ALBERT R. MANN
LIBRARY

NEW YORK STATE COLLEGES
OF
AGRICULTURE AND HOME ECONOMICS

AT
CORNELL UNIVERSITY

Cornell University Library
SD 383.P66

The trees of America.

3 1924 002 878 621 mann

Cornell University
Library

The original of this book is in
the Cornell University Library.

There are no known copyright restrictions in
the United States on the use of the text.

<http://www.archive.org/details/cu31924002878621>

Pl 14

Black Oak N.Y. Central P.R.R.

THE TREES OF AMERICA

THE
TREES OF AMERICA.

BY

R. ^{W. H. A. S.} U. ^{W. H. A. S.} PIPER M.D.,

WOBURN, MASS.

WILLIAM WHITE, PRINTER TO THE COMMONWEALTH.
BOSTON.

ENTERED, ACCORDING TO ACT OF CONGRESS, IN THE YEAR 1855, BY

R. U. PIPER,

IN THE CLERK'S OFFICE OF THE DISTRICT COURT OF THE DISTRICT OF MASSACHUSETTS.

ELECTROTYPED AT THE BOSTON STEREO TYPE FOUNDRY.

376492

TO THE
HON. MARSHALL P. WILDER,
PRESIDENT OF THE UNITED STATES AGRICULTURAL SOCIETY,

As a Token of Respect

FOR HIS EFFICIENT PROMOTION OF THOSE PURSUITS UPON WHICH THE

WELFARE OF A NATION SO MUCH DEPENDS,

AND

FOR HIS GENEROUS ENCOURAGEMENT OF THE AUTHOR,

FROM THE VERY COMMENCEMENT OF HIS UNDERTAKING,

THIS WORK

IS RESPECTFULLY INSCRIBED,

BY THE AUTHOR.

THE TREES OF AMERICA.

“Father, thy hand
Hath reared these venerable columns, thou
Didst weave this verdant roof. Thou didst look down
Upon the naked earth, and forthwith rose
All these fair ranks of trees. They in thy sun
Budded, and shook their green leaves in thy breeze,
And shot towards heaven. The century-living crow,
Whose birth was in their tops, grew old and died
Among their branches, till, at last, they stood,
As now they stand, massy, and tall, and dark,
Fit shrine for humble worshipper to hold
Communion with his Maker.” — BRYANT.

No one, it seems to us, who possesses the least spark of intelligence, can look abroad upon the works of nature, without being struck with the fact that the design of the All-wise Father was to address us more directly, and to impress us more powerfully, through the æsthetic, or sense of the beautiful, than by any other means. All his works are clothed with beauty as with a garment, as if to conceal their utility, in the usual acceptation of that term, in order to make us forget that sordid appreciation of them, which is too common with us all. He might have given us fruit, without first clothing the trees in a robe of beauty and of joy. He might have given us corn and grain, without their successive stages of beautiful development. He might have given us rain and sunshine, without every moment, during the solemn march of the ages, presenting new pictures in the earth and sky. He might have given us trees and plants, and

clothed them with leaves and flowers, without forming them as now, so that no two trees in all the world are alike, nor any two leaves in all this mighty mass of verdure that we cannot distinguish from each other, nor any two flowers, upon the same stalk even, which are not sufficiently unlike, to enable us to mark them as individuals.

Take for instance the branch of an oak, and examine every leaf in succession. You will find each is unlike every other, and that in addition to this variety, by the combination of lines and angles, the arrangement of the leaves on the stem so that each presents a different aspect to the eye, the effect of light and shadow, the shadows of some passing over the others, and in the thousand variations of tint and tone, which no language can describe, you have a mass of bewildering beauty, every part of which is felt to be distinct from the rest, and yet so alike, that you would not for one moment mistake the kind of tree to which it belongs.

But if nature presents such a variety in the single bough before us, what shall we say when we behold her in the majestic tree or solemn forest? "The leaves then," in the language of Ruskin, "at the extremities, become as fine as dust, a mere confusion of joints and lines between you and the sky, a confusion which you might as well draw sea sand, particle by particle, as to imitate leaf for leaf. This, as it comes down into the body of the tree, gets closer, but never opaque; it is always transparent with crumbling lights in it, letting you through to the sky; then out of this come, heavier and heavier, the masses of illumined foliage, all dazzling and inextricable, save here and there a single leaf on the extremities; then under these you get deep passages of broken, irregular gloom, passing into transparent, green-lighted, misty hollows; the twisted stems glancing through them, in their pale and entangled infinity, and the shafted sunbeams, rained from above, running along the lustrous leaves for an instant, then lost, then caught again on some emerald bank or knotted root, to be sent up again, with a faint reflex, on the white under sides of dim groups of drooping foliage, the shadows of the upper boughs running in gray network down the glossy stems, and resting in quiet checkers upon the glittering earth; but all penetrable and transparent, and, in proportion, inextricable and incomprehensible, except where, across the labyrinth and the mystery of the dazzling light and dream-like shadow,

falls, close to us, some solitary spray, some wreath of two or three motionless large leaves, the type and the embodying of all we feel and imagine, but can never see."

If we should follow out this investigation in all the varied works of creation, we should still find beauty every where; addressing us in every sight and sound, as if it were its special mission to lead us to the skies. It may not be inappropriate to add, that if the meanest human soul is capable of appreciating all this, and ten thousand times more, in the varied beauties of thought and action, how passing wonderful it is, and how solemn a thing is life, when it is viewed as the time for the commencement of the development of a being whose existence shall run parallel with the march of the ages!

We have not written thus to vindicate the object of our work to the public, but as a sort of introduction, which we should like to extend much farther, did our proposed limits permit. Such is the general intelligence of our people that we deem ourselves fortunate in having such a tribunal to decide upon the usefulness of our undertaking. If in a single district of one of our rural villages, containing not more than two thousand inhabitants, two hundred subscribers could be obtained in advance, to encourage a work of this description, we need not fear the verdict in this respect. We shall endeavor to perform our task in a manner which shall show our appreciation of such enlightened patronage. It has been repeatedly said to us by eminent gentlemen, who have honored us with the approval of our design, that in no other country could such an instance be found, and we may be pardoned if we glory in it, as an evidence of the intelligence of the people.

Downing says he is "almost forced to believe that the famous common schools of New England teach the æsthetics of art, and that the beauty of shade trees is the care of especial professorships." Strutt, in his work upon the trees of England, claims that there is no people who feel so much reverence, or manifest so much love, for these "most beautiful things in nature," as the English, instancing, in proof, that a tree on the estate of a nobleman was preserved, although two hundred pounds had been offered for it. In our travels, while collecting materials for this work, we have constantly met with instances of this kind,

where a large price has been refused for favorite trees, by those whose whole property did not amount to much more than the sum offered for a single tree.

The fact seems to us to be, that while in England this taste must, from the nature of the case, be confined to the few, with us it is almost universal. We have met with but few exceptions to this rule, and these, as usual, go to prove it. In one instance, where one of these "tree Vandals" commenced destroying an avenue of elms, a public meeting was called upon the subject, and such was the force of public opinion, that he could not bear up against it, and though dollars rung loudly, and most musically in his ears, "that other voice" compelled him to abandon his design. This took place in a small town in the interior of New Hampshire. What Irving says of English gentlemen seems to belong to the people with us, and confirms Mr. Downing's opinion, that our "famous common schools teach the æsthetics of art." In this, however, we only claim for ourselves, that we have inherited from our fathers that feeling which we have here wider room to develop.

"I am fond of listening," says Irving, "to the conversation of English gentlemen on rural concerns, and of noticing with what taste and discrimination, and with what strong, unaffected interest, they will discuss topics which in other countries are abandoned to mere woodmen or rustic cultivators. I have heard a noble earl descant on park and forest scenery with the science and feeling of a painter. He dwelt on the shape and beauty of particular trees on his estate with as much pride and technical precision as though he had been discussing the merits of statues in his collection. I found that he had even gone considerable distances to examine trees which were celebrated among rural amateurs; for it seems that trees, like horses, have their established points of excellence, and that there are some in England which enjoy very extensive celebrity, among tree fanciers, for being perfect in their kind. There is something nobly sweet and pure in such a taste; it argues, I think, a sweet and generous nature, to have this strong relish for the beauties of vegetation, and this friendship for the hardy and glorious sons of the forest. There is a grandeur of thought connected with this part of rural economy. It is, if I may be allowed the figure, the heroic line of husbandry. It is worthy of liberal, and free born, and aspiring men. He who

plants an oak looks forward to future ages, and plants for posterity. Nothing can be less selfish than this. He cannot expect to sit in its shade nor enjoy its shelter; but he exults in the idea that the acorn which he has buried in the earth shall grow up into a lofty pile, and shall keep on flourishing and increasing, and benefiting mankind, long after he shall have ceased to tread his paternal fields. Indeed, it is the nature of such occupations to lift the thoughts above mere worldliness. As the leaves of trees are said to absorb all noxious qualities of the air, and to breathe forth a purer atmosphere, so it seems to me as if they drew from us all sordid and angry passions, and breathed forth peace and philanthropy. There is a serene and settled majesty in woodland scenery, that enters into the soul, and dilates and elevates it, and fills it with noble inclinations.

There is another evidence of the almost universal prevalence of this feeling among us. The entire newspaper press of the country, however discordant upon other themes, harmonizes upon this. This is evident, from the manner in which all attempts in this direction have been met by this mighty power, which so controls and directs public opinion. From the outset of his work, the author has reason to appreciate this, and to be grateful for the kind encouragement he has received from every one of the many editors to whom he has submitted his plans.

There is another point of view, in connection with this subject, to which the lovers of trees, and the friends of our country, should direct their attention; that is, the planting and cultivation of trees for profit, and to supply the demand of those who are to occupy this glorious land, when we shall have passed away. "We ought not to cease our efforts," says Downing, "till every man feels it to be one of his moral duties to become a planter of trees; until every one feels, indeed, that it is the most patriotic thing which can be done, to cause trees to grow where no foliage has waved and fluttered before." If we find them so necessary and useful, will not posterity have reason to curse us if we provide not wisely for their wants in this respect? and if we "plant thus wisely we are more certain of receiving the thanks of posterity, than the most persuasive orator, or the most prolific writer of his day and generation." "In what one imaginable attribute that it ought to possess," says Christopher North, "is a tree, pray,

deficient? Light, shade, shelter, coolness, freshness, music, all the colors of the rainbow, dew and dreams dropping through their soft twilight at eve and morn, dropping direct, soft, sweet, soothing, restorative from heaven. Without trees, how in the name of wonder could we have houses, ships, bridges, easy chairs, or coffins, or almost any single one of the necessities, comforts, and conveniences of life?"

We may anticipate the verdict of posterity, in our own feelings when enjoying the shade and coolness of the leafy road, or in contemplating the many uses to which the tree is adapted. Who has not felt to bless the name of Tudor, when rambling over "the stern and rock-bound shores" of Nahant? And who does not feel a glow of gratitude, when walking the lofty aisles of verdure in the "City of Elms," to him who did so much to produce so vast a leafy temple?

In our enjoyment of the present, we are apt to forget that we cannot, without sin, neglect to provide for those who are to come after us. In order to do our duty to our country, to those who are to succeed us, we should do all in our power to encourage the planting of trees. In some parts of Germany the government makes it a duty for every landholder to plant trees in the highways, before his property; and it is said that in a few towns no young man can marry till he has planted a tree. As the people govern here, they should see that their government be as enlightened in this direction as that of the despotic rulers of the old world.

Lord Bagot planted, during his life, over two million oaks in Staffordshire and Wales, which are said to be the most planted by any one man in England in his time. It would seem as if a sort of noble rivalry existed among many English gentlemen, in respect to planting trees. Davy speaks of Sir Joshua Vannec, who, he says, "has, with his noble plantation of oaks, beeches, chestnuts, &c., ornamented the whole country, and which in half a century, as the soil is favorable to them, will be an inexhaustible treasure to the public, as well as to his family." — The profit of growing forest trees is a subject upon which we hope to be able to present some data in the progress of this work, which will be of value, and furnish additional inducements to the planting and preservation of trees. Mr. South mentions that an oak of sixty years' standing will in twenty-four years

double its contents of timber, and of course increase its value in a much greater ratio. Another foreign writer mentions a growth of two hundred acres of wood, which was three times cut over in twenty-four years, producing in all fifteen hundred dollars of our money, when, had it been allowed to stand from the first an equal number of years, it would have produced, at the very lowest valuation, thirty thousand dollars. We shall see from this how much care and judgment should be exercised in the cutting down of our forests. But we hope to pursue this subject farther in the future. The editor of the *Horticulturist*, a publication, we would remark, which ought to be in the hands of every family in the country, furnishes us with some facts which are of so much interest to all, that we shall avail ourselves of this opportunity, to present them to our readers. It seems that the supply of many kinds of wood, which are necessary for mechanical purposes, is becoming so uncertain, as to make it a matter of serious inquiry, what is to be done, in our own day, to meet the demand. It is proposed to plant the sides and embankments of railroads, canals, and public roads, with locust, white oak, chestnut, hickory, and larch, which would, in a few years, not only add much to the beauty of the country, but create a supply, sufficient, if properly managed, to meet an immense annual demand, and yield a very large profit on the first investment. This is a subject of so much importance to every one, whether small or great, in our country, that, although it may seem to some a little out of place in a work of this description, we shall pursue it still further. State governments should at once take this matter in hand, and thus do as much as is in their power to remedy past neglect. No public road or canal, of any kind, over which these governments have control, should be constructed, without making the planting of the borders with trees, and their after care, imperative upon those who have the management. Had this been done early in the history of these enterprises, says the author quoted above, "in the Southern States there would now have been an ample provision of live oak timber, and in the Northern of white oak, locust, &c., for national and private purposes."

"By planting the acorns, or seeds, scarcely any cost would be incurred; but it can be shown by practical men, that, at present prices, a mile of seedling oaks, one year old, planted ten feet apart, — which would give for both sides of

a road one mile in length, one thousand and fifty-six trees, — could be bought and planted for twenty dollars, and locust for the same, if not for less. At a low estimate, we will assume that these trees, in twenty years, would be worth, on an average, two dollars each, or two thousand one hundred and twelve dollars. (Ornamental trees produce a much greater result in from five to eight years.) If the route from Philadelphia to Pittsburg, which, with its branches, is four hundred miles in length, was planted on both sides, say eight hundred miles, the value produced, where nothing of value is now growing, would, if we are correct, yield eight hundred and fifty thousand dollars! Apply this estimate to the whole length of railroads, canals, and turnpikes in the Union, and the result is too startling for figures." It seems that we are now greatly dependent upon Canada to meet this demand, and the question is seriously asked, "When Canada has exhausted her supply," which she must at some time do, "where are we to go?"

In this calculation, trees of known mercantile value are taken as samples. It is recommended to change their character, according to climate and soil, and the demand in various localities. In case the companies already formed refuse to do this, it is recommended to form companies for this special purpose, the stock of which, we are assured, would be of much more value than that of the roads themselves. The governments of France and Switzerland, and of some other countries, long ago attended to this matter; and now we are informed that the turnpikes and canals furnish an abundance of timber for ship building and other purposes. Shall we, with all our common schools and freedom, be less wise than they? The English walnut, which is in such demand in this and other countries, is furnished, to a great extent, by trees planted on the sides of the roads leading from France to Switzerland over the Jura.

In Germany, the very near vicinity of the railroad track is cultivated by the lookout men, and the station house grounds, in many instances, are made so beautiful, by trees and flowering shrubs, as to compensate for a journey over the roads to see them.

We would again, however, appeal to the thousands of intelligent landholders in our country. It is to them that we look mainly for a reform in this direction. We know of an instance in a neighboring state, where a pasture, of but little

value, was covered with fruit trees, which in a few years produced an annual income of more than twelve hundred dollars. "The father of the late Duke of Athol lived to see a ship launched that was built out of the larch wood planted by himself on his naked Scotch hills." This larch flourishes well with us, and there are thousands of places, where it and other valuable woods should be planted, which would yield a thousand per cent., upon a very small outlay. It is calculated, by the able editor of the *Horticulturist*, that five hundred dollars worth of locust trees, planted at the birth of an infant, on land of moderate value, would be worth more than ten thousand dollars at its majority.

In order to foster and rightly develop this love of trees, which, according to a celebrated writer, is peculiarly the property of the northern races, several methods suggest themselves, which have been before presented by the lamented Downing and others. First, every private individual who owns a garden should every year give some portion of his own time, and that of his gardener, if he employs one, to his neighbors and the public, in order to beautify and improve his town or village. There is no benevolence which pays a higher money interest than this. But we would not urge this as a motive, though it may properly have its influence; nor do we think that it often enters into the calculations of those generous tree planters, whose favorite pursuit, according to Irving, is so ennobling in its nature. We know of one gentleman, who has pursued this course, and in a few years has, by his generous system, more than doubled the value of his own property, and that of his neighborhood. We were pleased to see inscribed over a beautiful arched entrance to his grounds, "People are requested to walk in these grounds," and though fruit and flowers are exposed in every direction, his confidence is never abused. Where there is not time to devote to this object, trees might be given away, upon the condition that they be carefully planted and cared for; and, as every successful cultivator must have some proper method of transplanting, &c., he should give some little instruction to the recipients of his gifts, in order to secure, as far as possible, a successful result. There is nothing in which people fail so often as in transplanting trees, and yet nothing is easier, or more certain, if it is conducted upon correct principles. We shall give a few simple rules in another part of this work, which we think cannot fail of being

easily understood and put in practice. We have transplanted hundreds of trees and shrubs, and with such uniform success, that we now not only expect them in all cases to live, (where their character and condition would warrant such an expectation,) but to make a rapid and vigorous growth. In the second place we would call upon the nursery men to lend their aid. It is their business, we know, to sell trees, and it may seem strange that we recommend them to give away their goods in order to increase their business; but we are convinced, by actual observation, that what Downing recommended some time since is the best course. He says, "It may appear, to some of our commercial readers, an odd recommendation, to urge them to give away precisely that which it is their business to sell; but we are not talking at random, when we say, most confidently, that such a course steadily pursued by amateurs and nurserymen, throughout the country, for ten years, would increase the taste for planting, and the demand for trees, five hundred fold." We know of an instance where this course has been pursued, by one liberal-minded nursery man, and the result has been, that his sales have more than doubled, every year, since he commenced the practice. It is but just to say, however, as this will fall under his eye, that he has done this with no view to profit, but from the promptings of a noble and generous heart.

It should be remembered by those who are disposed to benefit individuals and the country in this manner, that they have it in their power to do much to form a correct taste in regard to the choice of ornamental trees. They should urge the cultivation of our native trees. There are two reasons for this, which would seem to be conclusive: In most cases they are far more beautiful, and better adapted to our climate, than foreign trees. We have but to visit other countries to see how mistaken we are when we choose foreign trees and shrubs in preference to our own. An eminent Belgian collector said to an American traveller, after speaking of the difficulty he had in obtaining our native plants and trees, "And so, in a country of azaleas, kalmias, rhododendrons, cypripediums, magnolias, and nysas, the loveliest flowers, shrubs, and trees of temperate climates, you never put them in your gardens, but send over the water, every year, for thousands of dollars' worth of English larches and Dutch hyacinths. 'Voilà le goût republicain!'" — Behold the taste of republicans!

In France and Germany great attention is paid to the cultivation of American plants and trees, while in England every pleasure ground of any note has its American department, comprising, in many instances, a large number of acres. Our mountain laurel, (*Kalmia latifolia*,) our azaleas and rhododendrons, are here met with in great profusion. This beautiful shrub, the laurel, which deserves a place in every garden, has been introduced, to some extent, in the neighborhood of Boston. It occurs, among others, in the garden of the Hon. Bowen Buckman, of Woburn, Mass., a gentleman whose fine taste and public spirit have done much for that beautiful town. Downing says of the American laurel, "There is nothing which surpasses it, when in perfection, as to the richness of its dark-green foliage, or the exquisite delicacy and beauty of its gay masses of flowers." In order to transplant it successfully, it should be taken up in masses in the month of May, or with a frozen ball of earth about it, in the fall or winter. It should be set out in a clump, the larger the better, in a cool or shaded aspect, — a northern exposure is the best, — where the subsoil is rather damp. The soil should be sandy or gravelly, with a mixture of decomposed peat, or a cart load or two of decayed leaves; or perhaps meadow mud would answer for a part of the compost. This bed should be made at least two feet deep, to retain the moisture during long droughts. It would be well, also, to shade the ground for a few years with a bed of leaves or grass; this may be secured against the wind by covering it with stones. A mass of this beautiful evergreen, grown in this manner, will convince any one that it possesses all we claim for it.

As a third means to this end, we would ask the attention of Horticultural and Agricultural Societies to the subject. They have already done so much to develop the resources of the country in other directions, we feel confident, that if they were to take this matter in hand, we should soon see great and beneficial results. It would not become us to point out methods, but leave it to those who have already shown so much wisdom in giving direction and energy to the development of kindred pursuits.

We cannot better close this part of our subject than by quoting from one to whom we are already so much indebted. "In Saxony," says Downing, "the traveller beholds with surprise and delight, on the road between Wiessenfels and

Halle, quantities of the most beautiful and rare shrubs and flowers growing along the foot paths, and by the sides of the hedges which line the public promenades. The custom prevails there, among private individuals who have beautiful gardens, of annually planting some of their surplus *materiel* along these public promenades, for the enjoyment of those who have no gardens. And the custom is met in the same beautiful spirit by the people at large; for, in the main, those embellishments which turn the highway into pleasure grounds are respected, and grow and bloom as if within the enclosures.

“Does not this argue a civilization among these ‘down-trodden’ nations of Central Europe, that would not be unwelcome in this our land of equal rights and free schools?”

PLATE I.

OUR ENGRAVED TITLE PAGE.

THIS group is composed, mostly, with reference to one which haunts our memory, though seen long ago. It consists of the birch, whose graceful, pendulous branches, in all its varieties, are so beautiful, while its quivering leaves make music at the touch of the gentlest breeze, and the white and pitch pine, those trees of the “soft and soul-like sound,” and the red oak, with such a variety of shrubs as would surprise any one but a botanist. And here let us say, that this science, botany, should be one of the first taught in our common schools, if for no other reason than to make the young denizen of this beautiful world acquainted with the wonderful variety of his playmate trees and shrubs within the reach of his hand. The wild grape vine had climbed over the whole group, and twined its long, trailing arms lovingly about the old birch, which seemed

almost ready to fall, as if to protect it in its hour of need. The figure of the vine protecting the tree in its old age and decrepitude, though very common, seems like the rose, to lose none of its beauty for being so. Who has not seen, in a group like this, old trees, entirely decayed at the bottom, still upheld against the tempest and the storm by the clinging vine. The female figure, in the foreground, we have introduced, as we found her, gathering berries by the road side, to help eke out a scanty living, and yet here, as in all our experience, manifesting what seems peculiarly to belong to the sex, woman's loveliest trait, pointing to the highest development, the love of the beautiful. We have chosen the oak for our border, as the representative of American trees, we having, I believe, more than all the world besides; there being forty-four species of native growth between the twentieth and forty-eighth degree of north latitude. England, proud as she is of her oaks, (which deserve all her regard,) has but two species. We might write a long chapter on our title page, so many things are there in it — its variety of rocks, its many plants, including eight or ten species of the beautiful trefoil, the purple eupatorium, the delicate blue vervain, and several species of that flower which defies all attempts to tame it, (the yellow gerardia,) the despair of the cultivator, but the joy of the bees and butterflies, and all the gay tribe of honey-loving insects. But we hope that we have already said enough to convince every one of the great sources of enjoyment which are all around us, and which a little study of natural history would open to our vision. A single hand's breadth of the earth's surface not unfrequently contains twenty or thirty species of plants. That eminent naturalist Professor Agassiz once said that he could spend a whole life upon the border of one of our small ponds, and yet find enough about which to be profitably and pleasantly employed.

PLATE II.

SEQUOIA GIGANTEA, TORREY; WELLINGTONIA GIGANTEA, LINDLEY.
(GIANT REDWOOD.)

“Giant trees,
Children of elder time, in whose devotion,
The chainless winds still come, and ever come,
To drink their odors, and their mighty swinging
To hear — an old and solemn harmony.” — SHELLEY.

DR. LINDLEY says of this vegetable giant, whose age is estimated to be three thousand years, “It must have been a little plant when Samson was slaying his Philistines, or Paris running away with Helen.” It is found in a single district on the elevated slopes of the Sierra Nevada, near the head waters of the Stanislaus and San Antonio Rivers; — thirty-eight degrees north latitude, and one hundred and twenty-nine degrees west longitude, — at an elevation of five thousand feet above the level of the sea. Some eighty or ninety trees exist within the circuit of a mile. The following are the dimensions of some of the largest of them, from a source which we believe is worthy of credit: One, four hundred feet in height, one hundred and nineteen feet in circumference; a cluster of three, three hundred feet in height, ninety-two in circumference; one, two hundred feet in height, eighty-five feet in circumference; one, three hundred and twenty-five feet in height, ninety-one and a half feet in circumference; two, united at the base, three hundred feet in height, ninety-two feet in circumference; two, three hundred and twenty-five feet in height, ninety feet in circumference; one, three hundred feet in height, ninety-four feet in circumference; one, three hundred feet in height, seventy-two feet in circumference; two, three hundred feet in height, eighty-five feet in circumference.

The tree from which our plate is made was two hundred and ninety feet in

Pl. 2

Cowthorpe Oak, 63 ft. from ground 48 ft.

Boston Ann. Def. 3. 1814.

height, and ninety-six feet in circumference. This measurement corresponds with many others which have been made of it, and we are also assured by several gentlemen who have visited it, that our portrait is very correct. As will be seen, it has been broken at some distance from the top. By continuing the sides, they will be found to meet at a distance of four hundred and fifty feet from the base, which would make this tree higher than any now standing, of which we have an account. It is said that one has been discovered, lying prostrate, which must have been, at least, five hundred feet in height. The top was partly destroyed. It is difficult to form an adequate conception of the magnitude of these enormous trees. It will be seen that the base of some of them covers an area equal to that of a pretty good sized dwelling house. The "Father Pine," as it is called, aside from its branches, would make more than a thousand cords of wood. Dr. Hunter, in speaking of one of the gigantic English oaks, which measured forty-eight feet in circumference, says, "When compared to this, all other trees are but children of the forest." This enormous oak would scarcely make a branch for one of these gigantic Californians. A drawing of this oak and the Boston elm is shown in the plate, drawn on the same scale as the redwood.

Mr. Frank Marryat tells us that the wood of this tree, which is so light and easy to work, is very durable. From the specimens which we have seen, we should not judge it to be more than two thirds as heavy as white pine. The redwood bark, which is a foot in thickness, is penetrated towards the top of the tree with numerous holes, made by a kind of starling called carpentero — the carpenter. These birds fill their cells with acorns, for winter use. They are always at work, when they are not fighting among themselves, or engaged in scolding the gray squirrel, who frequently pillages their stores. When the squirrel ascends the redwood, he is immediately surrounded by the carpenteros, who, well knowing his errand, do their best to drive him away. The squirrel takes no notice of their angry remonstrances against his invasion of their rights, but chooses the acorn which suits him best, whisks his silvery tail from side to side, and turns his head with a comical look of composure, as if he were doing the most innocent and commendable action imaginable. The birds, however, do not view the matter in the same light, for they keep such a screaming over the "rascally business,"

that they soon assemble a whole flock of their neighbors, who join in the noise, until it becomes absolutely deafening to human ears. The squirrel, in the mean time, continues his thefts until his appetite is satisfied.

But a greater foe to the carpentero and the noble redwood is the Digger-Indian, who burns down the giant for the sake of the acorns stored in the cells of the industrious bird. Some of these mighty monuments of antiquity have also been destroyed by the cupidity of showmen and others; "men," as an eminent author says, "who would dig up the bones of their fathers, and expose them in the market-place for sale, and dispose of their household gods, of their very souls, even, for pence." The poor Digger has some excuse in his hunger and his ignorance for destroying these venerable monuments of the past; but what shall we say of the civilized man who dares to imitate him, especially where he has only the desire of gain to plead in excuse? Will not the people of California see to it that no more of these "children of elder time," whose birth was coeval with that of the Pyramids, be unnecessarily destroyed. Every pains should be taken to preserve them. They are monuments of the past, as are the Pyramids, and much more worthy of reverence and a pilgrimage. If, as says that writer whose fame is our nation's honor, the love and reverence of trees is worthy of liberal and free born men, will not the liberal and free born men of our sister state guard the redwood from all wanton injury? Ere long it seems to us that thousands will journey to the golden land to look upon these trees, "its greatest wonder."

Three thousand years ago — "how strange the story!" — these trees had their birth; and, while the monuments of Egypt are crumbling into dust, the redwood lives on, every fibre of its wondrous structure as sound as if it were destined to endure while the world lasts. And who can say when it shall become aged? The ancient cedars of Lebanon have nearly all passed away; the cedar of California has but begun its wondrous existence. When the Savior walked the earth, these trees had already seen twelve centuries pass by in their noiseless tread; and eighteen centuries more have glided away, and still they remain, clothed with a robe of living green, which may sing to the passing breeze until the "Final Day."

Comitatus
Universitatis
Librarius

Woodcut. Oak on the land. Engraving of the University of the Pacific.

PLATE III.

ASSABET OAK, ON THE RANDALL ESTATE, STOW, MASS.

“Jove’s own tree,
 That holds the woods in awful sovereignty;
 For length of ages lasts his happy reign,
 And lives of mortal man contend in vain;
 Full in the midst of his own strength he stands,
 Stretching his brawny arms and leafy hands;
 His shade protects the plains, his head the hills commands.” — VIRGIL.

THE oak is eminently the historic tree. From the earliest records of mankind, through all past history, it has been connected with the most important embodied ideas of the race. It has looked down as calmly, in its dignity and grandeur, upon the priests who made it sacred as the emblem of deity, and offered sacrifices beneath its leafy arches, as upon the murdered son of the royal Psalmist, or upon the more terrible offering of the relentless Jean Ziska.

The first oracles which conveyed the will of the gods to man were revealed in the sacred oak groves, or uttered through voices from the inspired trees themselves, —

Which in Dodona did enshrine;
 So faith too fondly deemed a voice divine.”

Our ancestors, the Britons, worshiped the oak. The Druids believed that every thing came from God which grew upon it. Their very name, it is said, is derived from it, as only beneath its solemn shade did they dare to address the gods.

Four centuries ago the hero Wallace, with his boy companions, played beneath the shade of the Wallace oak. Now

“The old memorial tree is down,
But its stirring legend still lives on —
A tale of grief and withering woe,
Of tears that ceased long ago.”

Beneath the Queen's Oak Elizabeth heard of the death of Mary, and knew that by this event she had become the ruler of a mighty kingdom.

From the top of an oak, separated from the fight by the waters of the swollen river, Owen Glendower witnessed the defeat of his friend Harry Hotspur, and the triumph of the tyrant king. We, too, have our historical oaks, as venerable for age as those of other lands, and like them fraught with a people's weal or woe.

The present noble queen of England, before she ascended the throne, planted with her own hands an oak at Chatsworth. Long may it live and flourish as the Queen's Oak, and tell to ages yet unborn far other tales than those told by the venerable tree which looked down upon the great queen who so long ago swayed the sceptre of the fatherland.

In our country, where all are born sovereigns, it is to be hoped that ere long every lady will deem it her duty to imitate England's queen in this, and plant at least one tree. When our *ladies* shall do this, then will the work be done, and throughout our broad land the reproach of neglect, in this respect, have passed away. This act of Victoria's, it seems to us, is not the least significant in the life of one to whom a people look, not in vain, for a high and noble example. If, as says the North American, the influence of Evelyn is now more felt for good, by the race, than any of the rulers and statesmen of his times, “private gentleman” though he was, may we not hope that many will thus strive to embalm their memories, and build for themselves leafy pyramids, monuments of love and good will, which shall preserve their deeds when the pyramids of Egypt shall have crumbled into dust, and the very names of the tyrants who hoped thus to perpetuate their memories have passed away, and left no trace upon the sands of time?

On another page we have alluded to what Mr. Tudor has done at Nahant, and since then we have taken pains to obtain further information upon the subject. It may be as well to remark in this connection, that as our work is

being published in parts, and must of necessity extend over a considerable space of time, and therefore develop itself as we go on, this will serve as an apology for any irregularity in its arrangement as a whole. We shall revert to subjects again and again, as we may deem them of value and interest. We wish not only to "make sacred the trees of America," but to preserve for future time the memory of our co-laborers in this field. We should like to inscribe on our *Libro d'Oro* the name of the humblest individual who causes a tree to grow where none grew before. Surely he is more worthy of being remembered than the noblest butcher who ever strode the earth leaving desolation in his track.

"Thirty years ago," says Mr. Tudor, "I began at Nahant, when the scene presented little but bare and bleak desolation. Now the trees are greeting me with the delicate perfume of flower and leaf;—and the wordless music of the breeze, as it sings through their branches, with the joyous carol of the birds, answers the roar of the 'deep-voiced neighboring ocean.' The birds! I had forgotten that they would come with the trees, and it is with glad surprise that I have watched them from year to year, as new varieties come and take up their abode with us. The robin, the bobolink, many kinds of sparrows, and even the humming bird now make their home here. The birds make free with my fruit, taking the best; but they are welcome to it, for they amply repay me with their music and their unceasing war upon the insect tribes.

"It seems to me that no object in nature is more beautiful than a tree;—combined with glancing, babbling streams, in the midst of ravines and precipices, standing beneath frowning, jagged rocks, or looking from the heights above upon the plains below, as if to invoke a blessing upon the dwellers in their shadow: they fill the soul with something akin to worship. But here at Nahant, with tame water and wild water, where the waves dash and the spray flies, where we have the rocks, and the precipices, and the mysterious voices from the caverns of ocean, they seem to me to combine to produce an effect before which interior scenery must give way."

Mr. Tudor has planted more than ten thousand trees at Nahant, and by the results of his experiments, has fully demonstrated that trees properly cared for in the beginning may be made to grow up to the very bounds of the ocean,

exposed to the biting of the wind and the spray of the sea. The only shelter they require is, at first, some interruption to break the current of the wind, such as fences, houses, or other trees. "My experience convinces me," he says, "that a tree will grow on the bank where the storm beats and the salt spray flies, if the wind is not allowed a free passage." We shall again refer to this subject, and show how almost every vegetable production is influenced by these same causes, giving, as we think, the true theory of many failures in agriculture which have as yet remained a mystery. Mr. Tudor invites others to come to Nahant and see what has been done. "Nantucket," he says, "can as easily be covered with trees as Nahant;" and there is no one better qualified than himself, or more ready to point out the way.

Mr. Tudor began his tree planting with the balm of Gilead and willow; rapid-growing, hardy trees. These he selected to commence with, as he was desirous to sit beneath the shade of trees of his own raising. Had he remembered that tree planting almost surely conduces to longevity, he might not have despaired of enjoying the shelter of an oak, over whose infancy he had watched. As he has planted some of these noble trees, we hope he may live to see them grow into vigorous manhood. Some forty years since, a gentleman of seventy commenced planting fruit and forest trees, not with the expectation of receiving much benefit from them himself, but with the unselfish, noble desire to benefit those who should come after him. As is too frequently the fact in such cases, his neighbors ridiculed the undertaking, on the ground that it was foolish to plant for others. In his case, however, they were disappointed, for he has lived to enjoy his trees and his intellect to the ripe age of one hundred and ten years, while they have all passed away. Besides poplars and willows, Mr. T. is cultivating white and red oaks; the latter a noble tree, and a very rapid grower. The white oak may also be made to grow rapidly. The rate of growth of all trees, however, depends very much upon management.

He has the rock maple, also the red, white, and Norway maples. The Norway maple, he observes, he has found very hardy, and peculiarly well adapted to exposed localities. Of the graceful birch family he has the white variety, a tree which the author has transplanted with success, and which he regards, in

groups with other trees, or by itself, as very beautiful. James Burt, the artist, whose early promise was so high, and who, had he lived, would have well fulfilled the mission to which he was called, used to speak of the birch, in all its varieties, as peculiarly graceful and beautiful. Mr. Tudor has the white ash and the white pine, raised from the seed. He has the horse chestnut, the butternut, and the Madeira-nut bearing fruit; also pears, apples, peaches, plums, and quinces, all of which do well under the conditions mentioned above—that is, shelter from violent winds. This condition is also necessary to be observed inland, and the neglect to do so has been the cause of failure in the planting of fruit and ornamental trees in numerous cases which have come under the notice of the author.

Mr. Tudor has also been very successful in the transplanting of large trees. In a letter to the author he says, “I have done a good deal in transplanting old and full-grown trees. I have removed forty or fifty apple and pear trees ten miles or more, each tree being a load for two horses. Some of these trees are more than fifty years of age, and yet I have not lost one of them. The balm of Gilead trees at Nahant, raised by myself, I have transplanted repeatedly, even when they have attained to a large size. Last year I removed forty of these, some of them at least sixty feet high, and from twelve to fifteen inches in diameter at a foot or more from the ground. All these are doing well, as are some forty others, nearly as large, transplanted the previous year.” Mrs. Tudor warmly sympathizes with her husband’s noble work, and thus sets an example to the fair daughters of our country, which we hope will induce many to use their influence to the same end. She has herself planted trees, carrying with her own hands the Madeira-nut tree into the interior of New York, thus introducing there a tree of which Mr. Tudor thinks much. We shall endeavor to give some account of this tree in the future. If every lady who has the opportunity would do thus, how soon would our whole country have distributed through all its broad extent the various species of trees which contribute so much to the comfort and support of the race! It must be pleasant to look back upon acts like this, and to remember that when we have passed away, the noble trees will tell to those who come after us that we have not lived in vain.

We have been thus particular in giving the result of Mr. Tudor's experiments, as we look upon them as of the highest importance. He has demonstrated, as he says, "that trees may be made to grow close to old ocean, spite of his anger and his storms;" and he has also shown that other vegetation can be as successfully cultivated in the same vicinity, if only sheltered by the guardian trees. Thus thousands of acres of barren land may be converted into fruitful fields, and vast populations be supported upon soil now deemed valueless. Certainly, by his experiments, it seems to us, he has conferred the greatest boon upon the race, and that, like Evelyn, he will receive the thanks of the world. His method of transplanting, etc., we shall give in another part of this work.

There are others, also, to whom we are more or less indebted for the shade, and verdure, and tree music of Nahant. Mr. Stephen Codman was one of the earliest tree planters here. It is said of him, as no mean praise, he was a great lover of trees. Mr. Charles Amory has also both fruit and forest trees of his own planting. The Hood family, the Johnsons, Mr. Whitney, Mr. Bryant, and Mr. Hammond, — and amongst the ladies, Mrs. Bulfinch and Mrs. Colby, — have aided in producing the change from barrenness to comparative fertility which Nahant now presents. They deserve, as they will receive, the thanks of the thousands who, from year to year, come here to visit old ocean, as well as a more lasting memorial in the general interest and value of the facts they have aided to establish.

There are various ways in which climate is influenced by the presence or absence of trees, and the success of the agriculturist often depends entirely upon their protection. They yield vital heat, and thus, in some degree, equalize the temperature of the air; they draw moisture from the earth, and give it off, by evaporation, from the surface of an infinitude of leaves. They protect the tender plant from the violence of the winds, which would, in this manner alone, in many instances, destroy the labors of the husbandman. By obstructing the winds, they prevent the rapid abstraction of heat and moisture, and perhaps in this manner render their most important services. They afford shelter and breeding places for the birds, without whose aid in destroying insects and worms we should try in vain to produce many important vegetables. This last

fact is not sufficiently regarded by the agriculturist. What farmer expects to raise doves or domestic fowls, if he provide no dovecots or places for them to breed in.

As well might he expect the birds which guard his crops against the insect armies, and cheer his labors with their music, to build their nests without the shelter of bush or tree, or hatch their young, as is the fable in regard to Mother Carey's chickens, in the air through which they soar and sing. But are the birds so important to the farmer — (and if to him, to all, for we all depend upon him for food) — as we regard them? We are too often so obstinate in our opinions, or so careless in our habits of observation, as to learn wisdom only by sad experience. Even the experience of others fails to arouse our attention, until too late we find ourselves the victims of the inexorable law. The "open secret of nature" lies spread out before us, and yet we fail to profit by it.

We should remember one thing in regard to insects injurious to vegetation; that is, that they all undergo several transformations, and that the bird which may shun them in one state may destroy myriads of them in another. Thus the barn swallow does not, to my knowledge, destroy a single insect in its larva or caterpillar state; but he all day long, from early morn to gray evening, with untiring wing and insatiable appetite, devours them by thousands, when, as moths or butterflies, each one is capable of laying eggs enough to produce a whole army of caterpillars.

But do birds really do much to prevent the destruction of vegetation by insects? "In England," says Carpenter, "the caterpillars of the beetle kind — especially those of the cockchafer — would speedily destroy the roots of all our corn and grasses, were it not for the rook and other birds. In some parts of the country, where rookeries have been destroyed, it has been found necessary to restore them. In some of the eastern counties of England, a few years since, the turnip crop, which is here considered so important, was nearly destroyed by the turnip fly. This result was only prevented by the increase of domestic fowls and the birds." Buffon informs us that there was once danger that the Island of Bourbon would be entirely devastated by locusts, their eggs having been introduced with some plants from Madagascar. This result was, however,

prevented by the intelligence and foresight of the governor, who obtained from India the grackle, — a bird which *first* seeks for its food the larva of the locust, — which in a short time devoured the destroyers.

After their legitimate food disappeared, the grackle began to feed upon the eggs and young of other birds, and also upon some of the crops, as our crows and some other species of birds do, when starved by the farmers, whose best friends they are. A law was then passed for the destruction of the grackle, and it was not long before they disappeared entirely from the island. But soon the all-powerful locusts compelled the people to send to India again for their feathered friend; who is himself now kept within due bounds by laws allowing him to be killed for food during certain seasons and under certain regulations. We have frequently seen articles in the periodicals of the day, in which the writers contended that certain kinds of birds did not destroy the caterpillars which infest our apple trees, for instance, because they had never been seen to feed upon them, whereas it is known to every naturalist that, in their perfect or insect state, these worms are devoured by thousands by the birds thus gravely condemned. There is no excuse for such mistakes, for every one knows that caterpillars turn into moths or butterflies; and it is well known, too, that the birds so barbarously killed in what is called sport have their crops stuffed full of these very insects. It is strange that beings claiming the possession of souls, as a distinction from all other animals, and also to be the noblest work of the divine hand, can call blood spilling, in any manner, sport. Can it be sport, indeed, to stop the joyous life which seems born of music? to see lying at one's feet, all blood-besprinkled and torn, the most wonderful organization of motion and music, of beauty of color, and form, that it is possible for the human mind to conceive of, or that the Deity has made? Is it a proud deed for a man to conquer a tiny bird? a noble sport to take, for no cause, the life we can in no manner restore? Is the short-lived child of earth in this manner fitting himself for that mysterious land beyond the "dark river" he must so soon explore? We could almost say with Burns, to one who needlessly destroys the helpless creatures he should rather be proud to protect, and thus show his claim to superiority, —

“Inhuman man! curse on thy barbarous art,
And blasted be thy murder-aiming eye;
May never pity soothe thee with a sigh,
Nor ever pleasure glad thy cruel heart!”

Trees and shrubs, then, are important as giving homes and shelter for the birds.

We have said that they probably affect the climate, and of course agriculture, more by preventing the rapid abstraction of caloric and evaporation of moisture by the wind, than in any other manner. If, for instance, a thermometer be placed in the open air, even when it is but slightly in motion, the mercury will cool down much more rapidly than when it is placed under the shelter of trees. We have tried the experiment repeatedly, and in various ways, during the past winter, (1855-6,) and have found, for example, that if the instrument were taken from the house at 65°, and placed in a current of air 2° below zero, it would fall to that point in three minutes, although the air was not moving very rapidly; while, if placed under the shelter of a thin growth of trees, it would be ten minutes reaching the same point. It will be readily understood from this why we feel colder and freeze more quickly when the wind blows, than when it is still, though the thermometer may indicate a much lower degree of temperature under the latter condition; it is because the wind takes away the heat from the system faster than it can supply it; and the same effect is produced upon living, growing plants, — which supply their own vital heat. Blight is caused in many cases and the growth of plants is retarded, — fruit is prevented from maturing and ripening, — the new wood, even, fails to be matured, and during the next winter it is “winterkilled,” and many valuable trees are thus lost. From this it appears how necessary it is that every species of vegetation should have shelter from the violence of the wind during certain stages of growth; and we are able to appreciate the benefit of Mr. Tudor’s wise experiments, since forest trees must constitute in most cases, as nature has intended they should, the barriers against the forces of the wind god. By further following out this subject, I think we shall see how *blight*, and other diseases may come from the same source. This word is used to express several different kinds of disease; but in its most extended sense, as far as I am able to ascertain, it may in

many instances be traced to this cause. There is no doubt that want of proper and sufficient food may, and often does, produce similar results. If a plant be deprived of its proper food, of course, like an animal under the same condition, it cannot grow, or develop its vital heat, and blight and death must follow; but I think that I have sufficient proof to show that blight and kindred diseases are much more frequently produced in this manner than in any other. Mr. Tudor's experiments seem to show this conclusively. Nothing that he plants on bleak Nahant fails to grow, when protected from the full force of the winds. In order to a proper understanding of this theory, however, we must examine somewhat more fully the process of the elimination of vital heat by plants.

The fact that all parts of growing plants eliminate vital heat is established beyond a doubt, says Carpenter, and even, as the author himself has proved by repeated experiments, during winter, when they are generally supposed to be in a quiescent state. Indeed the production of vital heat seems to be necessary to organized existence, however low in the scale it may rank; but it is during the process of flowering that its evolution is carried to the highest point. The geranium, during this process, has shown an elevation of temperature of 6° above that of the surrounding atmosphere. In the Arum tribe, where the flowers are collected in great numbers, in cases which act as non-conductors, this elevation of temperature is best shown. In one instance, where five spadixes, of the Arum cordifolium, were made the subject of experiment, the thermometer being placed in the midst of them, it rose to 111° ; in another, where twelve spadixes were used, it rose to 121° ; the temperature of the external air, in both cases, being but 66° .

In considering this law of vegetable existence in its relation to blight and other diseases, it will be seen at once that plants, like animals, can of course supply only a definite amount of heat during a given period of time; and if more is demanded from any cause, injury must follow in proportion to the character and condition of the plant, and the increased demand made upon its vital power. If, for instance, a plant is capable of supplying a definite amount of heat to the passing breeze, say 60° , during ten minutes, and the wind be increased in violence

so that it demand this amount in three minutes, it is not difficult to perceive that disease or death must follow. Again, it will be seen that the same effects may be produced by the rapid giving off of heat from the wind, when its temperature is much above that of the object with which it comes in contact. Ice, as Mr. Tudor remarks, wastes much more rapidly in the wind than when exposed to a much higher temperature where there is no current of air. As is well known, the air is a bad conductor of heat; and if it remain at rest, in contact with an object, it imparts or takes it very slowly. But let it once be set in motion, at the rate of twenty miles an hour, which is by no means an uncommon breeze, and it will be perceived at once how many thousands of particles of air must in a short space of time come in contact with any object, and give or take heat, as the case may be. Every one is familiar with the rapidity with which the snow and ice wastes, when we have a warm wind in winter; liquefying much faster than on a still day when the thermometer shows a much higher degree of temperature.

It is also well known, that if a part of the human body be burned or frozen, and it be too rapidly cooled in the one case, or thawed in the other, a much more serious disorganization follows than if the process had been a gradual one. The analogy, without doubt, holds good in regard to vegetable life; and we may hereafter ascertain that the wind, in blowing both hot and cold, is to be looked upon with the same suspicion, in regard to its effects upon both animal and vegetable health and life, as that with which, in the ancient woods, the Satyr is said to have regarded his guest, who warmed his fingers and cooled his food with the same breath. I have not, as yet, however, evidence that our winters kill well-ripened wood, if it is of a kind that is at all adapted to our climate.

The wind, like the skilful destroyer of a people, lays its hands upon the infant plant, and blights it at the commencement of its wondrous life; so that when winter comes, and it is called to bare its arms to contend with the breeze and the storm, it perishes in the stern contest. One of the best proofs of this is shown in those shrubs and trees which require protection during the first few years of their existence, and after the wood becomes mature, stand our climate from year to year, producing flowers or fruit, as the case may be. Among

numerous cases of this kind, I may mention the experiments of Mr. Buckman, a gentleman whom I have before alluded to in this work, upon the *Bignonia*, — fine large vines of which he has growing, and flowering from year to year, in a situation where they invariably die if not protected in their infancy.

Every one is familiar with the fact, that blight is often attributed to the wind, and that it is said that the wind poisons the plants. Thus a writer, in accounting for Mr. Tudor's success in raising fruit at Nahant, where his trees are protected by open fences, says, that these fences "sift the wind," — that is, take the poison out of it, we suppose. A scientific friend remarks to the author, that a neighbor of his has a field which was much exposed to the east wind, upon which repeated trials to raise wheat had been made, but in vain, as it was all blighted in flower, until a few rows of trees were planted upon the windward side; since then there has been no difficulty in raising a good crop.

The statement, then, may be made in brief, as follows: Mr. Tudor's success in raising fruits and flowers, &c., at Nahant, by protecting them with open fences, depends upon the fact, that these fences, besides shielding them from mechanical violence, prevent the rapid abstraction of vital heat, by retarding the motion of the wind, and perhaps, also, by breaking the currents, causing them to return upon each other, and in this way contributing to the same result. Further, they may operate, as Mr. Tudor himself suggests, in shielding them from the effects of warm winds in winter, which cause sudden changes to the opposite extreme, and may in this manner, in some cases, cause them to "winterkill."

The abstraction of moisture is subject to the same laws, and tends to the same end, — the destruction of life; it also takes with it vital heat. Electricity, no doubt, plays its part also, and the chemical changes which are constantly going on in plants must of course be directly affected by the same causes.

Whatever be the theory we adopt to explain the fact, it is sufficient for our purpose that trees protect vegetation, and by their agency a barren soil may be made to yield food for man and beast. Their effect in preventing drought, the permanent drying up of ponds and streams, and equalizing the flow of rivers,

&c., we shall notice hereafter, and shall, perhaps, find that here they act as important a part in the general economy of nature as any other agents.

The Assabet Oak, with which we commenced this chapter, is on the Randall estate in the town of Stow, Massachusetts, near the Assabet Brook, whose gently-flowing waters were singing in my ears while I was engaged in drawing the portrait of the beautiful tree.

I have chosen this tree for my plate on account of its great beauty, more than from its size, and also on account of my regard for the family in whose possession it is, who have resisted many large offers of money for this and other fine trees on the estate, while all around, the forests have been converted into dollars. The author of "The Consolations of Solitude," who has protected this noble tree, with its brothers, from the woodman's axe, speaks of the scenery of the brook and river as he saw it ere its glory had departed through the short-sighted cupidity of those who should have well considered, before they made such sweeping destruction. The beautiful stream upon which the monarch tree looks down is thus described in melodious verse:—

"Low on either margin bending,
Drooping elms, their dark boughs blending,
Lock their long arms the gorge across;
And as the breeze-fanned branches toss,
The green leaves, fluttering to and fro,
But half conceal the surge below,
Whiter than the drifted snow;
While the pale mists, all silvery gray,
Brood o'er the gulf of boiling spray."

The estate has been in the family almost since the first settlement of the town, and this tree, together with many other sturdy sons of the wood, has been preserved with pious care from generation to generation, so that the spirits of the red men of the forest, if they ever revisit the scenes of their council fires, and their hunting grounds, would find here many of the "old memorial trees" which looked down upon them when all this broad land was theirs. This oak is nearly one hundred feet in height and span, and some twenty feet in circumference near the ground. These dimensions may not be entirely correct, as I give

them from memory. It is in full health and vigor, and bids fair to live for centuries to come, if it escape the cupidity of the spoiler man. On the left hand of the engraving will be observed a curious specimen of natural grafting — two large limbs, which have united and grown as one. From this accidental union we may learn a method of making hedges of trees, which will be both picturesque and durable. This method of making hedges has been described and figured in one of the very valuable Patent Office Reports for the year 1854. It is mentioned, that in Belgium very handsome and strong fences are thus made. The beech is the tree used for this purpose. The young plants, after they are set in the hedge, are bound together with osiers, the stems crossing at right angles. The red American beech might be used for the same purpose. It is a hardy tree, and is found in great abundance in New England, New York, and the British Provinces. We have seen instances of natural grafting in the pine and other trees, and no doubt there are many kinds which might be used for this purpose. Such tree hedges, besides being sure barriers against the intrusion of cattle and other large animals, would afford protection against the winds, and be secure breeding places for the birds. They would, we should think, be comparatively inexpensive, as they would cost nothing for repairs after the first few years. They would do away with stone fences, which now occupy land without profit, and furnish homes for the mice, whose destructive ravages upon our orchards are so often witnessed. As to the objection that they occupy land, and are for this reason costly, it may be answered, that the same objection, to a greater or less extent, may be urged against any kind of fence; and also, that where they are in use, land is worth much more than with us; but as the advantages there seem to more than counterbalance the disadvantages, it would seem that the most cautious money calculator here, can with propriety urge no dollar argument against them. To those who consider the sense of the beautiful as much a gift of God as those senses which demand food, and clothing, and dollars, — they will particularly recommend themselves.

Cornell
University
Library

Every Elm, Broomfield, from nature by A. W. Dyce. No. 9. 1831. Age of the tree 100 years.
Diameter of trunk 34 ft. Circumference of trunk 108 ft. from ground 24 ft. Diameter of branches
2 ft. of 1 ft. of 1/2 ft. of 1/4 ft. of 1/8 ft. each 100 of branches each of 1/2 ft. 1/4 ft. 1/8 ft.

PLATE IV.

THE AVERY ELM, STRATHAM, N. H.

THIS tree is on the border of the town of Stratham, near the line which divides it from Greenland, about seven miles from the ocean, and eight from the city of Portsmouth. It is probably the largest tree of its age in the world. It is known to be but about one hundred years old. It was carefully measured by the author, assisted by the then town clerk of Stratham, James H. Dimon, Esq., in the fall of 1854. The dimensions are as follows: Smallest circumference of the trunk, twenty-four feet; circumference of the trunk at one foot from the ground, twenty-eight feet; circumference of the branches, two of eleven and a half feet each, one of ten feet, twenty-two of three feet each, and one hundred from one foot and a half to two feet or more. The span of the branches is one hundred and ten feet; the height about ninety feet. It has been estimated by judges to contain thirty-two cords of wood.

The author well remembers the white-haired old man, who in his youth planted the baby tree by the side of his dwelling, that it might grow with his babes and shelter him and them in after years. He remembers him as he sat beneath the shade of the majestic tree, which seemed only in its vigorous manhood, while he who had planted it when it was but a little younger than himself was now silvered with the frosts of fourscore years. With what interest I then listened to his words as he told of the troublous times of the war of the revolution, in which he and my own ancestors had borne an active and honorable part! Side by side had they stood, devoting property and life to their country; and now, beneath the shadow of their own trees could they sit down and tell to their children of the third and fourth generation what perils they had passed

through to secure to us this glorious heritage. His numerous descendants, who are now scattered over the country, have shown in their lives how much influence a wise and good man exerts over those who come after him. There is not one of them, they proudly say, who has done dishonor to the name.

At this time the tree was called the Great Elm. It is enshrined in the memory of the author, as is also the venerable Captain Avery, who planted it, and after whom it is named. In those days it was to me more than the "talking tree" of the Arabian story to him who so earnestly sought it, for it spoke a "various language." Then —

"There was in every thing an inner shrine ;
And tree, and hill, and mountain, and the great
Magnificence of ocean, and the sweep
Of sounding storms, and all the choral state
Of octaved stars in Heaven's rejoicing deep
Were everlasting worship . . . "

Sometimes I used to stay all night at the old mansion, over which the guardian tree had, from year to year, more widely spread its protecting arms, and after listening with childish eagerness and awe to the stories of my venerable friend, I would retire to my bed to hear the tree whisper to me in all its leaves, as if with ten thousand voices, all night long, and the brook, which ran then, as now it runs, close to its roots, sing its song, old as the universe, telling of the other land, to which that silver-haired old man was so soon to take his departure. Now all have passed like a dream away. The old man with the white hair, his children in the strength and vigor of their manhood, and his children's children, whose glad voices used to make the arches of the old elm ring with their joyous shouts, are to the aged tree as if they never were. And when I last visited it for the purpose of taking its portrait, on a cold gray day in the fall of the year, when the leaves, in their faded colors, were beginning to desert the branches to which they had clung all summer, spite of the storm and the breeze, it seemed as if it were sighing over the buried past. I could but think how soon this great tree, with its "hundred arms so strong," and the solemn forest around, and we who were looking upon them, would, in the march of the ages, become as specks upon the illimitable expanse of the past.

PLATE V.

ASH FOREST, STATE OF MAINE.

"Leafless are the trees; their purple branches
Spread themselves abroad, like reefs of coral
Rising silent
In the Red Sea of the winter sunset." — ATLANTIC MONTHLY.

THIS view is from a photograph, taken by an English artist, while travelling in this country; the author is indebted for it to Messrs. Whipple & Black, of Boston, and also for liberal offers of aid during the progress of his work.

Such forests are becoming very scarce in New England. We formerly knew of an island of three hundred acres situated in a lake in the State of Maine, which was covered with a growth of ash timber like that shown in our plate. The owner said that he could drive an ox team through any part of it without being obstructed by shrubs or stones. We are fortunately able to preserve, by the art of the engraver, one of these old memorial forests before they have all passed away, leaving behind them, for a short time only, a few crumbling relics of their mighty columns, which confirm the traditionary legends of their former grandeur. We are glad to present to our readers this woodland view, taken at a season of the year when the trees are divested of their leaves, in order that their detail may be studied, and the arches and angles formed by the crossing branches may be seen in all their wondrous beauty. Our plate, we think, will also be of interest to those who have never seen the trees when thus stripped to do battle with the blasts of our northern winters. There is an individuality in every part of any species of tree, which will enable the man who observes at all to distinguish it from every other species of tree. Thus a small portion of the bark, viewed only in regard to its external configuration, would enable any one of even moderate powers of observation to pronounce at once upon its species.

Before the window by which we are writing is an ash tree which is looking in upon us clothed in a robe of rippling green and sunlight. Its individuality is so marked that it would seem impossible not to recognize it, even if it were in the midst of the forest and surrounded by thousands of its fellow-trees. And yet every day we meet with those who do not recognize this difference. It is sad to think that all this beauty of variety, which must have been intended mainly for our enjoyment, should thus be a sealed book to most of us. It is not that we do not possess powers alike, I am well convinced, that we thus differ, and that to most people the myriad glories of the universe, which are spread all about us, are unenjoyed; but it is mainly because they shut their eyes and close their ears against them. What is the use? is the common question. We would answer, Does not He who made the ear to enjoy the choral harmonies of sound, and the eye to see the beauty and accord of every variety of form and every tint of color, know best? Has he given us beauty every where, and the capacity to appreciate it to all, and yet commanded us to close our eyes and ears against its teachings, and that we should bend our powers, so like a god's, to make ourselves so like a crawling worm?

"Nature is the visible spirit, the spirit the invisible nature, said Schelling, he who lives an immortal hero in the world of mind," wrote Professor Hasse to Andersen; "and yesterday this was rendered clear to me by your stories. As you, on the one hand, penetrate so deeply into the secrets of nature, understand and know the language of birds, and what the feelings of a fig tree or a daisy are, so that every thing seems to be there for its own sake, and we, together with our children, participate with them in their joys and their sorrows, yet on the other hand, every thing is but the image of the mind, and the human heart, in its infinity, trembles and beats throughout." As great and glorious as is this wondrous human heart for good if it but develop its powers in this direction, so powerful it seems for evil if it develop itself to this end.

The meanest human soul, if indeed there be any difference, is an instrument capable of being attuned to harmonies so grand, that in our highest moments of power, we cannot even imagine the limits of its attainments. All around us every where are the means for this development. "Every leaf in the immeasurable forest, every drop of the world of waters, contains its myriads of wondrous

and harmonious life," all of which may be made to contribute to our knowledge and worship, as they are said to have done to that of the Magian brotherhood. It is to this end that we would ask all our human brothers and sisters to go forth with us into our common heritage, the kingdom of nature. Go forth into the solemn forest, and every where, through all its sounding aisles, we shall hear the whisperings of the voice divine, and witness the workings of our Father's hand. Do we desire food for scientific study and careful investigation, let us examine the development of the little cellule which contains in its almost inconceivably small body the power to produce the mighty oak. Do we wish to commune with Him who is the author of our being, here are his first temples, before whose sublime architecture the noblest human structure becomes feeble, and dwindles into insignificance, when compared with the extent of the forest arches and columns, stretching arch beyond arch and column beyond column, until lost in the gray and shadowy distance. And then here, too, is the music of the woods:—

"The phantom fingers of the Breeze
Play upon the slumbrous trees
Their wondrous, untaught minstrelsy;
Making every leaf a key,
Every string a flat or sharp,
Every sycamore a harp."

A gifted friend, long since passed away, thought he could distinguish every species of bush and tree by its peculiar music when played upon by the passing breeze. There can be no doubt that the slightest change in form of leaf or branch must give back a different tone to the touch of the airy musician, and that it would require only an ear nice enough, to distinguish one from the other. The music of the pine groves is familiar to every one. The poet Coleridge calls it "soul-like music." The great and the good of every land lend us the influence of their example in this communing with the woods. Our own poet, Longfellow, to whom the world pays homage, thus speaks of his communings with the trees in their own

"green land of dreams,
The holy land of song."—

“The green trees whispered low and mild;
It was a sound of joy!
They were my playmates when a child,
And rocked me in their arms so wild;
Still they looked at me and smiled
As if I were a boy;
And ever whispered mild and low,
‘Come, be a child once more!’
And waved their long arms to and fro,
And beckoned solemnly and slow.
O, I could not choose but go
Into the woodlands hoar;
Into the blithe and breathing air;
Into the solemn wood,
Solemn and silent every where!
Nature with folded hands seemed there,
Kneeling at her evening prayer;
Like one in prayer I stood.”

There is interesting subject for study in the arrangement of the branches of trees. To carry out the design of nature, which every where strives to produce the greatest variety of form in the arrangement of lines and angles, it is necessary that the attachment of the branches of trees should be of such a character as to insure them against being torn from the parent stem by the ordinary forces to which they are exposed. Thus rectangular-branching and fruit-bearing trees have their branches much more securely united to the trunk than those whose angles are more acute, or that do not yield fruit. Again, the branches of evergreens, which are liable to be loaded with snow and ice during our winters, come directly out of the body of the tree, so as to present longitudinal fibres only to the action of the forces which tend to break them. The fibres, which, by their complex arrangement, make what is called branch-wood, which is so much prized in the manufacture of furniture, are mainly intended by nature to prevent the branches from splitting from the trunk.

It may not be inappropriate in this place to trace the progress of the development of vegetable structure; since all vegetable forms, from the Baobab of Senegal, with its hoary age of sixty centuries, and the giant Redwood of California, scarcely less venerable, which has looked down from its “far height” upon the storms of ages, to the fungus of a few hours, — all owe their origin to the

same law, the principle of cell formation. Starting, then, with the idea that all vegetable forms, from the mushroom to the tree, are but a heaping up as it were of little cells, like a pile of soap bubbles, or like the forms wrought in embroidery, which, when examined minutely, are found to consist of a series of similar stitches, which, when combined, produce such various results, we shall be prepared to examine to some extent into the growth of plants; that is, into cell-life, which, according to Professor Schleiden, is "almost the only really scientific part of botany."

The basis, then, of the structure of all the multiform developments of vegetable life, is a little vesicle composed of a membrane, like, so to speak, the skin of water which is stretched around a portion of air, and is called a bubble. This cell, which, it must be recollected, is so small as to require a microscope in order to examine it, is usually transparent and colorless. Within the outer membrane, which is somewhat firm in structure, is found a soft, yellowish substance lining the first, and thus constituting one of the coats of the cell. The external or proper cell-wall is composed of carbon, hydrogen, and oxygen; the internal lining membrane has, in addition to these, nitrogen. Out of this internal lining, or primordial utricle, as it is called, spring the new cells, which become crowded together in the process of growth, and constitute the cellular tissue which forms the whole structure of the plant. We may regard the cell as a sort of independent existence, living by its own inherent power. It draws its nutriment from sources in contact with it, and, by chemical processes which are continually going on within it, changes this into its own proper tissue, thus producing growth, and also into substances, some of which are stored up for future uses, and others expelled as unsuited for its special purposes; but still, in accordance with the universal law which makes every thing useful, these excretions have their place in the economy of nature. Thus the life of the cell, and also of the whole plant, since it is but an accumulation of cells, consists in this constant change of absorption and nutrition, the formation and decomposition of substances. In the growth of plants the cells undergo changes in form as they are subjected to the laws of growth; that is, some become changed by simple enlargement, others are elongated, flattened, or become star-like in shape; some are spindle-shaped, others are stretched out into the form of long, thin filaments. Cells are, however, subject

to other changes than those of mere form. The cell-wall is usually thickened by a deposit between the two walls. This deposit takes place often irregularly, varying in quantity and arrangement; and if we add to this that lime, silex, &c., are frequently deposited in the cell-walls, we shall understand what produces the almost countless number of differences which exists in the texture of different plants.

The multiplication of cells, which constitutes usually the growth of plants, takes place in the following manner. The nutrient matter within the parent cell forms secondary cells, which increase in size while the original or mother cell dissolves and disappears. This process goes on so rapidly in some cases that it is said that in a certain species of mushroom twenty thousand new cells are formed every minute. The different development of cells, as we have said, produces the different tissues of vegetables. Thus the production of what are called bast cells in the bark of many plants gives us substances of which cordage and various kinds of cloth are made. Such are hemp, flax, New Zealand flax, &c. Another development of cells produces cork, which is the bark of a species of oak; and still another, wood itself. The colors of plants (with the exception of green, which is found to depend upon colored granules which adhere to the inside of the wall of the cell) depend upon the colored fluids which are found in the cells.

Albumen, gum, sugar, citric and malic acids, &c., are found in solution in the cells; the various vegetable oils are also found there. Another important product of vegetables, starch, is found packed away in cells; and in wheat and rye the starch cells occupy the centre of the grain, while the external cells are filled with gluten. This substance, gluten, is much more nutritious than starch. Hence bread which is made of carefully bolted flour is not as good as that in which what is generally supposed to be a poorer article is used. We have thus glanced at some of the facts which the science of botany reveals to the student. If we have failed to make ourselves clear to our readers, the fault is ours; it does not, we are sure, exist in the subject itself, which, as it is now taught, may be understood by every one, and should, we are fully convinced, be a leading study in all our schools. The objects of our investigation are every where about us. They enter into every department of life; and shall we be content to be entirely ignorant of that which it so much concerns us to know?

Charter Oak Hartford Conn. from nature by A.W. Spier M.S. 1855.

PLATE VI.

THE CHARTER OAK, HARTFORD, CONNECTICUT.

THIS venerable and historic tree has at last, after the lapse of nearly ten centuries, yielded to the storm winds, and bowed its head low in the dust. Could it but answer our questionings, it would tell us tales of the buried past, long ages before the pale-faces commenced that havoc upon the forest, which, in the prophetic language of Bryant, may cause them to vanish hence, "as the red man has done, leaving perhaps in a short time scarcely a trace to tell of their occupancy."

This prophecy, which the poet puts in the mouth of the red man, is so in accordance with what we are constantly witnessing, and shows, withal, such scientific knowledge of the subject, that we quote it entire.

"But I behold a fearful sign,
To which the white men's eyes are blind;
Their race may vanish hence like mine,
And leave no trace behind,
Save ruins o'er the regions spread,
And the white stones above the dead.

"Before these fields were shorn and tilled,
Full to the brim our rivers flowed;
The melody of waters filled
The fresh and boundless wood;
And torrents dashed, and rivulets played,
And fountains spouted in the shade.

"Those grateful sounds are heard no more;
The springs are silent in the sun;
The rivers, by the blackened shore,
With lessening current run;
The realms our tribes are crushed to get
May be a barren desert yet."

Our drawing of the Charter Oak was taken from the front of the house of the Hon. J. W. Stuart, who was the owner of the glorious old tree, and who cherished it with that love and pride which its venerable character and historic renown fully warranted. The author has to make acknowledgments to Mr. Stuart and his interesting family, for their kind attentions during the time he was engaged in drawing its portrait. Long may they live to enjoy their beautiful seat, and to give their protection to the other noble sons of the forest which stand near the spot where the giant fell. The Charter Oak was about seventy feet high, and the same in spread of branches. The trunk was about sixteen feet in diameter at the ground; some thirty persons have been at one time within its cavity. When the author saw it, it appeared as if it might endure for many years; but alas, it has now fallen. The historical facts connected with this tree are known to all our people, but it will not be inappropriate to repeat the leading incidents here.

Rev. Thomas Hooker led the first settlers into Connecticut in the years 1635-6. They made a settlement at Windsor, Hartford, and Weathersfield. From the very commencement, the people chose their own rulers. On the 24th of January, 1639, the fathers of the State met at Hartford and framed a written constitution. This is said to be the first example in history of a people establishing, through representatives chosen by themselves, a constitution, defining and limiting the powers of government.

April 20, 1662, Charles II. granted a charter to the colony, confirming the rights set forth in the constitution they themselves had previously formed. In the language of Cotton Mather, this was "the freest charter under the cope of heaven."

James II., who succeeded Charles upon his death, in 1685, soon after his accession to the throne, ordered Sir Edmond Andross to demand it, or obtain it by force. The following extract from Judge Sewall's diary describes the manner in which Sir Edmond proceeded to obey the order.

"Wednesday, October 26, 1687. His Excellency, with sundry of y^e Council, Justices, and other gentlemen, four blew coats, two trumpeters, Sam Bligh, fifteen or twenty red coats, with small guns and short lances in y^e tops of y^m, set out

for Woodcocks, in order to go to Connecticut to assume y^e government of y^t place."

On his arrival at Hartford, he sent a message to the General Court demanding the surrender of the Charter. The Assembly met on the 31st of October, 1687, and deliberated until evening upon this message, without coming to the conclusion to obey the royal order. The divine right of kings had already begun to be disputed by these hardy sons of the Pilgrims. In the evening, Sir Edmond, becoming impatient of the delay, came in person to demand it, or to seize it, if the Assembly should refuse to yield it up. Suddenly the lights were extinguished in the very face of His Excellency, and when they were re-lighted the precious document was nowhere to be found. It had been conveyed away and lodged in the old oak, which had for ages stood the guardian of the land, and now was to become the keeper of an instrument which secured the liberties of a people. This bold deed was done by Captain Joseph Wadsworth, then a young man, who, in spite of the presence of the governor and his armed soldiers, bore away the precious Charter in triumph, and consigned it to the keeping of the "brave old oak." For some time after this, Sir Edmond administered the government of the colony, and sadly oppressed the people, loading them with heavy taxes, questioning the titles of their estates, and causing them much trouble. Upon the accession of William and Mary to the throne, he was seized and imprisoned by the people of Boston, and the old Charter again became the law of Connecticut. The government was administered under this instrument until 1818, when the present State Constitution was adopted. This venerable document is preserved in a frame made of the wood of the Charter Oak itself. This was the gift, we believe, of the patriotic gentleman on whose estate the tree stood. One of the children of the old tree has been planted on the spot where the parent grew. May it live a thousand years.

PLATE VII.

THE BOSTON ELM.

THE Great Elm on Boston Common, which, according to Dr. Warren, is over two hundred years old, is 72 1-2 feet in height; circumference, one foot above the ground, 22 1-2 feet; greatest span of branches, 101 feet. The author is indebted to the late lamented president of the Boston Society of Natural History, J. C. Warren, M. D., for most of the facts in his description of the great tree, as well as other kindly encouragement in connection with the publication of his book. This eminent surgeon and naturalist had such a love for the old elm as to lead him to write a book upon it. A copy of this book now lies before us while we are writing, and we value it much, not only as a token of regard from its distinguished author, but as teaching a lesson to all, when one whose name is known to science throughout the world could deem a single tree of so much consequence as to induce him to write its biography. Dr. Warren tells us that we owe a debt of gratitude to General Gage, the commander of the British army when encamped in Boston, and suffering under the inclemency of winter, for the preservation of this and other fine trees. More than a century ago, as is shown in a picture by Miss Hannah G. Otis, aunt of Hon. H. G. Otis, there was a cavity in the trunk, with a hole on the side sufficiently large for a boy of nine years of age to enter. This orifice was known to Dr. Warren, and according to him was made to heal up by covering the edges with a mixture of mud, &c., and protecting the whole by fastening a piece of canvas over it. Four of the largest limbs have also been split from the tree during a great storm, their ends resting upon the ground. These were raised by Mr. James A. Sutton, master block maker, assisted by others, and bolted in their places; and

Roots on Elm-Clawm at ground 44 ft. at 1 ft from ground 224 ft.
at 4 ft 17 ft. from 101 ft. to right 714 ft. from road. by 224 ft. from M. D. 1850.

such was the vigor of the old tree that they have become apparently as firmly united as at first. I have mentioned these facts somewhat carefully, in order that those who have fine trees which have been injured may not despair of their restoration. When Dr. Warren first knew the Great Elm, seventy years since, it bore, he says, "strong marks of decrepitude and approaching dissolution. The interior of the trunk was rotten, and much of it had disappeared. The aperture was from two to three feet in length, and about a foot in breadth."

Could the old tree but find a voice, how many tales of human passion, of joy and sorrow, might it not reveal to us! It has listened to the love vows of the children of the forest, and the death song of the warrior. It stood calmly by when old Matoonas fell by the hands of his own people. They brought him here "bound with cords," and his betrayer was allowed by the pale-faces to be his murderer. Here, too, Woodbridge and Phillips fought a duel for the favor of a young lady whose name is buried in the past, which caused the death of both of them, — one being fatally wounded in the combat, and the other dying soon after from remorse. The old tree has also, no doubt, been made the confidant of many a deed of crime which it never told to the police of the good city. Here, too, have lovers' vows been plighted, and sad farewells spoken,

"such as press
The life from out young hearts."

As to us, while drawing the picture of the patriarch, the human crowd, which hurried by, seemed like the waters of a mighty river which rush on their course to return no more forever, so have the tides of life for centuries flowed past it, to be swallowed up and forgotten in the ocean of eternity.

The Mayor of Boston, in 1854, Hon. J. V. C. Smith, erected a permanent iron fence around the ancient tree to aid in its preservation. We are also indebted to the same gentleman for the introduction of the beautiful gray squirrels, which are seen sporting among the branches of the trees on the Common, with all the freedom and liveliness displayed in their native haunts. Dr. Smith deserves the thanks of every lover of nature for this. All the young people, at least, will never cease to be grateful to him for this evidence of his kindly

interest in their welfare. "It has done much," says a gifted lady, "to benefit the children by teaching them to take an interest in the lower animals, and to treat them with kindness, thus writing the law of kindness upon their own hearts."

The Great Elm belongs to the species *Ulmus Americana* — White Elm. This is the species so common in all parts of New England. For grace and beauty, and variety of form, so that each tree might have its own individual name, it excels all other species. The prevailing types, however, are, as noticed by Emerson, three in number. The first is formed by a number of branches starting from a common centre, twenty or thirty feet from the ground, diverging very gradually as they ascend until they reach the height of sixty or seventy feet; then curving rapidly outward, forming a flat or rounded top, with a border formed of the ends of the branches pointing downwards, or in some cases bending inwards towards the centre. Sometimes the branches which compose the body of the vase, as well as the trunk, are clothed with foliage springing from innumerable small sprays. This gives the tree the appearance of having a wild vine clinging to it, and in these cases nothing can exceed its beauty. The irregular arrangement of bunches of these small twigs is common to many individuals of this species of elm; and although in all cases they add very much to the variety and beauty of the tree, they are usually cut off by the professed "tree surgeons," and also by a great many others who must, like Mr. Samuel Weller's "Deputy Sawbones," practise upon something. The author once knew a "Deputy Sawbones" of this description who had, in addition to the tree-improving mania, an irresistible desire to exercise his art upon cats and dogs, asserting that it was necessary to the appearance of these animals that they should have their ears and tails cut off, "especially their tails." He contended that nature had given them these appendages, as it had the superfluous branches to trees, in order to exercise and improve our taste in trimming them. There is a beautiful avenue of elms near the residence of the author which has lately undergone this improving process. The desire seems to be to destroy their graceful, pendulous character, and to make them as stiff and ugly as possible.

Another common form of the elm is the plumose. In these cases the tree rises in a single trunk to a great height before giving off its branches, as in the

case of the Pittsfield Elm, which is one hundred and fourteen feet to the first branch ; or it divides lower down into two or three branches, which rise to sixty feet or more, and then spread into a light, graceful plume. In other instances, the elm seems to try to resemble the oak in its general form, and in the rectangular arrangement of some of its principal branches, as is the case of the Great Elm on Boston Common. There is a tree in Boston, and one in Woburn, every branch of which is composed of a series of short curves, giving them, when stripped of their foliage, a very curious appearance. Again, I have seen the elm so closely resemble the hickory, that at a little distance it would be mistaken for that tree even by a careful observer.

We hope to give a plate comparing a number of these beautiful forms of trees, thus giving a much clearer idea of them than can be done by any written description. The description of the different species of elms, their uses &c., we must reserve for a future page.

PLATE VIII.

THE WINCHESTER PINE, ON THE ESTATE OF THE HON. F. O. PRINCE,
WINCHESTER, MASS.

WE owe the preservation of this fine tree to the good taste of Mr. Prince. There is also much credit due to this gentleman for the fostering care he has bestowed upon the forest trees around his mansion, situated upon that beautiful lake, which might well be called Silver Lake, so pure and bright are its waters. The other dwellers upon the marge of the lake have also not only spared the forest trees, but have done much to add to the natural beauties of the scene. Among these, we may mention Hon. John A. Bolles, C. P. Curtis, Esq., and Mr. Bellows, while we are indebted to Messrs. S. & H. Cutter and O. R. Clark for the beautiful Willow Walk which skirts the head of the lake. Were we to mention all the tree planters in Winchester, we should be obliged to record the names of a large portion of its citizens. The very name of the town recalls the memory of one who gave the means to preserve and hallow a forest cemetery — as lovely a spot as one could desire to lie down to rest in when the battle of life shall be ended. A few months since, the commander-in-chief of the British army, with many of England's chief nobility, with the inhabitants of a great city, joined in a holiday to commemorate the gift of a piece of land to the people, not many times larger, and certainly not more beautiful, than this we have here referred to. And surely we may be allowed the privilege of showing, in some degree, our appreciation of a similar act. Among those here who have done much in the cultivation of fruit is Charles McIntire, Esq., whose labors, with others, we shall have occasion to notice hereafter.

The Winchester Pine is the White Pine — *Pinus strobus* of the botanist. The

Pl 8

*Mossy (moss) Pine on the estate of the Hon. J. O. Prince, Winchester, Mass.
Height 60 ft. Spans 50 ft. Circum 9 ft.*

white pine is perhaps the most beautiful evergreen tree of the world. When allowed to grow singly, as is the case with the specimen we have drawn, it may perhaps be open to the objection which is sometimes urged against some other species of evergreens; that is, that it presents too regular an appearance. But even in single individuals, unlike the spruce or fir, the pine is very liable to a considerable variety of form. The slightest accident is sufficient to produce this modification, and in many cases no tree can be more picturesque, while its dense, green foliage, light and feathery almost as the plume of the ostrich, its inviting shade and the soft brown carpet it spreads beneath, with its "soul-like music," inspired by the gentlest breeze, render it worthy of the love of all noble souls. The white pine, too, with its congeners, is the "health-giving tree, the favorite of Hygeia." But this we shall speak of hereafter. It is one of our most rapid growing trees, and for this reason, as well as the protection it affords against the winds, it is peculiarly well adapted for growing in belts to that end, as has been suggested on a former page.

The New England Farmer of December 5, 1857, has an editorial article upon the influence of trees in modifying climate, which we wish could be read by every one in the country. We have referred to this subject before on a former page, showing that the unobstructed blowing of the wind causes the rapid abstraction of caloric in those cases where it is colder than the objects with which it comes in contact, and the rapid imparting of heat when the reverse is true — that is, when the wind is warmer than those objects. From this fact, and that the same cause — the unobstructed blowing of the wind — produces the rapid evaporation of moisture, we stated that droughts and the drying up of rivers, lakes, &c., and freshets, also, are due to the destruction of our forests. The extreme and rapid changes of weather, which of late years have been so frequent, and which exert so pernicious an effect upon vegetation, are probably due in some degree to the same cause. Freshets are produced by the rapid concentration of water in the streams. In this country, this result is brought about, in most cases, by the sudden thawing of snow and ice, sometimes assisted by rain, but always mainly dependent upon the blowing of warm winds. In the woods, as every one is aware, the snow remains much longer than in the open country; and as, of

course, it lies level there, the ground beneath is frozen only to a slight depth. When a thaw commences, the porous nature of the soil, and the little hollows, which are between the growing trees and beneath the fallen ones, retain the water until the earth is thawed; when it slowly trickles through its pores to the small streams and ponds which supply the rivers, which by this process are kept in an equal state of flow. But in an open country, the surface of the ground is more regular and the soil more compact, while in winter it is frozen to a much greater depth; and as the snow is usually blown into heaps, the frost penetrates irregularly, so that in the bare spots a long time is required before it can be thawed. Under these circumstances, when the weather becomes warm or rain falls, the water must at once concentrate in the ponds and small streams. These, in their turn, pour out their overflowing contents, and thus cause the terrible freshets which every year devastate portions of our country. In addition to all this, the unobstructed blowing of a warm wind will dissolve the snow more than ten times as fast as when, at the same temperature, it is protected from the wind. To determine this point, during the winter of 1856-7, I tried, among others, the following experiments:—

First, a body of snow, one foot in depth and sixteen feet square, was protected from the wind by a tight board fence about five feet high, while another body of snow, much more sheltered from the sun than the first, six feet in depth and about sixteen feet square, was fully exposed to the wind. When the thaw came on, which lasted about a fortnight, the larger body of snow was entirely dissolved in less than a week, while the smaller body was not wholly gone at the end of the second week.

Experiment second. Equal quantities of snow were placed in vessels of the same kind and capacity, the temperature of the air being seventy degrees. In the one case, a constant current of air was kept passing over the open vessel, while the other was protected by a cover. The snow in the first was dissolved in sixteen minutes, while the latter had a small unthawed portion remaining at the end of eighty-five minutes; that is, it melted five and one third times as fast in the first case, where a feeble current of air was kept up, as in the other, in which the snow was covered from the air.

Experiment third. The result of a series of experiments with the thermometer is as one to seven, nearly; that is, the temperature of the room being above eighty degrees, the mercury rose from thirty-two to eighty degrees in one seventh of the time when an artificial current of air was kept up by means of a fan, which of course could be of but little force, as when the instrument, placed in the same position as in the first case, was allowed to remain undisturbed. As a further illustration of the rapidity with which thawing is produced by the unobstructed blowing of a warm wind, a gentleman informs us he has found, by actual experiment, that ice will waste more in one or two hours under this condition than during a whole day of sunshine when it is entirely sheltered from the wind. From this we may perceive how freshets may be produced by the action of the wind, and also the only means we have in our power to guard against their production. And it is satisfactory to remember that the Creator has placed it within the ability of every one to aid in this, as the humblest individual can plant a tree.

The causes which produce freshets, as also the freshets themselves, produce droughts. The unobstructed blowing of the wind, especially if it be warm and dry, is, as is well known, the most rapid possible method of producing evaporation, and is, perhaps, the main cause of drought. During the blowing of the *simoon* of Africa, evaporation goes on so fast at the surface of the body as to dry the skin, and cause it to crack. The throat becomes inflamed, the respiration is accelerated, and extreme thirst and fever are the results. The water contained in the skins, which are the water casks of travellers, evaporates, and leaves them a prey to the most terrible sufferings. A traveller at Palermo speaks of his first experience of the *sirocco* — the hot wind of the Mediterranean: "The first blast of it on my face felt like the burning steam from the mouth of an oven. On another side of the house, not exposed to the wind, I found the heat much more supportable. Such are the drying effects of this wind, that the leaves of the trees become so parched that they can be rubbed into dust. Even household furniture cracks, and in many instances flies to pieces." From the above statement it will be seen how the mere barrier of a building produced a sensible modification of the wind.

Heat, without motion of the air, would never carry away the least particle of moisture from a given locality. The only *waste* of moisture, so to speak, in such a case, would be that which would be required by plants and animals, and also in the chemical processes of nature. A single rain, then, might last a country a century. In such a country, however, supplied at first with water, no rain, we should think, would be possible. As in the "Ward Cases," the air would be in a constant state of saturation, and, of course, only certain kinds of plants and animals could exist. The atmosphere, at a temperature of 32° , is saturated with $\frac{1}{160}$ of its weight of moisture; at 59° , with $\frac{1}{80}$; at 86° , with $\frac{1}{40}$ — that is, it doubles the quantity at every 27° of increase of temperature. Of course, in a country where there was no lateral motion of the air, moisture would rise in the form of vapor, and fall as dew; and this process would go on forever, in accordance with the rise and fall of temperature.

There is a good illustration of the effects of the destruction and reproduction of forests in drying up and restoring streams and ponds, in my immediate neighborhood. Within about one half of a mile of my residence there is a pond upon which mills have been standing for a long time, dating back, I believe, to the first settlement of the town. These have been kept in constant operation until within some twenty or thirty years, when the supply of water began to fail. The pond owes its existence to a stream which has its source in the hills which stretch some miles to the south. Within the time mentioned, these hills, which were clothed with a dense forest, have been almost entirely stripped of trees; and, to the "*wonder*" and loss of the mill owners, the water in the pond has failed, except in the season of freshets; and, what "was never heard of before," the stream itself has been entirely dry. Within the last ten years a new growth of wood has sprung up on most of the land formerly occupied by the old forest; and now the water runs through the year, notwithstanding the great droughts of the last few years, going back from 1856.

Instances of the same kind, and on a much more extended scale, might be multiplied from all parts of the world. William C. Bryant, in his letters from Spain, adds to the testimony of other travellers, that many of the rivers of the country are dried up or lessened in volume from the destruction of the forests,

while the soil is "literally being blown away," from the same cause. Mr. Bryant has also furnished me with an interesting fact in our own country which strongly illustrates my statements, and shows that every one is interested in this investigation.

"It is a common observation," says this correspondent, "that our summers are becoming dryer, and our streams smaller. Take the Cuyahoga as an illustration. Fifty years ago large barges loaded with goods went up and down that river, and one of the vessels engaged in the battle of Lake Erie, in which the gallant Perry was victorious, was built at Old Portage, six miles north of Albion, and floated down the lake. Now, in an ordinary stage of the water, a canoe or skiff can hardly pass down the stream.

"Many a boat of fifty tons burden has been built and loaded on the Tuscarawas, at New Portage, and sailed to New Orleans without breaking bulk. Now the river hardly affords a supply of water at New Portage for the canal. The same may be said of other streams — they are drying up. And from the same cause — the destruction of our forests — our summers are growing dryer, and our winters colder." Or perhaps it should be stated, the seasons are becoming subject to greater extremes of heat and cold — of dryness and moisture. Humbolt says, "The clearing of a country of trees has the effect of raising the mean annual temperature; but at the same time greater extremes of heat and cold are introduced." These very extremes are the great sources of mischief to vegetation, and also to the health of man and animals. I will add upon this point the testimony of the *American Agriculturist*.

"Forest trees should be preserved for their beneficial influence upon the climate. It is universally conceded that the winters of the northern states are colder" (subject to greater extremes) "than they were thirty or forty years ago, and that the weather is more windy, fluctuating, and disagreeable. We are also subject to severer droughts. Peaches once grew in abundance throughout Central New York; now it is almost impossible to raise them. The wheat and some other crops are more uncertain. These facts are to be ascribed not so much to the deterioration of the soil as to the destruction of our forests. Formerly our farms had belts of woodland, which broke the force of the winter and

spring winds; our hill-tops were covered with battalions of trees, which defended the slopes and the vales. The snow was not blown off from the tender grain crops in winter, nor were the fields laid bare to the blighting winds of spring. One of the greatest drawbacks to farm life on the western prairies is the absence of forest trees. Every mail brings accounts of sufferings and death occasioned by the want of sheltering forests." The prairies of the West, like the boundless wastes of ocean, being destitute of opposing objects to break the force of the wind, are subject, like it, to fearful gales and tornadoes which spread ruin and death in their paths.

Trees and bushes prevent the drifting of snow and sand; and certain species conduce to the covering of barren, sandy plains with grass. For this purpose the locust — (*Pseudacacia*) one of the "nurse trees of the world," as Evelyn calls them — seems peculiarly adapted. By the planting of this tree the author has seen rolling sand hills covered with a soft green turf. The method of planting is to begin upon the most exposed side of the sand barren, and cover what is to be planted at the time with brush, or any kind of coarse litter. This prevents the sand from blowing at the commencement; and, as it decays, forms a coating of manure for the young trees. It may be necessary, in some situations, to follow Mr. Tudor's plan in building slight open fences of laths on the windward side. If the locust seed is to be planted, scalding water should be poured upon it, and it should be allowed to stand in a warm place for three or four days. It should then be sown in the interstices of the brush, and covered with sand or soil to the depth of one or two inches. Of thousands which we have planted in this way, not one has failed. Almost every one is familiar with instances where many acres of fertile land have been lost to cultivation by drifting sands. Mr. Bryant mentions a large farm, which he visited, which had thus been ruined. The very fences had sunk, as it were, in a sea of sand. This farm had been cultivated till within a few years of Mr. Bryant's visit, when a thin barrier of trees, which had stood between it and the sea shore, had been removed. This opened the sluice-way through which the wind and the sand had rushed upon their prey, burying the fertile acres as completely as did the waters of the Red Sea the hosts of the Egyptian king. Many of the buried

cities of antiquity, mementos of the mighty races which have passed away, might have been preserved to us from the all-conquering sand by "ranks of trees."

Trees prevent the drifting of snow. This is important to all cultivators of the soil, as, if the snow lies level, the ground is prevented from exposure to sudden changes of temperature, which are the principal sources of mischief to vegetation during winter and spring. There is also, as we have seen, much less liability to freshets, as the ground is in a better condition to receive and retain the water produced by melting snows and ice. This fact is also important in regard to keeping in order common roads in winter, and also of special importance to railroads, as a very large item of expense is occasioned in clearing the track in winter of snow and ice, to say nothing of the expense of additional fuel, the wear and tear of engines and cars, etc. In order to obtain some facts upon this important point, the author, during the past year, 1857, sent a circular to the officers of some one hundred of our railroads, and received in substance the following reply:—

Answer to question 1. We have never been troubled with snow drifts where the road is protected by trees.

2. Two rows of evergreens, planted in the manner you describe, (that is, the trees three feet apart, the rows the same distance, so that those in one row would be opposite the blank spaces in the other,) would ordinarily afford sufficient protection.

3. Three or four rows of pines, of a few feet in height, if thrifty, or an equivalent amount of underbrush, would protect the roads.

4. Level snows, however deep, offer but little obstruction.

5. If the road passes through the forest, and the wind, during a storm, is in a line with the road, still the snow lies level, and offers but little if any obstruction.

6. More fuel is consumed in the open country than in the woods.

7. An engine will burn more fuel when there is a high wind, though it be a "fair wind;" but when blowing in an opposite direction to the passing train, the consumption of fuel will be increased twenty or twenty-five per cent., if the train is run at its usual speed.

8. From ten to twenty-five per cent. more of fuel is used on windy days than on calm ones.

9. This is the case when the wind is blowing in the direction of the passing train, and when, as might be supposed, the wind would aid the progress of the cars.

10. Less fuel is used upon cloudy days than upon fair — both being calm ; less, also, upon rainy or snowy days, under the same condition in regard to the wind.

11. The lowest estimated cost of fence is two dollars and seventy-five cents a rod — eight feet high.

It will be perceived by this that trees or bushes form not only a barrier against drifting snows, but also, by affording a protection against the wind, cause a material saving in fuel, by preventing the abstraction of caloric. Rows of trees, which will form efficient barriers to break the wind and prevent the drifting of snows upon our railroads, might be planted at a small part of the expense of the ordinary fences for this purpose, while they would continue to increase in value from year to year as the others were passing into decay. Such live fences would do much to benefit these roads, in many ways which will suggest themselves to every one, while they would materially aid in the larger idea of ameliorating the climate. This subject, which we have not room to pursue further, is one of great importance. If the payment or non-payment of dividends upon railroads, as says an authority upon the subject, often depends upon the amount of fuel consumed, it would seem to demand the attention of the thousands concerned in these enterprises. While who does not perceive that the additional comfort which the protection of trees would afford to travellers would add much to the attractions of this method of journeying ! The Scotch fir or pine seems to us, so far as we have examined the matter, the best adapted for the purpose. They can be purchased by the thousand for one or two cents apiece ; and such is the ease of transplanting them, that this process may be done for perhaps a less sum, (such, at least, is our experience in regard to them,) while they will thrive in almost any situation, and upon any soil, however poor.

Cornell University Library

PLATE IX.

BLACK WALNUT, AT FERN SIDE, NEAR THE RESIDENCE OF W. C.
BRYANT, ESQ., ROSLYN, LONG ISLAND.

THIS tree is very near Mr. Bryant's beautiful seat at Roslyn, Long Island. It would be a hopeless task for us to attempt a description of the wonderfully beautiful scenery of this and other parts of the island which we visited. An artist might spend a life delighted here without a wish to roam. The old tree stands, as it were, a guardian over the most lovely little glen in the world, where the ancient cottage with its clustering vine, and garden gay with flowers, seem as if sleeping beneath its sheltering arms, or lulled to rest by the music of the brook whose bright waters flow singing at its base. The kind family who dwell in the ancient mansion we hope may long be spared to enjoy the beautiful nature so lavishly spread all about them. Never, in all our wanderings, have we had more genuine sympathy and interest in our undertaking than from them and others whom we met there. Mr. Bryant, with a poet's instincts, has chosen this beautiful spot for his life's resting place. Will the future furnish scenes more fair? The thought of death in such a place seems doubly hard, although we know that He who created such Edens can give us mansions beyond the dark river of which we cannot even conceive in this imperfect state.

There are some historical facts connected with the ancient mansion which we hope to give in the future.

The Black Walnut — *Juglans nigra* — is a native of this country. Large forests of it are found at the West. It is valuable for its fruit, which by some is preferred to that of the shagbark hickory. The kernel contains an abundance of oil, which, according to Emerson, "is superior to most others for use in

cookery and for lamps." The wood is much used for the manufacture of furniture, and for posts, for which it is said to be very durable. On account of its certain and rapid growth from the seed, its beauty as a shade tree, and its value in other respects, we would recommend its cultivation. The fresh nuts planted in the fall will come up in the following spring. It is best to plant them on the top of the soil, covering them with two or three inches of leaves or rubbish. We have used spent tan bark for this purpose.

The Butternut or Oilnut tree — *Juglans cinerea* — belongs to this genus. This is a beautiful, rapid-growing tree, and well worthy of cultivation. When planted upon moderately rich soil, composed mostly of vegetable mould, it soon makes quite a large tree. We would for this reason recommend it to those who wish to have the benefit of shade trees as soon as possible after planting. Mr. Tudor has one of this species at Nahant which in five years from the nut has made a tree ten feet in height, and sixteen and a half in spread of branches. This tree has been managed in the same manner as his other trees. A description of this method we have given in another part of this work. The fruit of the butternut, when carefully dried, says Emerson, is sweet and very pleasant. Several kinds of dyes are made of the bark and the nut shells, such as purple, brown, and black. The nuts, when half grown, make excellent pickles. The wood is used for gun stocks, posts and rails for fences, wooden bowls, drawer fronts, panels for coaches and carriages, &c. It is very valuable for these and like purposes, as it is light, tough, and durable.

Cornell
University
Libraries

Balm of Gilead one of some hundreds of large trees transplanted within the last 3 years at Nahant Ms by J. Tudor Cox
with a portrait of Mr. Sula Height of tree 60 ft diam 15 inches age 30 years R. W. Piper fec 1854.

PLATE X.

BALM OF GILEAD, (*POPULUS CANDICANS*.)

THIS is a very hardy tree, and was chosen by Mr. Tudor for his experiments for this reason as well as for its rapid growth, which, with other qualities, render it peculiarly valuable as a "nurse tree." Evelyn calls the poplars "hospitable trees, for any thing thrives under their shade." This fact is well shown at Nahant by the vegetation which flourishes near them, and the improvement of the soil in their neighborhood. The willow is also of this class. The poplars, says Emerson, "grow readily amid the dust and smoke of close and crowded towns," and they may, therefore, be considered valuable for planting in these situations. The ease with which they may be transplanted, together with their rapid growth, strongly recommend them for this purpose. As the bad gases which poison the air in such crowded localities conduce to the growth of vegetation, they must be of much value to this end. In this connection it may be well to give Mr. Tudor's method of transplanting trees. His success has been so marked, and is so well known in the country, that we do not think we can confer a greater favor upon our readers. We have before noticed, to some extent, the results of his experiments.

He says, in answer to our inquiries, "I have tried various plans for transplanting all kinds of trees — large and small, forest and fruit trees; at all seasons — spring, summer, autumn, and winter. I give up all staking or tying of trees, at all seasons, and under all states of the soil, as being highly injurious. I substitute for this, ballasting with stone — varying in quantity from five or six hundred pounds to three or four tons. This stone has a very favorable effect on the tree by condensing the dews, preventing evaporation, and by keeping the

soil loose and friable. For a tree, however small, I dig a hole seven feet square, and, at the least, two feet and a half deep. When the tree is large, say fifty or sixty feet high, the hole should be fourteen feet square, and of course deeper, if the roots require it. In digging the hole, the top soil is thrown by itself, to be used in setting out the tree, while the gravel, etc., is carted away. A compost is then made, composed of rich soil, decayed forest leaves, peat, manure, etc., according to the requirements of the kind of tree to be planted. This is placed in readiness by the side of the hole. In case the ground is sloping, some of the poor soil is retained to make a half-moon dam of on the lower side of the tree, to retain the water.

“In digging up the tree I cut off as few roots as possible, and not any top the first year of planting. According to the size of the tree to be dug up, we break ground at some distance from the body, working under the roots towards it. If the tree is large, some slats are tied to the trunk, where the tackle and fall are to be attached — say at a point where the tree will be likely to balance when it is out of the ground. The tackle and fall are attached to a derrick, the derrick being secured by three guys fastened to the earth by iron pins. The tackle is to be drawn *taut* before the tree is wholly free from the ground. A wagon is brought up conveniently near the tree. In this wagon are two bundles of pressed hay, standing on end, upon which the tree is to lie. A yoke of oxen are hitched to the fall, and made to hoist the tree from its place, when it is swayed into position over the hay, with the roots towards the cattle. It is then lowered into its resting place, and fastened by ropes, and driven to where it is to be replanted. The derrick, guys, and tackle are transported at the same time, and the tree set in its new place by reversing the order of proceeding. Care should be taken not to plant the tree any deeper than it stood previous to moving. The soil should be well brought up under the roots; and it is a good plan, in all cases, to mix some of the soil with water, so as to form a thin mud, and turn it upon the roots. This may be mixed in a tub or pail. Trees which are difficult to make live after transplanting will in many cases have their lives insured by this process. It is well to mulch the tree previous to ballasting it with stone. This will pay in all cases, but is absolutely necessary to the

healthy growth of those trees which dislike to be moved. Leaves, or straw, or almost any waste vegetable substances, are good for mulching, and they also constitute food for the trees. But the best material I have found for this purpose, especially for fruit trees, is weeds, used before seeding, in July and August. The stone is removed from around the tree, the weeds put in place, and the stones returned to their former position. I pave around all my trees, and in many cases allow this pavement to remain for years. With some little care in placing it, it may be rendered quite ornamental. In lawns, where it is required to keep grass from growing close to trees, this paving process is an admirable one.

“The cost of moving trees of six or eight inches in diameter one mile, is not over ten dollars each. From one foot to eighteen inches, the cost will be from seventeen to twenty dollars. This includes all the expenses of transplanting.”

There are several native species of the poplar. The River Poplar — *P. lævigata* — is perhaps one of the finest. Emerson says of it, “The river poplar is a noble tree, rising often to the height of eighty feet or more, with a fine long open head. The river poplar deserves to be introduced into cultivation as an ornamental tree. It is much the tallest and most graceful of those which grow naturally in New England. It grows readily from cuttings, and by selecting these from the sterile tree the evil complained of in the cotton of the Balm of Gilead will be avoided. It has been extensively introduced into England and France, where it is valued for its beauty and its wood.” The wood of all the poplars is very durable if kept dry. Loudon quotes an old distich, said to be inscribed on a poplar plank, which he says is strictly correct: —

“Though heart of oak be e'er so stout,
Keep me dry and I'll see him out.”

The Necklace Poplar, another species, is said to be the most rapid growing tree known. Emerson mentions one at New Ashford, some sixty years of age in 1838, when he measured it; it was then twenty feet five inches in circumference at the smallest part between the ground and the branches. This tree, in the neighborhood of London, grows between thirty and forty feet in seven

years ; in Scotland it has grown to the height of seventy feet in sixteen years. Male trees should be selected for cultivation. The cuttings of this tree root freely. The necklace poplar gets its name from the aments resembling a necklace of beads. It has long been introduced into Europe, where it is cultivated to a considerable extent. It is called there the Virginian Poplar, and Swiss Poplar, the last name being derived from the fact that it has been extensively propagated in Switzerland. It is also called Black Italian Poplar in England, from its having been carried there from Italy.

There is another poplar found in Canada and the New England states. This is the true Balsam Poplar. It very much resembles the Balm of Gilead. It differs from this species in its leaves being smaller, with uniformly rounded bases. It has been pretty widely propagated in York county, Maine. Emerson found it growing naturally on the land of George Thompson, near the Kennebunk river. From here it has been carried into the neighboring towns.

The American Aspen, which is a favorite species with some, does not appear to do well in exposed, windy situations. At Nahant it suffers very much from the wind, and, judging from the specimens there, would by no means be considered a beautiful tree. There are, however, specimens in our neighborhood which are very fine. Some of the introduced species we hope to notice on a future page.

*Storm tree (red cedar) in Nahant Mass. seen from the ocean.

PLATE XI.

STORM TREE, (RED CEDAR,) NAHANT, MASSACHUSETTS.

THIS is one of the few trees which stood upon Nahant when Mr. Tudor began his tree-planting there. "Forty years since," said a gentleman to the author, "I visited Nahant, and do not recollect of seeing a single tree. It seemed to me the very picture of bleakness and desolation. The very idea of attempting to plant trees seemed the height of folly. I would almost as soon have made the attempt upon the sand washed by the waves as amongst those barren, desolate rocks. When I first heard the experiment had been tried, it seemed like an idle dream. Now I have come to see for myself, and the half has not been told me. Surely, if human energy and talent can do all this, what desert, however desolate, but may be made to bud and blossom as the rose? I would rather have done this than to have conquered a nation." And this was said by one who has made for himself a position to which many look up. The rocks in our picture tell the story of difficulties overcome, when we compare the appearance here with that where the Balm of Gilead stands. We have called this tree the Storm Tree from its appearing as if it were continually struggling in a gale of wind. Its branches all point to the south-west. The very bark has been worn from the north-east side of the tree by the north-east gales.

The Red Cedar — *Juniperus Virginiana* — of which there are many varieties, has a geographical range, it is said, superior to any tree known. "It is found," says Emerson, "in America, from the Saskatchewan, in Canada, latitude fifty-four degrees, as far as Georgia, Florida, Louisiana, the Bermudas, and Barbadoes Islands, around the Gulf of Mexico beyond St. Barnard's Bay, and through the western states to the Rocky Mountains. It abounds in Europe and Northern

Asia, as far as the Crimea and the Oural." The wood of the red cedar is used for posts, it being very durable. It is also used for pencils, the handles of paint brushes, and for various other purposes. As an ornamental tree, it is not in much demand. It might be made very useful for this purpose under certain circumstances, as it bears heading in to almost any extent; and may, by this process, be made so thick in foliage as almost to exclude the sunlight. For the purpose of live hedges it is well fitted, and it is to be regretted that it is not more extensively used in this way. A neighbor of ours, Jonathan Tidd, Esq., has a very promising hedge of this description. Emerson, quoting from the *New England Farmer*, says, "The cedar is peculiarly well fitted for the purpose of live hedges. It throws out boughs near the ground, pliant, and capable of being woven into any form. They gradually, however, become stiff. Clipping will make cedar hedges extremely thick. No animal will injure them by browsing. Manured and cultivated, they come rapidly to perfection. The plants are frequently found in great abundance without the trouble of raising them. As an evergreen, they are preferable to deciduous plants; and they live better than any young trees I have ever tried. They should be planted, with a sod taken up of sufficient size to prevent injury to the roots, between December and the middle of April, on each side of a fence, the plants and rows being each ten feet apart, and each plant in one row opposite the centre of the interval between two successive plants in the other row. They should be topped at a foot high, and not suffered to gain more than three or four inches yearly in height, such boughs excepted as can be worked into the fence at the ground. Of these, great use may be made in thickening the hedge by bending them to the ground, and covering them well with earth in the middle, leaving them growing to the stem. Thus they invariably take root and fill up gaps."

Evergreen trees are usually thought to be very difficult to transplant. Our beautiful white pine is generally so regarded; but we have never had any trouble with this most valuable variety. The month of June is perhaps the best time in which to move it. It is best to take some soil with it when it is dug up; and we would advise the same care with it as we bestow upon other trees. We follow Mr. Tudor's plan in all cases, thinking if a tree is worth

planting at all, it is worth planting well. If one would realize how much these beautiful trees, with other evergreens, will do to make home comfortable, and with how little expense this may be done, he should visit the place of Dexter Hart, Esq., of Woburn, Massachusetts. Many people are deterred from making the experiment from fear of the expense; but we can assure every one who has a house, that evergreens may be planted so as to make a saving of expense by the shelter they yield against the cold winds of winter and spring, and also in the influence they exert upon the health of the occupants. We do not recommend any of our New England spruces or balsams for this purpose, but, instead, would mention the Norway spruce fir, the Scotch fir or pine, the Austrian pine, and last, not least, our own white pine, the most beautiful evergreen in the world. We should think some of the western spruces and pines might be very valuable for this purpose. We shall speak of these hereafter.

August 9, 1858. Since the above has been put in type we have carefully examined Mr. Tidd's hedge of *Juniperus Virginiana*, and find that it far exceeds our expectations in the rapidity of its growth. In June, from one foot to eighteen inches of the ends of the branches were clipped. From all these points numerous shoots have been produced, which are now as long as the original ones, while the uncut short branches have made an equally luxuriant growth. Within the short space of two years an evergreen hedge has been formed, which already is quite a formidable fence against intruders, while the foliage, fed by a comparatively rich soil, is very beautiful. In a very short time this hedge will become an impassable barrier for man and beast, while it will be a far better protection against the wind than any artificial fence. This tree, so far as we have had opportunity to observe it, shows the beneficial effect of man re more than any other forest tree. It would be very valuable for the purpose of planting along the sides of railways and common roads. Judging from the success of Mr. Tidd's experiment, no such care in planting or trimming is required as directed by the New England Farmer. These were "*pulled*" from the ground in April, and hastily planted. We would, however, recommend proper care in the experiment.

PLATE XII.

YELLOW PINE (OF THE WEST)—*PINUS PONDEROSA*.

THIS pine is also known by the names of *P. Brachyptera*, *P. Engelmanni*, *P. Berdslezi*, and *P. Benthamiana*.

We are indebted for our description and Plate to the "Pacific Railroad Survey." We take pleasure in acknowledging our obligation to Dr. Newberry, "Geologist and Botanist of the expedition," for much valuable information upon the botany, etc., of this interesting portion of our country. "This pine," says Dr. Newberry, "is the most widely distributed of all the pines which are found in California or Oregon, and over large areas it is not only the most common, but the only species. The range of this tree is from the mountains of New Mexico, (San Francisco, &c.,) northward to and beyond the Columbia, and from the coast in California, where it is comparatively rare, to the Rocky Mountain chain on the east."

We should think that this species might be introduced here with advantage, for it seems well adapted to almost any climate or soil. Speaking of its range, Dr. Newberry goes on to say, "At McCumber's, it forms an important element in the magnificent forest of that region; and still higher, on the flanks of Larren's butte, it composes the entire forest, rising nearly to the line of perpetual snow; as we descended into Pit river and Klamath basins, we found it still abundant, forming the most constant feature in the vegetation of our route from Pit river to the Columbia. Near or distant trees were always in sight; and in the arid and desert regions of the interior basin we made whole days' marches in forests of yellow pine, of which the monotony was unbroken either by other forms of vegetation, or the stillness by the flutter of a bird or the hum of an insect.

Pinus ponderosa

Pl. 11

Willows Nahant Mass

Pl 13