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# BIRDS AND NATURE.

ILLUSTRATED BY COLOR PHOTOGRAPHY.

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VOL. IX.

MAY, 1901.

No. 5

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# BIRDS AND NATURE.

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## MAY.

May brings all the flowers at once,  
Teased by rains and kissed by suns;  
Now the meadows white and gold;  
Now the lambs leap in the fold.  
May is wreathed with virgin white;  
Glad May dances all the night;  
May laughs, rolling 'mong the flowers,  
Careless of the wintry hours.  
May's storms turn to sunny rain,  
And, when Iris springs again,  
All the angels clap their hands,  
Singing in their seraph bands.

—Walter Thornbury, "The Twelve Brothers."

Now, shrilleth clear each several bird his note,  
The Halcyon charms the wave that knows no gale,  
About our eaves the swallow tells her tale,  
Along the river banks the swan, afloat,  
And down the woodland glades the nightingale.

Now tendrils curl and earth bursts forth anew—  
Now shepherds pipe and fleecy flocks are gay—  
Now sailors sail, and Bacchus gets his due—  
Now wild birds chirp and bees their toil pursue—  
Sing, poet, thou—and sing thy best for May!

—William M. Hardinge, "Spring."

## AUDUBON'S ORIOLE. (*Icterus audubonii*.)

The name oriole is from the French word oriol, which is a corruption of the Latin word aureolus, meaning golden. The name was originally applied to a vire, but is now used in a much wider sense and includes a number of birds.

The true orioles are birds of the Old World and are closely related to the thrushes. It is said that no fewer than twenty species from Asia and Africa have been described.

The orioles of America belong to a very different group of birds and are related to our blackbirds, the bobolink and the meadowlark. All these birds belong to the family Icteridae, the representatives of which are confined to the New World.

The genus of orioles (*Icterus*) contains about forty species, chiefly natives of Central and South America. The plumage of nearly all the species is more or less colored with shades of yellow, orange and black.

Audubon's Oriole, the male of which we illustrate, has a very limited range, including the "valley of the Lower Rio Grande in Texas and southward in Mexico to Oaxaca." It is more common in central and eastern Mexico than in any other part of its range. In the summer, it only frequents the denser forests of its Texas home, but during the winter months it will approach the inhabited regions.

The Mexicans capture these Orioles and offer them for sale. In captivity, however, they seem to lose their vivacity and will not sing. "When free their usual song is a prolonged and repeated whistle of extraordinary mellowness and sweetness, each note varying in pitch from the preceding."

It is said that this beautiful bird is frequently called upon to become the foster parents of the offspring of some of those birds that have neither the inclination to build their own nests or to raise their own families. The ingenious nests of the orioles seem to be especially attractive to these tramp birds which possess parasitic tastes.

The red-eyed cowbird (*Calliothrus robustus*), of the Southern United States and Central America, seems to be the pest that infests the homes of Audubon's Oriole. It has been stated that the majority of the sets of eggs collected from the nests of this Oriole contain one or more of the cowbird's eggs. It is also probable that many of the Oriole's eggs are destroyed by the cowbirds as well as by other agencies, and thus, though the raising of two broods the same season is frequently attempted, the species is far from abundant.

Regarding the nesting habits of the Audubon's Oriole, Captain Charles Bendire says, "The nest of this Oriole is usually placed in mesquite trees, in thickets and open woods, from six to fourteen feet from the ground. It is a semipensile structure, woven of fine, wire-like grass used while still green and resembles those of the hooded and orchard orioles, which are much better known. The nest is firmly attached, both on the top and sides, to small branches and growing twigs and, for the size of the bird, it appears rather small. One now before me measures three inches in depth inside by about the same in inner diameter. The rim of the nest is somewhat contracted to prevent the eggs from being thrown out during high winds. The inner lining consists of somewhat finer grass tops, which still retain considerable strength and are even now, when perfectly dry, difficult to break. Only a single nest of those found was placed in a bunch of Spanish moss and this was suspended within reach of the ground; the others were attached to small twigs."



AUDUBON'S ORIOLE.  
(*Icterus audubonii*).  
 $\frac{2}{3}$  Life-size.  
FROM COL. CHI. ACAD. SCIENCES.

The number of eggs vary from two to five and "sets of one or two eggs of this Oriole, with two or three cowbird's eggs, seem to be most frequently found, some of the first named eggs being thrown out to make room." The eggs are ovate in form and the general color varies from white with a bluish cast to white with a grayish cast and in some instances a purple shade predominates. The markings vary greatly both in color and form. They may be either thread-like, in streaks or in blotches. In color they may be various shades of either brown, purple or lavender. 197

The food of Audubon's Oriole consists of insects and, to some extent, of berries and other fruits. Mr. Chark, who studied the habits of this species in Texas, says that he observed it frequently feeding on the fruit of the hackberry. He also states that these birds were usually in pairs and exhibited a retiring disposition, preferring the thick foliage of the margins of streams rather than that of more open and exposed places.

Seth Mindwell.

### TO A SEA-BIRD.

Sauntering hither on listless wings,  
Careless vagabond of the sea,  
Little thou heedest the surf that sings,  
The bar that thunders, the shale that rings,—  
Give me to keep thy company.

Little thou hast, old friend, that's new,  
Storms and wrecks are old things to thee;  
Sick am I of these changes, too;  
Little to care for, little to rue,—  
I on the shore, and thou on the sea,

All of thy wanderings, far and near,  
Bring thee at last to shore and me;  
All of my journeyings end them here,  
This our tether must be our cheer,—  
I on the shore and thou on the sea.

Lazily rocking on ocean's breast,  
Something in common, old friend, have we;  
Thou on the shingle seek'st thy nest,  
I to the waters look for rest,—  
I on the shore, and thou on the sea.

—Bret Harte.

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## FROM AN ORNITHOLOGIST'S YEAR BOOK. THE HEART OF A DRYAD. I.

It was an oak wood. A few hickories and chestnuts grew there, but the oaks ruled; great of girth, brawny of limb, with knotted muscles like the figures of Michael Angelo or Tintoretto's workmen in his painting of the Forge of Vulcan. As to coloring, the oaks were of the Venetian painter's following, every oak of them! In summer they were "men in green," rich, vigorous green, with blue shadows between the rustling boughs; in early autumn, though russet in the shadow, the sunshine showed them a deep and splendid crimson, pouring through them like a libation to the gods of the lower earth, and to the noble dead, for the Dryad had a heart for heroes and all oak-like men.

Immediately before the great winds came, stripping them bare, and dashing silver cymbals to wild airs of triumph, they wore a sober brown, but it put on a glow, as of bronze or heated metal after a rain, when the sun's rays smote them with shining spears smiting aslant with unwonted glittering. Under the moon or after a freeze they were all clad in steel, armor of proof, and mighty was the tumult, as of meeting swords, when the great boughs swung, and the long icicles fell upon ice below.

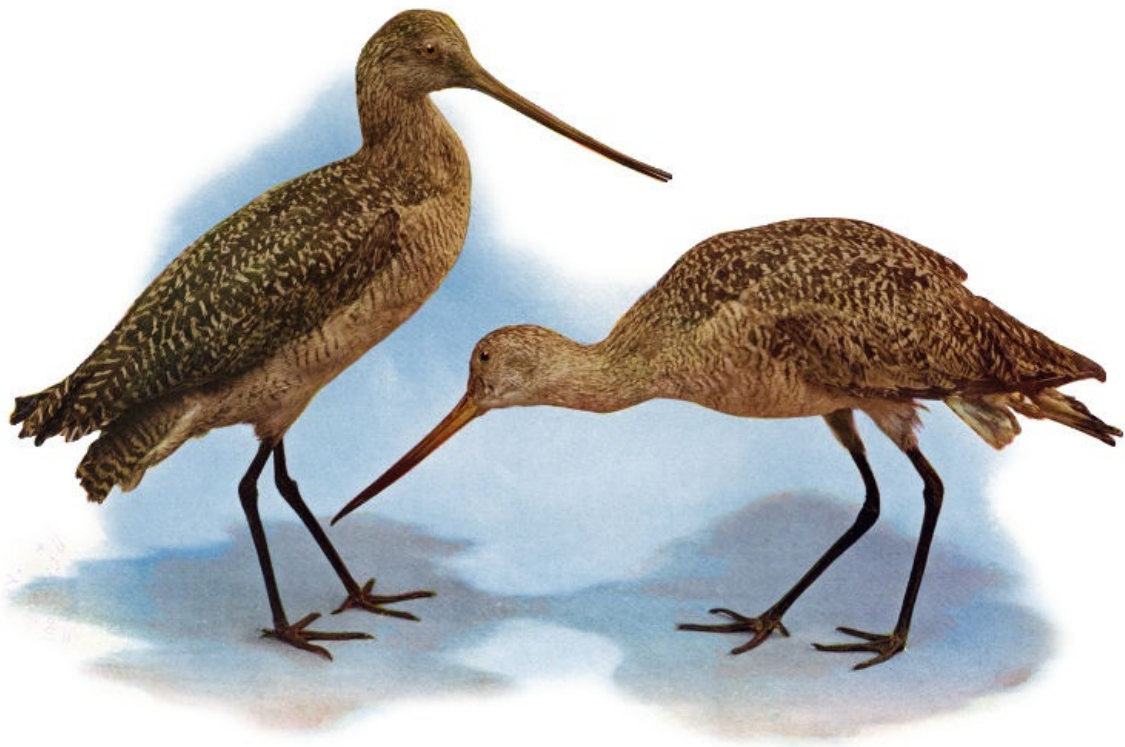
But these days were far off. It was summer, and a crystal brook slipped from level to level, singing its sweet water-song, and bringing cool water to bathe the feet of the oak which the Dryad loved and decked with green garlands. The orioles loved it, flashing here and there with rich red gold or flame-like orange on breast and wings and soft, velvety black on head and shoulders, splendidly beautiful as some tropic flower, they chose the end of an oak bough to hang their pensile nest. The male oriole shone in the sun, but his mate glowed with a duller hue, an orange veiled with gray, and mottled and spotted or splashed with white and fuscous and black, as a brooding creature should be that sits all day long amid the play of fleeting light and shade upon constant color. But both were beautiful in their strong and darting flight, and their labors of love.

The mother alone fashioned the nest, weaving it strongly of grasses and bark, of fibre, hair and string, and lashing it firmly near the end, a hanging cradle for the wind to rock at will and safely, and beautifully adorned with a fantastic pattern of green oak leaves, woven across, and aiding to conceal the nest itself. The eggs, four to six, were white, but marked with strange characters, sometimes distinct, sometimes obscure, a hieroglyphic of black or fuscous lines, over which the mother brooded patiently for many days. But the male oriole was not indifferent, even while the young were in the egg. He did not fear to expose himself upon an upper branch, where he could watch untiringly over the safety of the beloved nest and all day long, in bright or cloudy weather, floated down to his silent mate a song of courage and tenderness.

Ah, no shepherds in far-off Arcady ever piped more sweetly to their beloved than this winged lover! His note is wild and free, a touch of anxious pleading perhaps in the brooding song that one does not catch in the first triumphant cry of joy with which he flashes upon our sight in April, but inexpressibly sweet and liquid. It is essentially music of the pipes, like the soft airs blown by lips of happy children upon reeds cut from the brook-side in the first joyous days of spring, but it is different in its airy quality, as if a melody, unfinished, were floating far above our heads! They are loving house-holders, and, if undisturbed, will return, year after year, to the same nest.

Happy is the Dryad that dwells in an oak where the orioles build and sing!

Ella F. Mosby.



MARbled GODWIT.  
(*Limosa fedoa*).  
About  $\frac{2}{5}$  Life-size.  
FROM COL. CHI. ACAD. SCIENCES.

## THE MARbled GODWIT. (*Limosa fedoa*.)

—I behold

The godwits running by the water edge,  
The mossy bridges mirrored as of old;  
The little curlews creeping from the sedge.

—Jean Ingelow, "The Four Bridges."

The Godwits form an interesting group of the shore birds (Limicolae) and belong in the same family as the snipes and sandpipers. They command attention not alone because of their habits, but also because they have for centuries been considered a delicate food for man, and much has been written in praise of their flesh.

Early in the sixteenth century one of the European species was rated as "worth three times as much as the snipe," and was considered a delicacy of the French epicure. We are told that the black-tailed Godwit in the year 1766 was sold in England for half-a-crown. Ben Jonson speaks enthusiastically of this bird as a delicate morsel for the appetite.

The origin of the name Godwit is veiled in obscurity. It has been suggested that it may be a corruption of the two words good and the antiquated word wight, the latter meaning swift, though the Godwits are not birds of very rapid flight.

The Marbled Godwit belongs to a genus (*Limosa*) which, though not rich in the number of species, has representatives throughout the Northern Hemisphere. This bird frequents muddy pools and marshes and wet, sandy shores. It is this habit that suggested to the naturalist the generic name, which is derived from the Latin word *limosus*, meaning muddy.

As is the case with many of our game birds, this species bears a number of common names, such as the Straight-Billed Curlew, the Marbled or Brown Marlin, the Red Curlew and, among sportsmen, the Dough and the Doe Bird.

With the exception of the long-billed curlew the Marbled Godwit is the largest of the "Bay Birds." These two birds closely resemble each other in coloration, but may be easily distinguished by the characteristics of the bills, which are very long. The terminal half of the bill of the curlew is curved downward, while that of the Godwit is either straight or slightly curved upward.

The geographical distribution of the Marbled Godwit includes the whole of North America, though it is infrequent on the Atlantic coast. Its nesting range is chiefly limited to the interior from Iowa and Nebraska northward to the Saskatchewan. In winter it migrates to Central America, Cuba and the northern part of South America.

In company with the long-billed curlew and some species of sandpipers it builds its nest on the grassy banks of

rivers and ponds, usually in some natural depression. Occasionally, however, the nests are found on moist prairies some distance from a stream. In these grass-lined nests are laid the three or four bright olivaceous, drab or creamy buff eggs that are variously spotted or blotched with varying shades of brown. They are domestic and seemingly devoted to their fellows. When one of their number is wounded and unable to fly they will frequently remain in the vicinity, flying around the spot where lies their wounded comrade.

Dr. Coues tells us that "on intrusion near the nest the birds mount in the air with loud, piercing cries, hovering slowly around with labored flight, in evident distress and approaching sometimes within a few feet of the observer."

Its food consists of the smaller crustaceans, worms, snails, insects and their larvae. These are captured from the surface of the water, on the shore or are probed for, with the long, sensitive bills, in the soft soil of the banks or under shallow water. When feeding it moves in an easy and graceful manner. Its grace and dignity well merit the saying that "it is one of the most beautiful of the birds sought by the sportsman." 202

Neltje Blanchan has very aptly described the habits of this bird. She says: "It is not the intention of the Godwit to give anyone a near view of either plumage or bill. The most stealthy intruder on its domains—salt or fresh water shores, marshes or prairie lands—startles it to wing; its loud, whistled notes sound the alarm to other marlins hidden among the tall sedges, and the entire flock flies off at an easy, steady pace, not rapid, yet not to be overtaken afoot. A beautiful posture, common to the plovers, curlews, terns and some other birds, is struck just as they alight. Raising the tips of the wings till they meet high above the back, the marlins suggest the favorite attitude of angels shown by the early Italian painters."

### **A BIRD-JOKE AT LEAFY LAWN.**

In early spring Robin Redbreast returned to Leafy Lawn and selected a new site for his nest in the same apple tree his father and grandfather had occupied during preceding summers. No other birds had yet arrived and Robin jumped about on the sprouting lawn master of all he surveyed.

He soon discovered to his sorrow that those selfish, quarrelsome sparrows who tormented the birds last summer and drove away the wrens, had gone no farther during the winter than to the eaves of a near barn, and were already back to their nest in the tall poplar, scolding and threatening as disagreeably as ever. But Robin noticed that the limb which held their nest so high was dead and he hoped a strong wind would dash limb, nest and ugly sparrows all to the ground.

Robin looked very handsome in his crimson vest, hopping over the grass in a scalloped path, with his modest little mate following in a similar path beside him. Suddenly they stopped and listened.

"Surely that is Mr. Woodpecker pounding on the tin roof-drain," said Robin; and Mrs. Robin looked about curiously and spied Mrs. Woodpecker on a near tree listening to her husband's wonderful drumming. Mrs. Woodpecker was thinking what a fine nest such a strong husband could cut out and what quantities of corn and nuts he could hammer into the bark of the trees for an extra food supply. In a very short time the woodpeckers selected the balm-of-Gilead tree by the gate for their home and the work began of cutting and tossing the tiny shavings and so making a hole large enough to accommodate Mrs. Woodpecker while she sat over the ivory eggs waiting the day of their hatching.

Mr. Woodpecker was recognized as king of Leafy Lawn, perhaps because of his lordly manner and fine clothes. He always wore a jet black coat and white satin vest, and what was queer on a king, a large scarlet bonnet.

A few days after the arrival of the Woodpeckers, Robin saw Mr. Blue Jay making a circuitous route to the tall pine and he knew the Jays had located there. Though Mr. Blue Jay was always cautious, trying to deceive every one concerning the whereabouts of his home, he himself knew every other nest in the yard. 203

So persistent was he in patrolling Leafy Lawn, jumping from tree to tree and from branch to branch, reporting his presence, and in case of danger threatening, squawking so loudly and repeatedly, that it was agreed, as he already had a blue uniform, that he should be the policeman for this precinct.

There came a day early in the season when Mr. Woodpecker, Robin Redbreast and Mr. Blue Jay all assembled within speaking distance on the lower branches of a silver maple tree and excitedly discussed the arrival of a number of birds which they had heard early that morning but had been unable to find.

"My wife," said Robin, "awakened me from the twig near her nest, where I usually sleep and keep guard, and she said that one of our kin had arrived for she had heard a voice exactly like mine from the plum tree. Hoping it was one of my brothers I searched eagerly until sunrise, and though I heard him twice I could not find him."

Mr. Blue Jay was more excited than before and turned about, twitched his tail violently, scolded and sputtered that he had had just such an experience and he believed the sparrows had added witchcraft to their other sins and were trying to hoodoo the birds of Leafy Lawn.

A frightened sparrow overheard this accusation and came near enough to protest that they were not guilty and had been themselves trying in vain to find their newly-arrived English relatives, whom they had believed they heard that morning.

Mr. Woodpecker said it might be no personal affair of his as he had heard no drumming nor mocking of his song,

but if Leafy Lawn were to be occupied by kildares, bobolinks, meadow larks and blackbirds he thought there would be scarce picking of worms, bugs or seeds for the old settlers who were the rightful possessors of these premises and it was a serious condition of things. In closing his pompous speech he shook his scarlet bonnet furiously, smoothed his waistcoat and jumped upon a higher limb and called off his "chit-it-it-it-it" so shrill and high that his companions were for the moment alarmed lest he should split his throat. But he stopped as suddenly as he had begun, and upon the silence that followed the birds heard, as surely as they saw the blossoms on the apple trees, the song of the thrush.

"It is undoubtedly a hobgoblin," hoarsely whispered Mr. Woodpecker, "for Mr. Blue Jay swore to me this morning that during the seasons he and his ancestors have patrolled this lawn never have they seen a thrush even alight here."

It was decided that the three birds make one more immediate and thorough search for the monster hobgoblin which infested the Lawn.

Imagine their chagrin when they saw tilting upon the unleaved twig of a late catalpa tree a modest little gray bird with keen, bright eyes, who commenced a garble of all their songs called off in such merriment that the birds could not but appreciate the sport. Then the stranger, who was no other than Mr. Cat-bird, a cousin to the brown mocking-bird of the south, gave a weird cry exactly like a cat's meow which so frightened the birds they flew hastily away to their several homes.

Mr. Cat-bird was welcomed to Leafy Lawn, for his beautiful voice was an esteemed acquisition to the morning chorus, but he could not deceive the birds again with his imitative songs.

Many a time, however, he would sit upon the corner of the house roof and perpetrate his joke on the boy in the hammock below, who thought he knew much about birds, but who could not understand why, when he heard so many different voices, there was only a little gray cat-bird within sight.

Gertrude Southwick Kingsland.

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## **THE RUSTY BLACKBIRD OR GRACKLE.** **(*Scolecophagus carolinus.*)**

Unlike the other blackbirds and our common orioles the Rusty Blackbird must not be sought in the orchards and fields of our farms and waysides, but in our forests and the heavily wooded banks of mountain streams and lakes. In such places this retiring bird passes the breeding season and raises its family in quiet solitude. It even seems to shun the company of its own kind and, unlike the red-winged blackbird, is seldom seen in large flocks. It is only in the spring that we may observe even small flocks from "whence issues a confused medley of whistles, sweeter and higher-pitched than the best efforts of the redwings." Captain Charles Bendire says: "The ordinary call note sounds like 'tehack, tehack,' several times repeated; another like 'turnlee, turnlee, turnlee,' uttered in a clear tone and varied occasionally to 'trallahee, trallahee.'"

Few birds exhibit a more happy disposition. They seem always to be perfectly satisfied with their surroundings. One writer, quietly watching them, gathered in the trees about him, says that "The wind whistled loudly through the branches above, but these lively fellows began a serenade so joyous and full of gleeful abandon that I lingered long to hear them. In singing they opened the bill widely and the throat swelled with melody. Their notes are rich, varied and energetic. They are almost constantly in motion, chasing each other or flying from perch to perch, singing merrily most of the time."

The Rusty Blackbird has a wide range. It is more common in the eastern portion of North America from Florida and the Gulf of Mexico northward to the northern limit of the forests. Westward, though constantly decreasing in numbers as the distance increases from the Atlantic coast, it is found as far as the great plains and very rarely on the eastern slopes of the Rocky Mountains. It frequents practically the whole forest area of British America from the Atlantic to the Pacific ocean. Mr. E. W. Nelson says: "I found it abundant at the Yukon mouth, where the widely extended areas of bush grown country offered suitable shelter and where it consequently nested in considerable numbers."

Their nesting range covers the whole of British America, but in the United States it is restricted to a comparatively small area. Its nests have only been reported as occurring in portions of New England and in the wild Adirondack forests. In winter it makes its home in the Middle and Southern States. At this time, from necessity, it is often seen around barn and stock yards, feeding on the grain that has been dropped by the cattle.

During the summer season the Rusty Blackbird depends almost entirely on animal life for its food, eating caterpillars, moths and other insects, worms, snails and spiders, also eating, to a limited extent, wild berries.

The nest of the Rusty Blackbird is large and substantially constructed. It is generally placed in cone-bearing trees and is seldom more than ten feet from the ground. As a rule, trees growing in swampy and rather inaccessible places are selected. The base of the nest "is principally composed of sphagnum moss and earth, forming a firm, hard platform on which the nest proper is built. This is thickly covered on the outside with small tamarack and spruce twigs, mixed with a few blades of grass, pieces of fern and long green moss, especially at the base. The inner cup is thickly and neatly lined with fine bright green grass." These blackbirds are not quarrelsome and are devoted parents, both sexes assisting in the care of the young, which are able to leave the nest in about fifteen or sixteen days. Our illustration shows the fall and winter plumage of the male. During the breeding season the



plumage is a glossy bluish black.



RUSTY BLACKBIRD OR GRACKLE.  
(*Scolecophagus carolinus*).  
 $\frac{2}{3}$  Life-size.  
FROM COL. CHI. ACAD. SCIENCES.

## WHAT EVOLUTION MEANS.

If any person devoted his time to the correction of popular errors, there is no probability that he would have any spare moments for eating or sleeping. The serious aspect of the present condition of popular knowledge, however, is the apparent absence of desire upon the part of many young people to grasp the principles of natural science. I am not exaggerating when I say that there are plenty of fairly educated persons in every large city who deny that man is an animal, and who insist that a whale must be a fish, because it lives in the sea.

Everybody professes to be aware in a sort of unconscious way that the theory of Evolution was invented by Mr. Darwin, and patented by Mr. Spencer, the most important points in the doctrine being that all men are descended from monkeys which had lost their tails, that the fittest survived, and that there is a "missing link" between man and his ancestors.

These ideas have little foundation in fact. Darwin no more discovered Evolution than Edison discovered electricity; we are not descended from any existing ape, with or without a tail, and no competent person ever asserted that we were; and there are good reasons for saying that such palaeontological "links" as are missing are not of the greatest possible importance. In short, whatever is evolutionary in the popular mind, is a burlesque upon the evolutionist's true opinions.

Charles Darwin was born in 1809, on the same day as Lincoln, but, long before Darwin's time, evolution had become a recognized force in science. Kant, who lived from 1724 to 1804, and Laplace (1749-1827) had worked out the development of the sun and the planets from white-hot gas. Lyell (1797-1875) had worked out the evolution of the earth's surface to its present condition; and Lamarck (1744-1829) had shown that there is evidence of the descent of all animals, as well as all plants, from a few ancestors by gradual modification. Again, Herbert Spencer, during Darwin's lifetime, began to work out the growth of mind from the most simple beginnings to the highest development of human thought.

The philosophies of the ancients were all of them founded upon limited observation; they were merely speculative fancy-pictures evolved from the author's own consciousness. Modern science, however, is of quite a different character. It has relegated certain fundamental propositions to a region called "the Unknowable" (this means at

present unknowable), and it permits everybody to explain these propositions by means of any hypotheses which may occur to him. In other words, modern science does not deal with such phenomena as are at the present day outside the range of the human intellect; and I venture to warn the reader that speculation concerning matters upon which we have as yet no scientific data is waste of time. Modern science is founded upon investigation and observation, and the evidence is always weighed as carefully and as impartially as are the statements of witnesses in a law court.

One naturally asks: "What is Evolution?" "Continuous change according to certain fixed laws," is a reply which may have some value, although it is quite insufficient. A technical definition, given by Mr. Spencer, is as follows:

"An integration of matter and concomitant dissipation of motion, during which the matter passes from an indefinite, incoherent heterogeneity, to a definite, coherent homogeneity, and during which the retained motion undergoes a parallel transformation." Anybody who will think about this definition will be able to appreciate its meaning, provided a good dictionary is at hand.

Evolution is not another word for Development, and Mr. Spencer has carefully distinguished the one from the other; but the details are too technical for notice in this paper. Evolution may be regarded as "a general term for the history of the steps by which any living being has acquired the morphological and physiological characters which distinguish it." Development is "the process of differentiation by which the primitively similar parts of a living body become more and more unlike one another." Both definitions are Huxley's. 208

The evolution of organic matter now claims attention in detail. Of the origin of first life, we know absolutely nothing. The doctrine of Evolution does not deal with that. There are, however, many hypotheses upon the subject. Lord Kelvin, the eminent physicist, has suggested that unicellular life may have been transferred to this globe from a wrecked planet. This hypothesis obviously aids us very little, for it merely transfers the original scene of action to some other world. Personally, I prefer the idea that the first protoplasm was produced by the action of the sun upon inorganic matter not unlike the colloids, and that it "fed upon the previous steps in its own evolution." In this connection, I may say that two points are certain—viz., that vegetable life preceded animal life, and that the first forms of life were mere specks of jelly, without organs. Can these primitive specks be created at the present time? Or, in other words, can protoplasm be manufactured by artificial processes? The answer must be No; not by any process now known, although a great number of experiments have been made with the object of manufacturing unicellular vegetable life. During the years between 1870 and 1880, this question was thoroughly thrashed out, and at first the balance seemed to be very evenly held between the supporters and the opponents of spontaneous generation. The investigations of the late Professor Tyndall, however, conclusively proved that biogenesis, that is, all life from previous life, is the condition at the present day. But I must add Huxley's words of warning, viz., "that with organic chemistry, molecular physics, and physiology yet in their infancy, and every day making prodigious strides, it would be the height of presumption for any man to say that the conditions under which matter assumes the qualities called vital, may not some day be artificially brought together." And further, "that as a matter not of proof but of probability, if it were given me to look beyond the abyss of geologically recorded time, to the still more remote period when the earth was passing through chemical and physical conditions which it can never see again, I should expect to be a witness of the evolution of living protoplasm from nonliving matter."

The first protoplasm must be extremely ancient, for the remains of sea-weeds are found in the oldest strata, and vegetation implies the manufacture of protoplasm from inorganic matter.

When the earth was in the condition to which Huxley referred, the constantly decreasing heat, and the recurrence of the seasons produced, by slow degrees, changes in the congenital character of the forms of life. Every individual varied somewhat from its predecessors, and those forms which possessed variations most suitable to the environment were the ones which eventually survived. The transition from the protophyta, the lowest class of vegetable life, to the protozoa, the lowest class of animal life, must have been a very simple matter in the condition in which the earth then was. Indeed, today the difference between the lowest microscopic animals and the lowest microscopic plants is by no means clearly defined.

Innumerable hosts of life made their appearance upon our planet while the surface was going through the cooling process, and they were, at first, of course, of the most primitive kind. But the same laws were always at work, viz., no two living things were exactly alike when they made their appearance upon this earth, although the differences between several forms might be very slight. Variation was, and is, the order of the day.

The individuals which possessed variations in accordance with the environment persisted, while those having injurious variations had a tendency to disappear. Congenital variations were (and are) transmitted with great certainty. This is Mr. Darwin's "Process of Natural Selection," called by Mr. Spencer "The Survival of the Fittest."

The other Darwinian factor in evolution is Sexual Selection. It is that department of Natural Selection in which sex is especially concerned. Anything which exhibits the prowess or beauty of the one sex attracts the other, and decides the preference for one individual over another, with the result that those individuals which are unattractive to the opposite sex are unable to reproduce their kind. The importance of this factor will be appreciated if I give an extract from Darwin's "Descent of Man" (Vol. II., p. 367). "For my own part," wrote our great master, "I conclude that of all the causes which have led to the differences in external appearance between the races of men, and to a great extent between man and the lower animals, sexual selection must have been by far the most efficient." 209

As I have already said, Darwin neither invented nor discovered the doctrine of Evolution. But he placed it upon a firm foundation by the discovery of the two great factors to which I have referred, and, by incessant observation and indomitable energy, he demonstrated the truth of them beyond any reasonable doubt.

The proofs of the truth of Evolution are of two kinds—palaeontological and embryological. The palaeontological evidence has found its way into popular books, and even into some of the literary newspapers. The history of the horses, of the crocodiles, of the rhinoceros is known in detail. All the stages have been found which intervene between the four-toed Eohippos of the Lower Eocene and the zebra and horse of the present day. Thanks to the late Professor Marsh, of Yale, not only are the successive steps in the evolution of the foot-structure preserved, but so also are the various stages in the evolution of the teeth. The occasional appearance of a three-toed horse points very plainly to a three-toed progenitor, a striking example of atavism, that is, the reappearance of a characteristic which has “skipped” one or more generations.

If the principle of heredity be true, one would expect to find in the development of animals and plants, traces of the line of descent. “If Evolution be true, one ought to find, following back the development of the egg, that specific details would vanish and give rise to more generalized features; that the earlier the stages, the more the embryos of related forms would resemble each other.” This is exactly what is found, there being, in a vast number of instances, a remarkable parallel between the palaeontological record and the embryological evidence. A detailed examination of the facts would not be intelligible to anybody who is not a practical biologist; but I am fully warranted in asserting that every organism in the course of its life-history (technically called ontogeny) is a recapitulation of the history of the race—technically known as phylogeny.

There is other evidence in abundance. The phenomena named atavism is a part of that evidence. Almost everybody has seen well-defined and regular stripes upon horses, and nobody doubts that they indicate a zebra-like ancestor. Again, in the inner side of the human eye is a little red fold, known as the *plica semilunaris*, the remnant of an ancestor which possessed a third eyelid, similar to that possessed by some reptiles and birds of today.

Who are the supporters of the doctrine of Evolution? Practically the whole scientific world. The late Professor Marsh, the distinguished palaeontologist, when president of the American Association for the Advance of Science in 1878, said:

“I need offer no argument for Evolution, since to doubt evolution is to doubt science, and science is only another name for the truth.” Professor Marsh meant, of course, not that evolution is to be taken “on trust,” but that it has been so thoroughly proved that new arguments in support of it are unnecessary.

Concerning Natural Selection, sometimes called Darwinism, the late Professor Huxley said (quotation from Darwin’s “Life”): “I venture to affirm that so far as all my knowledge goes, all the ingenuity and all the learning of the hostile critics have not enabled them to adduce a single fact of which it can be said this is irreconcilable with the Darwinian theory.”

I occasionally hear the old argument that species are immutable—that a species is something which never changes. It seems a little late in the day to revive this contention, but it is necessary to be prepared with a reply. The critics of Darwin’s theory of “the Origin of Species by Natural Selection” have always refused to give a tangible definition of the word “species,” and, as a result, the real difficulty turns upon that point. What is a species? Linnaeus said: “There are as many species as an infinite Being created at the beginning,” a statement which is a confession of faith, and not a scientific definition. We must remember, of course, that Linnaeus died as long ago as 1778. The truth is that all the various tests for species have proved faulty, that of the fertility of hybrids having little more value than many of the other so-called “tests.” In classification, the word “species” means the lowest subdivision to which a name is usually applied, and to aid the zoologist’s or botanist’s memory, some system of classification is, I need not say, an absolute necessity.

According to the view of the anti-evolutionists, most of whom are not scientific men, descendants of a common ancestor must belong to the same species. Nevertheless, the late Mr. Romanes has shown that the rabbits of Porto Santo, an island in the Atlantic, about twenty-five miles from Madeira, descended from the European stock of nearly 500 years ago, will no longer breed with their continental cousins.

When we remember that some wild animals will not breed in captivity, the idea of sterility as a test of species seems utterly unscientific. I venture to say that there can be no accurate definition of species in terms of physiology, for every individual has its peculiarities, chemical as well as physical, and the real difficulty is to decide when these peculiarities are important enough to make it useful to give a precise name to their possessors. Assume for a moment that a species is a group of individuals agreeing in essential characters which remain constant from one generation to another. But what are essential characters and how much constancy is demonstrated? Upon these points no two biologists are likely to agree. For example, taking the birds of Germany, Bechstein says there are 367 species; Brehm says there are 900. According to Reichenbach there are 379, and Meyer and Wolf tell us there are 406.

The idea of a species is based upon structural resemblances between individuals, and the degree of importance attached to these depends upon the mind of the particular observer.

There are two reasons why nobody has seen one species turn into another. The first is that until the word “species” is satisfactorily defined, instances of the evolution of new forms cannot be supplied. Secondly, as nobody lives much beyond a hundred years at the most—a mere moment in Nature—our ability to witness marked changes in animals or plants is extremely limited. Minor changes, of course, are frequently noticed. I ask the reader to remember, however, that the flower-garden and the farm-yard are in an artificial condition, Natural Selection having ceased. For instance, the duck which has defective wings when hatched has as good a chance of surviving as the duck with powerful wings.

Who are the opponents of the doctrine of Evolution? In the scientific world they are difficult to find. Professor Virchow, of Berlin, the distinguished pathologist must, I think, be classed as one, although his verdict is really

"not proven." Professor Haeckel, however, has pointed out that the opinion of a pathologist, no matter how eminent, upon the subject of evolution cannot carry much weight.

Until recently we had with us two men of science whose opposition to some portion of the doctrine of evolution was of importance. These men were Sir William Dawson, the Canadian geologist, and Mr. Mivart, the English anatomist. Both of these gentlemen have died within the past two years.

Having now written a brief outline of the doctrine of Evolution, I believe that I cannot do better than conclude this very imperfect sketch with a quotation from the immortal Shakespeare:

"The truth can never be confirmed enough,  
Though doubts did ever sleep."

Lawrence Irwell.



SURF SCOTER.  
(*Oidemia perspicillata*).  
About ½ Life-size.  
FROM COL. CHI. ACAD. SCIENCES.

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### **THE SURF SCOTER.** **(*Oidemia perspicillata*.)**

The Surf Scoter is also known by several other popular names, such as the Surf Duck, the Surf or Sea Coot and, not infrequently, the Booby. The name Velvet Duck, though more commonly applied to the white-winged scoter, is also sometimes used to designate this species.

This Scoter is an American species and is only an accidental visitor to European coasts. Its range includes the "coasts and larger inland waters of northern North America; in winter, south to Florida, to the Ohio River and to San Quentin Bay, Lower California."

Our illustration is that of a male bird. The female is a sooty brown, silvery gray below and with much white on the sides of the head.

Immense flocks of the young of this species winter on San Diego Bay, California. Here the adult birds are of rather rare occurrence for they are able to withstand the rigors of an arctic winter and stay far to the northward where they are a common resident. In the vicinity of San Diego there was about one adult to every seventy-five or one hundred juvenile birds. The former may be easily distinguished by their very striking velvety black plumage, the white markings on the nape and forehead standing out in bold contrast. These white markings remind one of the white bull's eye on a target. Because of this striking color characteristic the Surf Scoter is frequently called the Target Head, by the California hunters.

They are wary birds and it is often necessary to make a long detour in order to reach a spot near to a flock, without attracting their attention, as they ride the crest of the waves in a heavy surf. The younger birds will remain in the surf so close to the shore that frequently they are cast high and dry upon the beach. When this

happens it is very amusing to watch them awkwardly scramble back and enter the water again. The older birds are usually much more shy, remaining far out on the water where they congregate in pairs, though sometimes there may be six or eight together.

As the tides enter San Diego Bay they carry in the loose seaweeds in which are entangled numerous dead starfish and other forms of marine life. These form the principal food not only of the Scoters but also of all the water fowls, such as other species of ducks, the cormorant, the pelican and the beautiful California gull.

The note of the Surf Scoter is to me the most pleasing of all the ducks. It is a soft, mellow whistle ending in a cluck! cluck!

Mr. Nelson states that the Surf Scoter appears in the vicinity of St. Michaels, Alaska, about the middle of May and nests commonly in the marshes of the delta of the Yukon river. It also nests in large numbers on the Atlantic coast from Labrador northward.

Dr. Coues, speaking of these birds as he observed them in Labrador, says, "They are tough birds and remarkably tenacious of life and require a heavy charge to kill them. They are known as Bottle-nosed Coots, a name given in allusion to the very peculiar shape and color of the bill."

Its nest, usually placed on grassy knolls, in fresh-water marshes near the sea, is made of dried weeds and grasses and lined with the down of the bird. It is evident that the female performs all the duties of incubating the eggs and carrying for the young, for during the nesting period large flocks are observable that consist entirely of males, constantly feeding in their accustomed haunts.

This ocean duck feeds "on small mollusks and fishes, for which it dives almost constantly, both in the sandy bays and amidst the tumbling surf, sometimes fishing at the depth of several fathoms and floating buoyantly among the surf of the raging billows, where it seems as unconcerned as if it were on the most tranquil waters."

Frank M. Woodruff.

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## A BACK-YARD CLASS.

The Farnum's back-yard was something disagreeable. Still it didn't matter much, thought the children, as long as the front yard was nicely kept and there was a high fence all around the back. Besides, Mr. Farnum was away from home traveling all the week; Mrs. Farnum was so busy that she hardly ever saw the disreputable yard, and the children, Rob, Lora and Baby Jim, liked best to play away from home.

At last it dawned on the mother's mind that they were hardly ever at home except to eat and to sleep and to get ready to go away again and she began to worry about it and wonder what she should do.

That very day Rob came running in to show a bug which he had in a bottle. It was such a queer looking specimen that all became interested in it at once.

"I'll keep it till papa comes back, he'll be sure to know!" exclaimed Rob proudly.

"But this is only Tuesday, my boy. You can't keep it in that bottle all the week without food or drink. It must not be left to starve," Mrs. Farnum replied.

"We'll find it something to eat," cried the children, and off they ran.

But this was not such an easy matter. Mr. Bug would not touch any of the back-yard "vegetables," as Rob called the variety of weeds that clung to the rotten fence boards or matted the ground of the large garden. In spite of their efforts the bug stuck to the corner of the bottle and refused to be comforted, with food, at least. At last, in despair, Rob ran to the drug store and asked what he could give the bug to "make it die a peaceful death."

"Just put a layer of pyrethrum in the bottom of your bottle," answered the druggist, "keep it corked tight, and you can make every bug in your yard die happy. Pyrethrum is a powder that is harmless to people (though of course you must not eat it), but the least smell of it kills insects."

Rob went home delighted. "I'll make a collection of bugs, as Sam Ward does of butterflies," he declared.

"I'd help you if it wasn't for those horrid spiders," said Lora. "I'm afraid as death of them ever since I read about a baby dying from a spider-bite."

"Pshaw! Only a few spiders are poisonous, that is, I think so. Let's get a library book about them and find out; then may be we'll have a spider collection, too," answered the practical brother.

While Rob was getting his bottles ready in which to "electrocute" the bugs and Lora was going to the library after the books, Mrs. Farnum was rummaging in the attic. At last she came down bearing triumphantly aloft a big old-fashioned work-box.

"This you may have for a specimen case," she said. "If you'll fit some little drawers in it, Rob, I'll line them with scraps of velvet and have a glass top put on."

The children set to work at once, and in vain the neighbors' children whistled for them on the other side of the high board fence. Lora took the hammock from the front lawn to swing beneath the old apple tree. But the tall weeds reached up to the hammock, so Rob had to go for the old scythe rusting in the fence corner and Baby Jim came dragging a hoe with which to cut them down. Soon they had a large space cleared under and around the apple trees, and when it was carefully raked and swept they ran in to beg their mother for some porch chairs for their "summer parlor."

Then Rob made for himself a camp-stool that he could carry around and plant among the bushes where he would sit watching for certain bugs to appear and trying to catch them in his bottle. Such patience as it took at first! And how little Rob had of it! But Lora read long, interesting chapters to him out of "The Insect World," and the specimen case grew so fast and became so fascinating that he found the patience quite worth while.

Whatever Rob did, of course, Baby Jim wanted to do.

"The ant-hill's mine! I 'scovered it!" he announced at supper one evening. "I'll make a fence wound it to keep the wolves out, and I'll have the ants for my sheepses."

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Mrs. Farnum did not look as pleased as the rest.

"I don't want the ants crawling all over you," she said.

"No, they won't; I'll take my red chair out and sit on it, like Rob does," he answered, solemnly.

The next day he set to work to build a big circular fence around his ant hill, working as perseveringly as ever any real shepherd did to get his fold ready, and accepting no help from Rob except allowing him to shave up a board to furnish the "palings." Then, day after day, while Lora swung in the hammock reading aloud to Rob, little Jim sat perched on his red chair herding his ant-flock.

"I feed them and they eat, but they never drink a tiny bit," he said.

"The ants find their drink away down in the ground, dear," replied his mother. "Now tell me what you have learned about your sheep."

"I learned a greedy lesson to-day," said Baby Jim. "One ant had some food and he met an ant who hadn't any, and he divided; then he went on some more and met another ant with not any, and he told him to come over to my chair-leg where the cookie was."

The family all laughed, and still more at Rob, who asked, "Is Jim going to be an ant-hropologist, papa?"

"Perhaps," answered Mr. Farnum. "Now, children, I have something nice to tell you. I have hired a man to come and help us improve the back-yard. He will cut the weeds and trim up the trees and bushes, and we can plan the walks and flower-beds for next spring."

"How lovely!" cried Lora.

"I don't know about that," said Rob, with an ugly pucker in his forehead. "It will scare all my bugs away. They like weeds and dirty places."

"Yes," admitted his papa, "but next spring you will have to go to the woods for new specimens."

"It won't scare my specimens away," laughed Lora. "I've been studying birds lately. You see when I become tired of reading I just lie back in the hammock and watch the birds in the tree-tops. They are so very smart, and they do the queerest things!"

So the plan to improve the yard suited all but Baby Jim, who wailed long and loud because his ant city would be destroyed. In vain did the family try to comfort him. He could not be persuaded to abandon his flock.

That night, to Jim's distress, a cold rainfall set in. "My sheeps will all be dwounded," he wailed! "I meant to make a 'bwella over them!"

"Look here," said Lora, drawing him up to the sofa beside her. "This is the picture of the inside of an ant-hill. Here is the top door where you see the ants go in, then they go down to this large room, then sideways to this one, then down, down, down."

Baby Jim's eyes opened very wide. He seized the book and studied the drawing long and earnestly.

"Your sheep are all down in the rooms now, having a nice Sunday, I think," continued Lora. "When winter comes and the snow is all over the ground they won't come up at all. Haven't you seen them carrying food in to pile up in one of their rooms?"

"O, and my cookies are all down there!" he cried in great delight.

When the man appeared in the morning Baby Jim marched out with an air of importance, and, after surveying the deserted ant-hill, he turned to the man and said, "My sheeps are all gone into the house to bed, so you can clean up their meadow if you want to."

And thus it was that the Farnum children began a study which will interest them as long as they live. There is no longer any need to worry about their living at the neighbors; and at last the Farnum back-yard has become not

## THE AMERICAN ELK OR WAPITI. (*Cervus canadensis*.)

Centuries ago, before Columbus sailed the unknown seas which divided him from the New World of his dreams and ambitions, before the birth of De Soto, that adventurer whose discoveries and conquests were to unfold to the Old World the mysteries and fascinations of the new land, through the virgin forest and over the broad plains as yet unknown to the white race, roamed many animals which were widely distributed throughout North America.

They fearlessly sought those localities which would furnish them the most abundant supply of food and water. Unmolested except by their natural enemies, they multiplied and lived a free and untrammelled life.

In these early times the Wapiti or the American Elk, as it is commonly though erroneously called, was probably the most widely distributed quadruped in North America. Its range extended from the northern part of Mexico northward to Hudson's Bay and from the Atlantic to the Pacific Ocean. At the present time, however, but a few wild individuals are left in the United States east of the Mississippi and lower Missouri Rivers. They are occasionally met with in the wilder regions bordering Lake Superior, and it is reported that they are still living in the mountainous regions of Pennsylvania and Virginia. The advance of civilization, causing the cultivation of the lands and the destruction of the forests, has gradually driven this noble animal to the westward and into the wilds of British America. In the states bordering the Pacific Ocean and along the western tributaries of the Mississippi and the Missouri rivers it is still quite common. One writer tells us that "in the rich pasture lands of the San Joaquin and Sacramento it formerly was to be seen in immense droves and with the antelope, the black-tailed deer, the wild cattle and mustangs covered those plains with herds rivalling those of the bison east of the mountains or of the antelope in South Africa."

The name Wapiti is of Indian origin, and in their language is used to designate a Rock Mountain goat. The name elk so commonly applied to this animal should properly be limited to the moose.

The Wapiti is closely related and belongs to the same genus as the famous stag or red deer (*Cervus elaphus*) of Europe. This animal, which is smaller than the Wapiti, inhabits the forests of mountainous regions.

In both the Wapiti and the stag the senses of sight, hearing and smell are well developed. They will detect a human being or other animal when some distance away. Though their acute senses protect them, they are said to have poor memories as well as weak powers of comprehension. The Wapiti when listening raises its head and throws forward its erected ears. When entering the forest it will examine the surrounding open country and sniff the wind, seeking possible danger.

The antlers of both Wapiti and stag are much alike, though those of the former are longer and heavier, corresponding to its larger size. The full growth of the horns is attained about the seventh year. The perfect horns are slightly oval in transverse section and thickly covered with warts or slight elevations, which are arranged in longitudinal lines. All the branches or prongs are situated on the front side of the main trunk. "The general color is a light chestnut red, which deepens into a brownish hue on the neck and legs and almost into a black on the throat and along the median line of the under surface of the body. The buttocks are yellowish white, bordered by a dusky band which extends down the posterior surface of the hind legs." In winter the fur is much thicker and finer and the general color is more gray than in summer. "During the mating season the males have fierce combats, and at this time the male Wapiti emits a peculiar noise, resembling the braying of an ass, beginning with a loud shrill tone and ending in a deep guttural note." At this time, even when kept in confinement, the male is easily irritated and may attack people. Old males will frequently wage persistent and long battles for supremacy. The antlers are used as the weapons in these duels, and cases have been recorded where these have become so firmly interlocked that they could not be separated, resulting in the death of both individuals.



AMERICAN ELK OR WAPITI.  
(*Cervus canadensis*).

When food is plentiful and the Wapiti is not constantly disturbed, it will remain in the same region, only straying away during the mating season. They assemble in herds of a greater or less number of individuals. 219  
The females and fawns usually remain together; the older females without fawns form another herd and the old males, as a rule, lead a more or less solitary life, except during the mating season.

The Wapiti is more common in low grounds in the vicinity of marshes and well wooded tracts, where it feeds on grasses and the young branches and leaves of the willows and allied trees.

The Wapiti is graceful and proud in its bearing and very light in its movements. This is especially true of the male, which may be described as an animal of "noble carriage." When moving from place to place it walks rapidly and runs with remarkable swiftness.

### **A FRIENDLY FIELD MOUSE.**

Many stories have been told in the past, tending to show that wild animals when in trouble will display surprising confidence in man, in fact will often seek his assistance when sore beset. The writer, when a boy upon a farm in Minnesota, had an experience with a field mouse which prettily illustrates this trait in wild creatures. It was stacking time and the men were all busy in the fields lifting the shocks of cured grain and stacking them in hive-shaped stacks in the barnyard. The writer, a barefoot boy at that time, had been following the wagons in the field all the morning in a vain endeavor to capture some field mice to take home as pets. He had seen a number of the drab little creatures with their short tails, but had failed to lay his hands upon any of them, owing to the thick stubble and the nimbleness of the mice. At last, as a particularly large shock was lifted, a broken nest was disclosed and the youthful mouser was put upon the qui vive by the slender squeaks of seven or eight hairless little beings that were so young as not to have opened their eyes as yet. The mother disappeared with a whisk, whereupon the young hunter sat down in a critical attitude beside the nest and began to examine his find. He had already put one of the young mice in his trousers pocket when the mother reappeared out of the stubble beside the nest. The boy held his breath and awaited developments. Much to his surprise, the mouse-mother, after carefully examining the ruined nest, entered his pocket, which, as he sat, opened very near to the nest. She seemed to come to the conclusion very quickly that her lost little one had found a very good home, and in about two minutes had transferred the remainder of her offspring from the nest to the pocket, carrying them one at a time in her mouth.

The writer has had many varied experiences with wild animals, but none of them impressed him so strongly as the episode of the mouse-mother in the wheat stubble.

J. Clyde Hayden.

### **THE OPENING OF WINTER BUDS.**



In our cold temperate zone spring means chiefly the changing of the trees from their naked winter condition to the beautiful green leafy appearance of early summer. When stripped of their foliage, trees present to the observant eye a great variety of form. The tall, slender poplar can easily be distinguished from the spreading elm as far as it is seen; as, also, can the rough-barked hickory, with its clinging strips of bark, from the smooth beech.

Usually, the opening of buds seems to take place almost in a single night, but they really open very gradually. Now, these buds are all formed the summer before, but they are so small that they are scarcely noticed in the midst of the many leaves. In the winter, however, they are readily seen; and, then, when the first warm rains fall in the spring they start to swell, and gradually grow larger until, suddenly, they burst through their snug winter coats, and show the tiny, green leaves that have been concealed in the thick, dark, outer covering.

The buckeye bud is one of the largest of the winter buds. It is covered with small, pointed, brown scales, which overlap each other, thus keeping the cold from the more delicate parts within. Underneath these hard outer scales are thinner, half-transparent ones. Their color is a delicate pink, and fine veins line them. Snugly wrapped inside these dainty coats are tiny woolly objects, and when the wool is removed they are found to be miniature leaves folded together so compactly that they occupy very little room. If the bud has grown on the end of the twig a very small flower bud will be enclosed within the leaves; but if it has grown on the side there will be no flower bud. Since these leaves and flowers have all been formed the summer before, it is easy to understand that a few warm days will cause them to grow so that they soon become too large for their winter covering, and suddenly burst it open.

The trees are forced into a period of inactivity by the cold, so, if a twig is broken off, and placed in moderately warm water, in a warm, light place, the buds on it will open just as they do in the spring and their development may be easily watched.

Often a tree will have a countless number of buds; and since growing buds need much light and nourishment only the stronger ones will grow, the weaker ones remaining in a resting state. These resting buds are called dormant buds, the word dormant coming from the Latin word "dormio," which means "to sleep." The buds often continue in this dormant state for several years, becoming weaker and weaker all the time, until finally they die. If, however, the stronger buds are killed at any time, as by a late frost, the dormant ones suddenly become active, and grow to take the place of the ones that were destroyed. This shows us how cleverly trees provide substitutes for cases of emergency. These dormant buds then might even be compared to the understudies of the stage.

The regular places for buds to grow are in the axes of the leaves or on the end of the twigs. Buds, however, can be made to grow on unusual places. If the tops of the tree are cut off, as we often see them in the maple, buds will grow on the trunks. Then, if trees are cut down or blown over, buds will grow on the stumps or from the roots.

Thus, we can see by watching the formation and development of buds, and the growth of branches, that trees follow certain fixed laws of nature, modifying these laws only on account of some peculiar external conditions as, for example, nourishment, light, heat or moisture.

Roberta Irvine Brotherson.

## THE CHAMBERED NAUTILUS.

This is the ship of pearl, which, poets feign,  
Sails the unshadowed main,  
The venturous bark that flings  
On the sweet summer wind its purpled wings  
In gulfs enchanted, where the Siren sings,  
And coral reefs lie bare,  
Where the cold sea maids rise to sun their streaming hair.

Its webs of living gauze no more unfurl!  
Wrecked is the ship of pearl!  
And every chambered cell,  
Where its dim dreaming life was wont to dwell,  
As the frail tenant shaped his growing shell,  
Before thee lies revealed,—  
Its irised ceiling rent, its sunless crypt unsealed!

Year after year beheld the silent toil  
That spread his lustrous coil;  
Still, as the spiral grew,  
He left the past year's dwelling for the new,  
Stole with soft step his shining archway through,  
Built up its idle door,  
Stretched in his last-found home, and knew the old no more.

Thanks for the heavenly message brought by thee,  
Child of the wandering sea,  
Cast from her lap, forlorn!  
From thy dead lips a clearer note is born,

Than ever Triton blew from wreathéd horn!  
While on mine ear it rings,  
Through the deep caves of thought I hear a voice that sings:

Build thee more stately mansions, O my soul,  
As the swift seasons roll!  
Leave thy low-vaulted past!  
Let each new temple, nobler than the last,  
Shut thee from heaven with a dome more vast,  
Till thou at length art free,  
Leaving thine outgrown shell by life's unresting sea!

—Oliver Wendell Holmes.

## THE NAUTILUS AND OTHER CEPHALOPODS.

The highest group of mollusks belongs to the class Cephalopoda, which signifies head-footed, the name being given to them because the head is surrounded by a circle of eight or ten arms, which act both as arms and feet. Let us take as an example of this class the common squid of the Atlantic coast (*Ommastrephes illecebrosa*), and see how it is formed. The body is long and cylindrical and ends at the tail in a point; the dorsal side of the tail end has a pair of triangular fins. The body is practically a hollow cylinder or sac which contains the vital organs of the animal. The neck is in many genera fastened to this cylinder or mantle by an apparatus which may be likened to a button and button-hole. The head is rounded, has on either side the large, round eyes, and at the end it is split up into ten arms, two of which are longer than the others and are called the tentacular arms. On the inner side, the arms are provided with two rows of suckers, which are little, rounded cups placed on pedicels or stems and which form a vacuum when they touch an object and so cling to it. The two long arms are expanded and club-shaped at the end, each club being armed with four rows of suckers. Directly in the center of the circle of arms the mouth is placed and is provided with two sharp beaks like those of a parrot, only inverted. In addition to these organs there is a large siphon or tube on the ventral side, which is really an organ of locomotion, for it expels water from the mantle cavity with great force, thus rapidly sending the animal backward, its usual direction of propulsion. The body has no shell for protection, but in its place there is a long rod called a pen, which acts as a backbone to support the body of the animal, although of course not in the same sense as the backbone of vertebrated animals. In some cephalopods this pen is hard and stiff but in *Ommastrephes* it is thin and soft. Such is the general form of a cephalopod, familiar names of which are the Octopus, Squid, Nautilus, Paper-nautilus and Devil-fish. In this class, also, the majority of the shelled species are extinct, only a few living at the present time. The Ammonite is an example of the extinct cephalopods.

The most familiar member of this class to the layman is the Pearly Nautilus, the shell of which may be found on the mantel shelf or what-not of very many dwellings. The shell of the Nautilus is formed in a spiral and is made up of many chambers, all connected by a tube called a siphuncle, the outer chamber containing the animal and hence called the living chamber. The shell is called the "Pearly Nautilus," but the pearly tints cannot be seen until the outer layer—which is yellowish-white with brown markings—is taken off, when the exquisite, rainbow-like colors may be observed.

While the shell of Nautilus is well known the animal is very rare in our museums, although the natives of the Fiji Islands, New Hebrides and New Caledonia are able to obtain it in large quantities for food and it is highly esteemed by them. During the voyage of H. M. S. Challenger around the world, a living Nautilus was captured by dredging in some three hundred and twenty fathoms near Mateeka Island, one of the Fiji group. This was placed in a tub and it swam about in a lively manner by ejecting water from its funnel. The tentacles, of which there are a larger number than in the other cephalopods, were spread out radially, like those of the sea anemone. The Nautilus lives among the coral reefs, at depths varying from three to three hundred fathoms or more.



BEAK OF OCTOPUS.  
 PAPER NAUTILUS.  
 (*Argonauta tuberculata*).  
 PEARLY NAUTILUS.  
 (*Nautilus umbilicatus*).  
 FROM COL. CHI. ACAD. SCIENCES.

The Fijian's method of capturing the Nautilus for food is thus described (Tryon,—Structural and Systematic Conchology): "When the water is smooth so that the bottom, at several fathoms' depth, near the border of the reef, may be distinctly seen, the fisherman in his little, frail canoe scrutinizes the sands and the coral masses below, to discover the animal in its favorite haunts. The experienced eye of the native may probably encounter it in its usual position, clinging to some prominent ledge, with the shell turned downwards. The tackle consists first, of a large, round, wicker-work basket, shaped very much like a cage rat-trap, having an opening above, with a circlet of points directed inward, so as to permit of entry but to preclude escape; secondly, a rough piece of rope of sufficient length to reach the bottom; and lastly, a small piece of branched wood, with the branches sharpened to form a sort of grapnel, to which a perforated stone is attached, answering the purpose of a sinker. The basket is now weighted with stones, well baited with boiled cray-fish (the principal food of the Nautilus is crabs of different species), and then dropped gently down near the victim. The trap is now either closely watched or a mark is placed upon the spot, and the fisherman pursues his avocation upon other parts of the reef until a certain period has elapsed, when he returns and in all probability finds the Nautilus in his cage, feeding upon the bait. The grapnel is now carefully let down, and having entered the basket through the opening on top, a dextrous movement of the hand fixes one or more of the points or hooks and the prize is safely hoisted into the canoe." 225

The animal is made into soup by some of the natives while others boil it in a pot. The shells are used by the natives to make beautifully carved figures, the contrast of the dark outer coating against the light, pearly, inner coating producing a striking effect. The shell is also used in England and on the Continent to produce elegant cameos.

The "Argonaut," or "Paper Sailor," is no less beautiful and interesting than the Pearly Nautilus. The thin and fragile shell cannot be compared with that of the Nautilus nor with the pen, or internal support, of the squid, for it is attached to the animal by no muscles, and is only kept in position by the broad webs on the upper arms of the female (which alone possesses a shell), its function being simply to protect the eggs. The male is very much smaller than the female and is exceedingly rare. The natural position of the female is with its arms spread out and hanging about the shell, four in front and four behind, the two broad arms supporting the shell being spread out and closely embracing the latter. The siphon is turned toward the ridged part of the shell and the animal progresses in a backward direction by forcibly ejecting water through this organ. It crawls with the shell on its back, like a snail.

The poets have given us many beautiful writings detailing the vices and virtues of the lower forms of life and among these the Pearly Nautilus and Paper Sailor have received a goodly share of the muse's attention. But, alas! for the poet, who, not being a conchologist, has sadly misused and misjudged these helpless and harmless

creatures. Thus we are told how the paper nautilus sails over the ocean with his "sails" (meaning the two expanded arms) spread out to catch the breeze, and how, when the storm approaches, it folds its sails and disappears beneath the waters of the ocean. Alas for the poet! he puts the most beautiful ideas together in verse, ideas and themes which we would fain believe; but along comes cold, calculating science, and at one fell stroke sweeps away all that the poet has done, for in the poem on the Argonaut all is wrong, the animal does not and could not sail, for were it to do so the shell would fall and become lost in the bottom of the ocean.

A mollusk whose shell is cast upon the shore by thousands, but the animal of which is very rare, is the Spirula. The shell is less than an inch in diameter, is made in the form of a loose spiral and is divided into little chambers connected by a siphuncle. The shell of this genus does not contain the animal, as in Nautilus, but it is enveloped in two flaps of the mantle, at the posterior part of the animal, the shell being concealed with the exception of a part of the edge on each side. The body of the animal is long and cylindrical and the arms are quite short, more nearly resembling those of the Nautilus than those of the Octopus or squid. The body ends in a disk which is supposed to be a kind of sucker, by which the animal can adhere to rocks, thus enabling it to freely use its arms in obtaining food. It has been supposed by some anatomists that the shells of the fossil Ammonites were attached to the animal in a similar manner, and if this should be true these small mollusks would assume a new meaning as being the last survivors of a large group of animals of which all except Spirula are extinct. 226

Probably the best known of the shell-less cephalopods is the octopus, with its rounded body, large eyes and long arms. Almost everybody has read Victor Hugo's weird account of the octopus in his "Toilers of the Sea," and the animal has thus been rendered more or less familiar, although it was made to do several things by the author that it would not do in nature, as, for example, "drinking" a man alive. The Octopus is found abundantly throughout temperate and tropical seas, generally on the coast among rocks, but frequently on the sandy bottom in water of moderate depth. Here it may occasionally be seen "walking" clumsily along on its eight long arms, its little round body being balanced above the arms. Its favorite position, however, is among the rocks. In such a locality it will squeeze its body into some crevice and spread out its arms until they form a sort of web, resembling in this position a huge spider waiting for its prey. And it may well be likened to a spider for from this web there is no escape if once a hapless fish has come in contact with the powerful suckers on the long arms. The poor fish is paralyzed when seized by the octopus and is drawn towards the mouth, where it is torn to pieces by the beak-like jaws, and swallowed.

Like many of the mollusks of which we have written the octopus is esteemed as a valuable article of food by several savage tribes as well as by some civilized people. The native of the Pacific coast catches the Octopus (*Octopus punctatus*) by a very ingenious method. Providing himself with a spear twelve or fourteen feet long which has four or five barbed pieces of hard wood some fourteen inches long attached to the end, he paddles his canoe to the feeding-ground of the mollusk. One is soon found in ten or twelve feet of water and the Indian carefully lets down his spear until within a few inches of the center of the animal, when he quickly plunges it into the soft mass. Instantly the water is in commotion, the eight long arms writhing about in an endeavor to reach the boat. The Indian knows that should this happen his chances for life would be slim indeed. But he is prepared, and carefully lifting up the octopus with his barbed spear until it is above the surface of the water, he plunges a long, sharp spear, with which he is provided, into each arm where it joins the body. At each plunge of the spear, an arm becomes helpless and in a short time the animal, which but a few moments before had the power of a score of men, lies in the canoe, a shapeless, helpless mass.

That the octopus is good eating the writer can attest from experience, for during a visit to Yucatan some years ago this mollusk was served as a meat dish and was very palatable, the flesh being firm and tender and much resembling chicken. The portion which fell to the writer was the head, with a part of the arms attached.

One of the most interesting characteristics of the Octopi and allied cephalopods is their facility for changing color when danger is near. These changes are caused by little pigment cells just beneath the skin, which expand and contract. Thus, if a person is looking at an octopus in captivity and the animal is so placed that it cannot escape, the observer will be astonished to see the body of the animal suddenly assume a deep pinkish color which in turn is succeeded by a blue and then by a green, and finally a return to pink. The body is covered with these little pigment cells, the different colors—pink, blue and green—being so evenly scattered over the surface than when each color cell is expanded the whole body assumes that tinge. This is one of the most wonderful characteristics of the Mollusca.

Another cephalopod closely related to the Octopus is the Squid, several species of which are found on the Atlantic coast of the United States. In this genus the body is long and cylindrical, ends in two fins, has a prominent head terminating in eight short and two long arms and is supported by a long, cartilaginous, internal pen, which is made up of a central shaft with expansions on each side like a quill, hence the name "pen." These animals are very numerous in individuals and form a large part of the food of fishes, like the blue-fish, black bass, etc., and have even been found in the stomach of jelly-fishes. Besides being eaten by the fish the squid furnishes a large part of the food of some whales, the former occurring frequently in shoals and falling ready victims to the huge monster. 227

In Norway and Sweden the people have a legend of a peculiar sea-monster, called the Kraken, which was probably founded on some of the enormous squids discovered during the past thirty years. Many of these mollusks are found off the coasts of Norway, Scotland and Ireland, and not a few have been recorded from the coasts of Nova Scotia and New England. In the larger of these animals the body is eight or ten feet long, the short arms eight feet and the long, tentacular arms thirty feet in length, making in all an animal nearly forty feet long when fully stretched out! The squid is greatly prized as bait and frequently a royal battle will take place between one of these gigantic creatures and a boat's crew. Sad indeed is the fate of the latter if the mollusk once gets a firm hold of the boat. Care is used, however, to guard against such a result, and the animal is gradually deprived of its strength by making a sudden dash, cutting off an arm and as quickly retreating. These large squids are not as common as the smaller ones and they are rarely captured.

An ingenious method of capturing a species of the smaller squids (*Ommastrephes illecebrosa*) in use by the fishermen of the New England coast is as follows: The squid has the habit of swimming in an opposite direction to a light, as the full moon, so the fishermen go out to sea in boats, light a large torch in each boat and slowly row toward the shore, driving the squid, which of course swim backward in an opposite direction from the light, upon the beach, where they may be gathered by thousands after such an expedition. Another method of capture is by jigging; the jig is made of a piece of lead some two inches in length which is armed with a circle of sharp, unbarbed wires pointing upward and curving outward. The process of jigging is accomplished as follows: the jig is attached to twelve or fifteen feet of stout line and is lowered into the water, which is generally chosen of a depth of ten feet from the side of a small boat. When near the bottom it is kept moving slowly up and down until a squid is felt upon it, when it is suddenly drawn to the surface with the squid attached. These squid, when caught, are used for bait, a single fishing smack being known to use as many as eighty thousand squids in a single season.

A familiar object to most canary-bird fanciers is the cuttle-bone placed in the cages of these birds for them to sharpen their beaks upon. This "cuttle-bone" is the internal support of the Cuttle-fish (*Sepia officinalis*) and is homologous with the pen of the squid, mentioned above. The animal of *Sepia* is short and rounded, with a large head surrounded by a row of eight short arms and two very long tentacular arms, ending in expanded clubs armed with powerful suckers. Like the Octopus and Squid, the Cuttle-fish is capable of many changes of colors by the contraction and expansion of its pigment cells. They are found throughout the world, living near the shore, but the species found about European shores are the best known.

Frank Collins Baker.

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God made all the creatures and gave them  
Our love and our fear,  
To give sign we and they are His children,  
One family here.

—Robert Browning.

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## THE TRAILING ARBUTUS. (*Epigaea repens*.)

Many years ago, before the Mayflower had cast anchor in Plymouth Bay or Columbus had landed at San Salvador, an aged indian sat shivering in his wigwam. Vainly had he sought for fuel and in his extremity he called upon the Great Spirit, that he might not perish with the cold. Crouching over the dying embers of his fire he stoically awaited the end, when suddenly there appeared before him a beautiful maiden wreathed with wild flowers and carrying in her hands, buds of the willow. Ferns and grasses draped her form and her moccasins were fashioned from pure white lilies. When she breathed the landscape suddenly blossomed with the thousand hues of nature and the warm rains fell in obedience to her will.

Under the influence of this spirit of the springtime the aged red man slumbered and, as his head sank upon his breast, the sunshine came out in all its splendor and a blue bird alighted upon the top of the wigwam. Slowly the maiden passed her hand above the old indian and gradually he shrank away until nothing remained but a cluster of green leaves. Then taking from her bosom a cluster of rosy blossoms, she concealed them among the leaves, bestowing upon them her own sweetness and fragrance and telling them that as the harbingers of spring, all who would inhale their fragrance, must bow the knee in honor of the vernal goddess. The maiden then passed away through the woods and over the prairies and wherever her footsteps lingered, there grows today the sweet-breathed mayflower.

Whether or not this fanciful story relates the real origin of the Trailing Arbutus, Ground Laurel or Mayflower, as it is variously called in different sections of the country, the fact remains that it follows closely in the footsteps of spring, often pushing up its dainty blossoms through the leaves and snow. It is always known as the Mayflower throughout New England and the old story of its being Flora's first offering to the ocean-tossed pilgrims as they landed at Plymouth, in appreciation of which they named it the Mayflower in memory of their vessel, has endeared the beautiful plant to every New England heart and has caused it to be placed in Cupid's keeping, along with the Scotch blue bell, the German corn flower and the Swiss edelweiss.

The Trailing Arbutus (*Epigaea repens*) belongs to the Heath family or Ericaceæ and constitutes the only species of the genus. Like the partridge berry which is often associated with it in pine woods and sandy soils, it is still in a state of transition, although it has been developing for centuries. As a rule, plants have the stamens and pistils in the same blossom or part in one and part in another. The Mayflower, however, does not carry out this arrangement. Either the anthers or the stigmas are abortive or partially so, or in other words, the perfect stigmas are usually associated with abortive anthers and vice versa. In this manner, nature has wisely provided for cross fertilization which is accomplished largely by insects, as the structure of the plant is not adapted to wind fertilization. The chosen agents for this process are honey bees, and a few early moths and butterflies, to which the nectar is served by this beautiful Hebe of the spring and who carry the pollen from one flower to another.



MOUNTAIN LAUREL OR CALICO-BUSH.  
 (*Kalmia latifolia*).  
 TRAILING ARBUTUS OR MAYFLOWER.  
 (*Epigaea repens*).  
 FROM "NATURE'S GARDEN"

A wise provision of nature has been pointed out whereby ants are kept away from the nectar which they would devour without accomplishing the purposes for which it was created. Every rocky hillside on which the Trailing Arbutus is frequently found, swarms with ants which are debarred from the blossoms by hairs which project upward from the inner surfaces of the corolla and the outer surfaces of the ovary and style and effectually prevent the ants from entering but are not sufficiently rigid to keep out the larger insects. 231

As a rule, the pollen bearing flowers are larger and whiter than the others. The stigma bearing blossoms, while small, more than offset their defect by a rosy color which makes the flowers far more attractive than their larger but paler rivals.

Very little success has been achieved in domesticating the Trailing Arbutus. It is essentially a wild creature and prefers to waste its fragrance on the desert air. Success may be had, however, if the conditions under which the plants are found growing are preserved as nearly as possible. Yearling plants should be selected and plenty of roots taken or results can be obtained from planting seeds, but as these are difficult to obtain, the other method is the more satisfactory.

Charles S. Raddin.

## TRAILING ARBUTUS.

Ah, quite alone these April days  
 It blossoms to evoke my praise;  
 And hyacinthine scents are shed  
 To bless and cheer me, hither led.

Upon this sheltered, upland knoll,  
 At early dawn I often stroll;  
 White clusters edged with crimson hue  
 Lie here, impearled with crystal dew.

The leaves, like memories, evergreen,  
 The blooms, like truth, of purest sheen;  
 The cup within, like some fair breast  
 Where holy thoughts can surely rest.

How worthy of its meek renown!  
 Delightful gem for beauty's crown.  
 O'er it with joy can poet brood;  
 It breathes of God in solitude.

## THE MOUNTAIN LAUREL. (*Kalmia latifolia.*)

About the middle of the eighteenth century an enthusiastic botanist and collector, Peter Kalm, gathered specimens in America of a beautiful plant which he carried back to the gardens of Europe and also to his preceptor, the naturalist Linnaeus. In the year 1753 Linnaeus named the plant, honoring his pupil by giving to the plant the generic name *Kalmia*. He also gave it the specific name *latifolia*, referring to its broad leaves.

The genus *Kalmia* includes six known species, five of which are natives of eastern North America and one a native of Cuba. They are all beautiful shrubs, varying in height from a few inches to several feet.

The plant of our illustration is a native of the eastern portion of the United States, where it grows in sandy or rocky woods and is more abundant in mountainous regions. This shrub, which grows to a maximum height of twenty feet, is a superb object early in June, when it is covered with corymbs of rather large pink or pinkish-white flowers and numerous evergreen leaves.

Easily cultivated and highly ornamental, it has been introduced into the greenhouses and gardens of this and European countries.

In spite of the beauty of this plant, it has a bad reputation, for its leaves are narcotic and poisonous to some animals. "Even the intelligent grouse, hard pressed with hunger when deep snow covers much of their chosen food, are sometimes found dead and their crops distended by these leaves."

We cannot show the characteristics of this plant in any better way than to quote from "Nature's Garden," where we find the following passage:

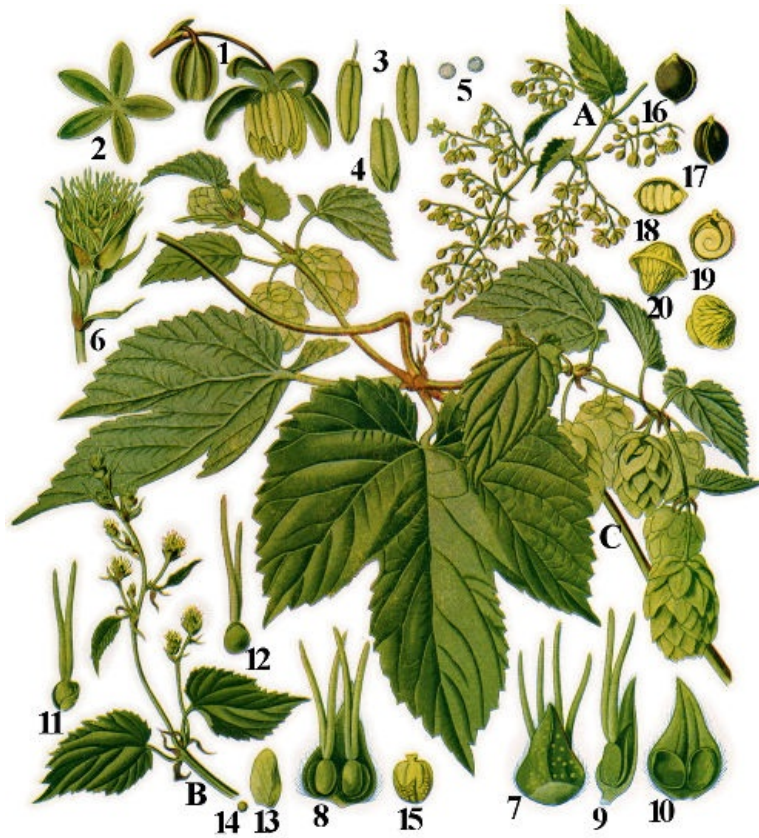
"All the *Kalmias* resort to a most ingenious device for compelling insect visitors to carry their pollen from blossom to blossom. A newly opened flower has its stigma erected where the incoming bee must leave on its sticky surface the four minute orange-like grains carried from the anther of another flower on the hairy underside of her body. Now, each anther is tucked away in one of the ten little pockets of the saucer-shaped blossom and the elastic filaments are strained upward like a bow. After hovering above the nectary, the bee has only to descend towards it, when her leg, touching against one of the hair-triggers of the spring trap, pop! goes the little anther-gun, discharging pollen from its bores as it flies upward. So delicately is the mechanism adjusted, the slightest jar or rough handling releases the anthers; but, on the other hand, should insects be excluded by a net stretched over the plant, the flowers will fall off and wither without firing off their pollen-charged guns. At least this is true in the great majority of tests. As in the case of hot-house flowers, no fertile seed is set when nets keep away the laurel's benefactors."

Many of our readers reside near the home of the Mountain Laurel and can examine the interesting features of this beautiful plant in Nature's own garden. Those that do this will be well repaid.

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Violets stir and arbutus waits,  
Claytonia's rosy bells unfold;  
Dandelion through the meadow makes  
A royal road, with seals of gold.

—Helen Hunt Jackson.



HOPS.  
FROM KEHLER'S MEDICINAL-PFLANZEN.

Description of Plate.—A, staminate (male) inflorescence; B, pistillate (female) inflorescence; C, fruiting branch; 1, staminate flower; 2, perigone; 3, stamen; 4, open anther; 5, pollen; 6, pistillate catkin; 7, 8, 9, pistillate flowers; 10, scales; 11, 12, 13, scales and flowers; 14, 15, fruit; 16, 17, 19, seed; 20, resin gland (lupulin).

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## HOPS. (*Humulus lupulus* L.)

“A land of hops and poppy-mingled fields.”

—Tennyson: *Aylmer's Field*.

The hop plant is a creeping perennial with several stems or branches attaining a length of fifteen to twenty-five feet. It has numerous opposite three to five lobed, palmately veined, coarsely toothed leaves with long leaf stalks (petioles). Flowers unisexual, that is staminate and pistillate flowers separate, either on separate plants (dioecious) or upon different branches of the same plant (monoecious). Flowers insignificant in loose, drooping axillary panicles. Fruit a cone-like catkin usually designated a strobile.

The hop has been called the northern vine. It is found in a wild state throughout Europe, excepting the extreme north, and extends east to the Caucasus and through central Asia. It is a handsome plant and not infrequently used as an arbor plant. The lower or basal leaves are very large, gradually decreasing in size toward the apex. *H. lupulus* is the only representative of the genus.

It is rather remarkable that a plant so widely distributed and familiar should not have been known to the Greeks and Romans. Its cultivation in Europe dates back to the eighth and ninth centuries. It was, however, not extensively cultivated until about the sixteenth and seventeenth centuries.

The word hop (German, Hopfen) is of very uncertain origin. According to some authorities it is traceable to the old English, hoppan, in reference to the habit of the plant in climbing over hedges and fences. *Humulus* is said to refer to its habit of creeping over the soil. *Lupulus* (diminutive of *lupus*, wolf) is said to refer to the pernicious and destructive influence the hop plant has upon plants which it uses as a support, especially the willows. Plinius named it *Lupus salictarius*, that is, the willow wolf or willow destroyer.

Beside the countries above named hops is also cultivated in Brazil and other South American countries, Australia and India. There are several cultivated varieties. According to most authorities it is not supposed to be indigenous to North America, but Millspaugh expresses it as his opinion that it is indigenous northward and westward, growing in alluvial soil, blossoming in July and fruiting in September.

The plants are planted in rows and the rapidly growing branches trained upon poles stuck into the soil. Three or four male plants (with staminate flowers) are grown in an acre patch to supply the necessary pollen. Some



authorities state, however, that the female plants develop enough staminate flowers to effect pollination. It is extensively cultivated in England, Germany and France. Also in New England, New York, Michigan, and in fact nearly every State in the Union.

In Belgium the young, tender tops of the plants are cut off in the spring and eaten like asparagus, especially recommended to the pale and anaemic and those with scrofulous taints.

The peculiar hop-like fruiting known as strobiles are collected in the fall of the year (September to October), dried and tightly packed into bales. The base of the scales of the strobile are covered with a yellowish powder, consisting of resin-bearing glands, known as lupulin. One pound of hops yields about one ounce of lupulin. Since the medicinal virtues of hops reside in the lupulin it will be readily understood that the hops from which the glands have been removed is of little or no medicinal value. Lupulin as well as the hops have a faint, peculiar, somewhat yeasty odor, which increases with age due to the development of valerianic acid. For medicinal purposes only fresh hops should be used. 236

The principal use of hops is in the manufacture of beer, to which it imparts the peculiarly bitter taste, and its repute as a tonic. For this purpose enormous quantities are consumed in Germany and England. The exhausted hops from the breweries form an excellent fertilizer for light soils. The leaves have been used as fodder for cows. Leaves, stems and roots possess astringent properties and have been used in tanning. In Sweden the fibre of the stems is used in manufacturing a very durable white cloth, not unlike the cloth made from hemp and flax.

Hops is used medicinally. It at first causes a very slight excitation of brain and heart, followed by a rather pronounced disposition to sleep. Pillows stuffed with hops form a very popular domestic remedy for wakefulness. Hop bags dipped in hot water form a very soothing external application in painful inflammatory conditions, especially of the abdominal organs. It has undoubted value as a bitter tonic in dyspepsia and in undue cerebral excitation. Tincture of lupulin and red pepper (capsicum) enjoys the reputation of being a very efficient substitute for alcoholic stimulants when their use is to be discontinued. Earlier physicians recommended hops very highly in kidney and liver complaints, as a "blood purifier" and to cure eruptive skin troubles. It is recommended in nervous troubles and in delirium tremens. The roots were formerly employed as a substitute for sarsaparilla.

Hops contains an etherial oil, resin and tannic acid. The oil and the resin are important constituents in the manufacture of beer. The young shoots contain asparagin, etherial oil, resin and sugar.

Albert Schneider.

## AWAKENING.

Never yet was a springtime,  
 Late though lingered the snow,  
 That the sap stirred not at the whisper  
 Of the south wind sweet and low;  
 Never yet was a springtime  
 When the buds forgot to blow.

—Margaret E. Sangster.

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