting fact in connection with the distribution of the Conifers is that their great centers of display are in regions which border the Pacific Ocean, and they have often been spoken of as a Pacific group. There are three special centers of display; one is the China-Japan region, a second is the general Australasian region, and the third is western North America. Just why this border region of the Pacific is especially favorable for this sort of plant life is a question which we do not as yet pretend to answer. Another fact which illustrates this persistent distribution in connection with the Pacific is that in the case of the Conifers which belong to the southern hemisphere, the continental masses which pair in the display of similar forms are Australia and South America. 43

Another fact, which is true of all large groups, is that certain forms have a very extensive distribution, and others are very much restricted in their occurrence. For example, the greatest genus of Conifers is the genus made up by the pines, at least seventy kinds of which are recognized. This great genus sweeps throughout all the north temperate regions of the globe. There is a similar extensive distribution of the different kinds of spruce, larch, juniper, etc. On the other hand, the giant redwood, known as Sequoia, is restricted to certain comparatively small areas in California. In China and Japan, and also in Australia, there are numerous illustrations of forms very much restricted in their occurrence.

The other great group of seed plants is known as the Angiosperms, and to it belong all those seed plants which are most commonly met in this region. The distribution of Angiosperms is a very much more difficult question than that of Gymnosperms; for while there are only about four hundred kinds of living Gymnosperms, there are more than one hundred thousand kinds of living Angiosperms. In presenting the distribution of this great group, it will be necessary to consider its two main divisions separately, for they differ from one another very much. One of the groups is known as the Monocotyledons, to which belong such forms as the grasses, lilies, palms, orchids, etc.

Some prominent facts in reference to the geographical distribution of these Monocotyledons are as follows: They contain four great families, which include almost one-half of their number, and which have become world-wide in their distribution. These families are the grasses, the sedges, the lilies, and the irises. This world-wide distribution means that these families have succeeded in adapting themselves to every condition of soil and climate. In this world-distribution the grasses easily lead, not only among Monocotyledons, but among all seed plants.

Another fact in reference to the Monocotyledons is that they include an unusual number of families which are entirely aquatic in their habit. These aquatic families are also world-wide in their distribution, so far as fresh and brackish waters can be called world-wide. It is important to notice that while the world-families which belong to the land have worked out about ten thousand different forms, the world-families which belong to the water have worked out considerably less than two hundred different forms. This seems to indicate that the great number in the one case is due to the very diverse conditions of the land, while the small number in the latter case is due to the very uniform conditions of water life.

A third fact of importance is that the Monocotyledons are mainly massed in the tropics, and in this sense are almost an exact contrast to the Conifers we have been considering above. The same effect of separation in working out diversity in structure is shown by the Monocotyledons as was shown by the eastern and western Cycads, and the northern and southern Conifers. For example, the palms represent the great tree group of Monocotyledons, and are restricted to the tropics as rigidly as are the Cycads. They are found in about equal numbers in the eastern and western tropics, but there are no forms in common. The eastern and western forms have become so different that they might almost be regarded as different families.

The Monocotyledons are also somewhat famous for the number of air plants which they contain—that is, plants which have sometimes been called “perchers,” because they fasten themselves upon trunks and branches and supports of various kinds, and absorb what they need directly from the air. It is a notable fact that these so-called “perchers” are very much more abundant in the western tropics than in the eastern. An explanation for this is to be found in the fact that the western tropics have a very much greater rainfall; in fact, in the rainy woods of the Amazon region the air is saturated with water, and everything is dripping.

One of the facts in connection with the distribution of Monocotyledons is quite puzzling, and that is the very poor representation of the whole group in the southern hemisphere. In examining the distribution of other groups 44 in the southern hemisphere, it is found that Australia and its general vicinity is prolific in peculiar forms. In the case of the Monocotyledons, however, the Australasian region is the most poverty-stricken one in all the southern hemisphere. Just why the southern hemisphere in general, and the Australasian region in particular, are unfavorable for Monocotyledons, it is hard to say. Of course in these cases the world-families already mentioned are represented.

The other great division of Angiosperms is known as Dicotyledons, which include such forms as our common forest trees, buttercups, roses, peas, mints, sunflowers, etc. As there are about eighty thousand of these Dicotyledons, it is impossible to state anything very definite in reference to the distribution of the group as a whole. Taking the higher forms, however, as representing the general tendency of the group, some of the facts of distribution are as follows:

It has been noticed that the Monocotyledons are massed in the tropics, and that the temperate and boreal regions have been left comparatively free by previous groups, with the exception of the Conifers, which only develop tree types. With the coming of the Dicotyledons, therefore, the vast temperate and boreal regions presented a particularly favorable field, which they have entered and taken possession of. This vast group is prominently adapted to living in the unoccupied temperate and boreal regions. This does not mean that they are not found in the tropics for they hold their own there with the other groups.

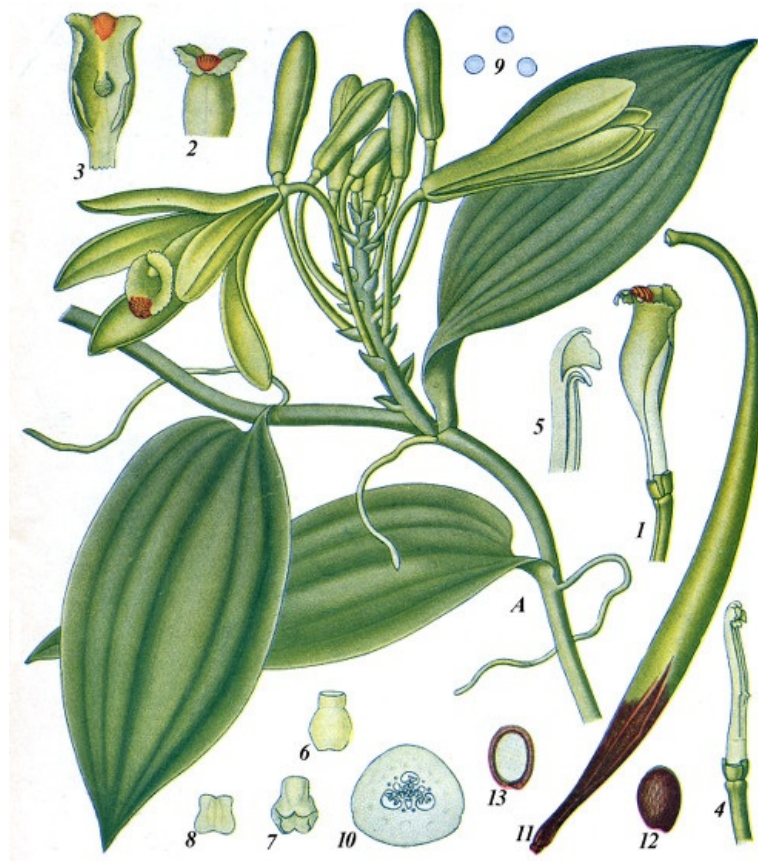
Dicotyledons, however, succeeded in working out but three world-families: Composites, to which the sunflowers, dandelions, etc., belong; the Mints; and the Plantains. There are other large families which characterize certain great areas, but they are not world-wide in their distribution.

Another fact, which might indicate that the Dicotyledons have taken possession of comparatively unoccupied regions only, is that they are very poorly represented, so far as higher groups are concerned, in aquatic conditions. It would seem as though the conditions of life in the water had been fairly well taken up by other groups. In looking over the display of Dicotyledons in the tropics of the eastern and western hemispheres, it becomes evident that there is no such difference between the forms of the two regions as in the groups previously mentioned. It will be remembered, however, that in the case of the Cycads and palms, which were used as illustrations, they are restricted to the tropics, and their eastern and western forms are separated from one another, not merely by oceans, but by temperate and boreal lands. In the case of Dicotyledons this is different, for while they are found in the tropics, they are found in the other regions as well, and have better chances for intermingling than the other groups.

This tropical display of Dicotyledons further shows the great prominence of America in the display of forms. This appears not merely in the greater number of peculiar forms and often families which appear in tropical America; but whenever the continents are paired in the display of forms, America is always one of the pair, Asia or Africa being the other member.

It will be recognized from what has been said that the whole subject of geographic distribution is a very extensive one, and that it will be a long time before the important facts are recorded. The importance of the subject rests not so much upon the mere presence of certain plants in certain regions, but it has to do with explaining just why the conditions are suited to the plants, and also just how the plants have come to be what they are and where they are.

John Merle Coulter.



VANILLA.  
FROM KEHLER'S MEDICINAL-PFLANZEN.

Description of Plate—A, flowering twig; 1, 2, 3, corolla; 4, 5, pistil; 6, 7, stamen; 9, pollen; 10, 11, fruit; 12, 13, seed.

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**VANILLA.**  
**(*Vanilla planifolia*, Andrews.)**

You flavor everything; you are the *vanille* of society.

—Sydney Smith: Works, p. 329.

*Vanilla planifolia* belongs to the Orchid family (Orchidaceae), though it has many characteristics not common to most members of the family. It is a fleshy, dark-green perennial climber, adhering to trees by its aerial roots, which are produced at the nodes. The stem attains a length of many feet, reaching to the very tops of the supporting trees. The young plant roots in the ground, but as the stem grows in length, winding about its support and clinging to it by the aerial roots, it loses the subterranean roots and the plant establishes itself as a saprophyte or partial parasite, life habits common to orchids. The leaves are entire, dark-green, and sessile. Inflorescence consists of eight to ten flowers sessile upon axillary spikes. The flowers are a pale greenish yellow, perianth rather fleshy and soon falls away from the ovary or young fruit, which is a pod, and by the casual observer would be taken for the flower stalk. The mature fruit is a brown curved pod six to eight inches long, smooth, splitting lengthwise in two unequal parts, thus liberating the numerous, very small, oval or lenticular seeds.

There are several species of vanilla indigenous to Eastern Mexico, growing in warm, moist, shaded forests. It is now extensively cultivated in Mexico; also in Mauritius, Bourbon, Madagascar and Java. It is extensively grown in hot-houses of England and other temperate countries. The wild growing plants no doubt depended upon certain insects for pollination, but with the cultivated plants this is effected artificially by means of a small brush.

The word vanilla is derived from the Spanish vainilla, the diminutive of vaina, meaning a sheath or pod, in reference to the fruit. There is little doubt that the natives of Mexico employed vanilla as a flavor for cocoa long before the discovery of America. We received our first description of the plant from the Spanish physician Hernandez, who, during 1571-1577 explored New Spain or Mexico. In 1602, Morgan, apothecary to Queen Elizabeth, sent specimens of the fruit to Clusius, who described it independently of Hernandez. In 1694 vanilla was imported to Europe by way of Spain. In France it was much used for flavoring chocolate and tobacco. During the first half of the eighteenth century it was extensively used in Europe, particularly in England, after which it seems to have gradually disappeared. Now it is, however, again very abundantly employed in nearly all countries.

Vanilla must be cultivated with great care. In Mexico a clearing is made in the forest, leaving a few trees twelve to fifteen feet apart to serve as a support for the vanilla plants. Cuttings of the vanilla stems are made three to



five feet in length, one cutting being inserted into the soil to a depth of about ten inches near each tree. The cuttings become rooted in about one month and grow quite rapidly, but do not begin to bear fruit until the third year and continue to bear for about thirty years. In Reunion, Mauritius and the Seychelles the young plants are supported by a rude trellis fastened between the trunks of trees. In cultivation pollination is universally effected artificially; the pollen being transplanted from one flower to another by means of a small brush or pencil. Only the finest flowers are thus fertilized so as to prevent exhaustion and to insure a good commercial article. Among wild growing plants pollination is effected through the agency of insects, which evidently do not occur in the vicinity of the plantations; thus man is called upon to assist nature. The pods are cut off separately as they ripen; if over-ripe they are apt to split in drying; if collected green the product will be of an inferior quality.

The peculiar fragrance of the vanilla pods is due to vanillin, which occurs upon the exterior of the dried fruit in the form of a crystalline deposit, which serves as a criterion of quality. This substance does not pre-exist in the ripe fruit. It is developed in the process of drying and fermentation. In Mexico the collected pods are placed in heaps under a shed until they begin to wilt or shrivel, whereupon they are subjected to the sweating process conducted as follows: The pods are wrapped in woolen cloth and exposed to the sun during the day or heated in an oven at 140°F., then enclosed in air-tight boxes at night to sweat. In twenty-four to thirty-six hours they assume a chestnut-brown color. They are then dried in the sun for several months. 48

In Reunion the pods are first scalded for a few minutes in boiling hot water, then exposed to the sun for about one week, wrapped in woolen blankets; then spread out and dried under sheds, turning frequently so as to insure uniform drying. When the pods can be twisted around the finger without splitting or cracking the "smoothing process" begins. This consists in rolling the pods between the fingers to distribute the unctuous liquid, which exudes during the sweating process (fermentation), and to which the pods owe their lustre and suppleness.

Vanilla workers are apt to suffer from an affection known as vanillism, characterized by an itching eruption of the skin, nasal catarrh, more or less headache and muscular pain. By some this is said to be caused by a poisonous substance in the vanilla or perhaps the oil of cashew, with which the pods are coated. According to others the trouble, at least the itching and eruption, is caused by a species of acarus (itch mite) found upon the pod. It must also be borne in mind that most of these workers are anything but cleanly in their habits. Bacteria, dirt, etc., find their way to the pods from the dirty hands of the workmen. The entire process of gathering, sweating, drying, smoothing and packing, as carried on in Mexico and South American countries is not conducted in accordance with recognized sanitary rules.

There are a number of commercial varieties of vanilla named after the countries in which they are grown or after the centers of export, as Mexican, Vera Cruz, Bourbon, Mauritius, Java, La Guayra, Honduras and Brazilian vanilla. The most highly valued Mexican variety is known as Vainilla de leg (leg, meaning law). The pods are long, dark-brown, very fragrant and coated with crystals. Since vanilla is a costly article adulteration is quite common. Useless pods are coated with balsam of Peru to give them a good appearance. Split, empty pods are filled with some worthless material, glued together and coated with balsam of Peru.

Vanillin also occurs in Siam benzoin, in raw beet-sugar and in cloves. It has been artificially prepared from coniferin, a substance found in the sap-wood of fir-trees, and from asafoetida. In Germany commercial vanilla is now largely prepared from eugenol, a constituent of oil of cloves.

Vanillin seems to have some special action upon the nervous system, and has been employed in the treatment of hysteria. It is also used to disguise disagreeable tastes and odors of medicines, as in lozenges and mixtures. Its principal use is that of spice for flavoring chocolate, confectionery, ices, ice-cream, drinks, pastry; in the preparation of perfumery, sachet powders, etc. It has a very pleasant, delicate aroma when properly diluted and can be very effectively combined with other odors. Vanilla, combined with almonds, simulates heliotrope.

The poisonous effects of ice creams flavored with vanilla are perhaps not due to vanillin, but to toxins formed by bacteria found upon vanilla pods, or the bacteria of the milk and cream used.

Albert Schneider.

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