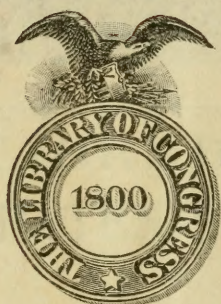
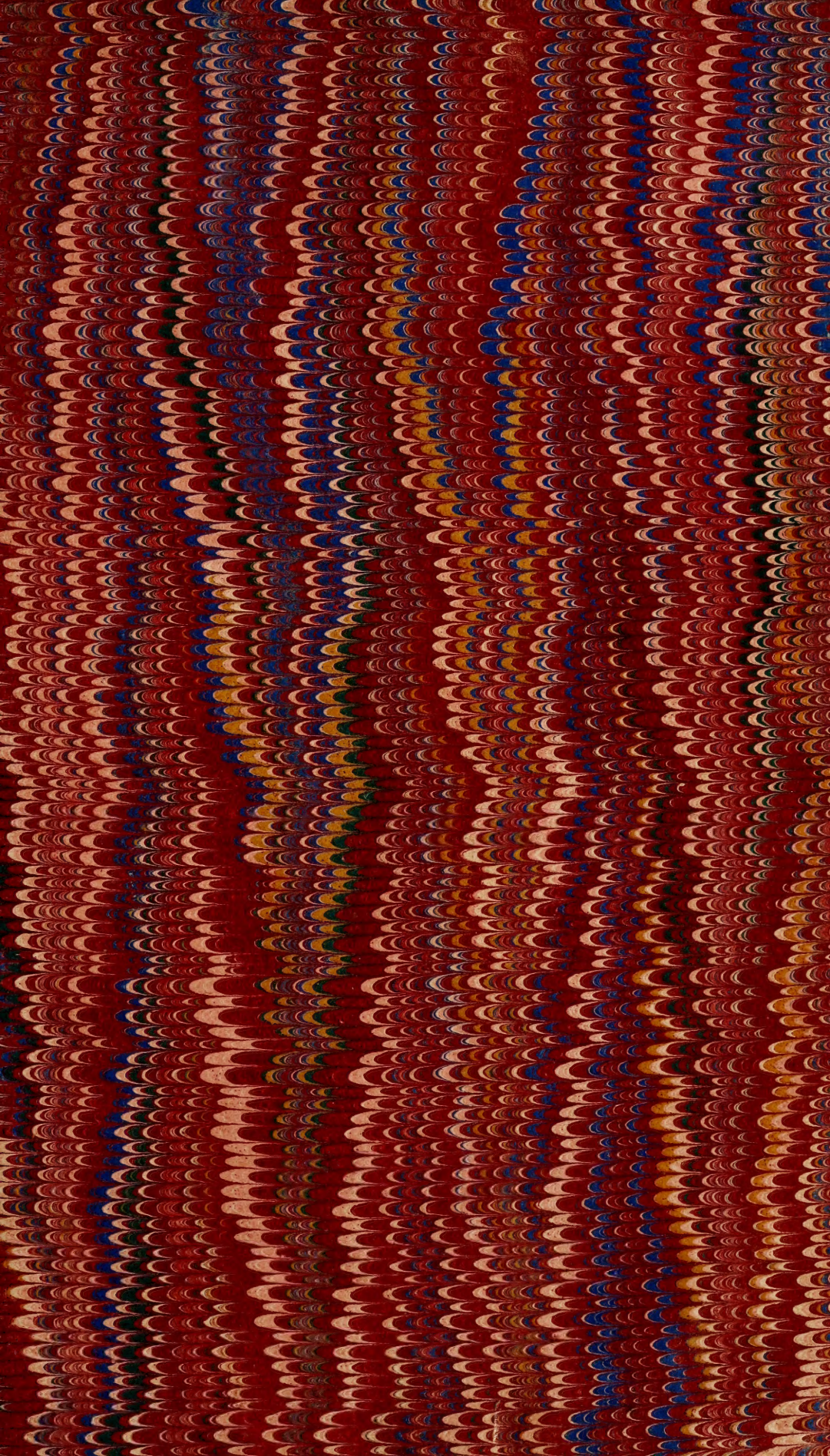


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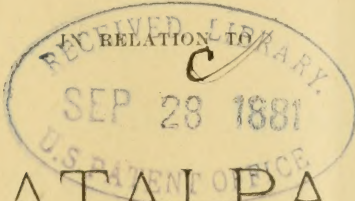


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ADDITIONAL FACTS

AND

INFORMATION



THE CATALPA TREE.

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CATALPA BIGNONIoidES

AND

ITS VARIETY? SPECIOSA. ✓

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E. E. BARNEY,

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DAYTON, OHIO.

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THE CATALPA TREE.

A PAPER READ BEFORE

THE NATIONAL AGRICULTURAL CONGRESS,

At New Haven, Conn., August 27th 1878,

AND BEFORE

THE OHIO HORTICULTURAL SOCIETY,

At Dayton, O., December 6, 1878,

By **E. E. BARNEY**, of Dayton, Ohio.

INTRODUCTION.

When first informed that the catalpa, a tree I had been familiar with on our streets for more than thirty years, possessed the power to resist decay to a wonderful degree, I was so impressed with its great economic value that I deemed it very important that a knowledge of its very valuable properties should become widely extended. I have devoted what time I could command from the supervision of a large manufacturing business, for the last eight years, to gathering and publishing, from time to time, such facts and information as I have been able to obtain on this subject.

A year ago, at the request of the president of a leading railroad, I published these facts and information in pamphlet form. Since then I have been greatly encouraged and aided in its general circulation by Dr. Jno. A. Warder, President of the Ohio Horticultural Society and of the American Forestry Association, and Prof. C. S. Sargent, Director of the Botanic Garden and Arnold Arboretum of Harvard University, and many others. Most efficient aid has been rendered also by

The American Agriculturist, The Monthly Garden and Horticulturist, The Cultivator and Country Gentleman, The Prairie Farmer, The Scientific American, The Railway Age, The National Car Builder, The Ohio Farmer, and The New York Tribune. Through the notices made of the pamphlet, and the articles on catalpa published in these periodicals, attention has been awakened on this subject to such an extent that I have received letters of inquiry from every State and Territory in the Union, amounting in the aggregate to thousands: also from England, South Australia, and New Zealand. As a result, if seed can be obtained, enough will be planted the coming Spring to produce millions of catalpa trees. During the last two or three years several persons have been engaged in the benevolent act of distributing packages of catalpa seed to thousands of persons in the West, notably, Suel Foster, of Muscatine, Iowa; J. F. Tallent, Burlington, Iowa; and Horace J. Smith, Georges Hill, Philadelphia. Many others have been engaged in the same kindly work, but I have not their names.

The subject has been deemed of sufficient importance to justify the occupying of your attention with a brief statement of some of the facts that have been gathered in relation to catalpa.

THE SIZE TO WHICH IT ATTAINS.

No work that I have examined on botany or forestry begins to do justice to the catalpa in this regard. One and a half and two feet is the largest diameter given in any of the books I have seen. C. H. Miller, Landscape Gardener of Fairmount Park, Philadelphia, writes: "There is a fine grove of common catalpa in the park, some of them very large, one measuring thirteen feet in circumference." Arthur Bryant, of Princeton, Ill., has in his grounds a catalpa of the *Speciosa* variety, raised from the seed in 1839, that measures, stump high, three feet in diameter. J. M. Bucklin reports catalpa trees in South-eastern Missouri, in 1866, three and four feet in diameter, and fifty feet to a limb, and in a letter received last week I am informed that plenty catalpa trees of that size are there to-day. In the *Geological Survey* of Indiana, 1873, Prof. John Collet reports catalpa trees three, four, and four and a half feet in diameter. Recently, a man writes me from Southern Illinois that he had sawed up catalpa trees three feet in diameter, and fifty feet to a limb. He also sent me catalpa railroad ties, among them a section of a limb 8 feet long and $12\frac{1}{2}$ inches in diameter at the small end, cut from the tree forty-five feet from the stump. So that in Pennsylvania, Indiana, Illinois, and Missouri the catalpa attains to the diameter of three, four, and four and a half feet, instead of one and a half and two feet as given in the books.

ITS DURABILITY.

Wm. R. Arthur, formerly Sup't Illinois Central Railroad, informed me that he had visited with a friend the old homestead, and took up a catalpa gate-post his friend had assisted his father to set forty-six years before. They found it as sound as the day it was set, no signs of decay whatever. Judge Upsher, formerly of Indiana, informed me that old citizens of Vincennes had stated to him that the old stockade, built by the first French settlers of that place, was largely from catalpa trees, which grow native in the forests there, and that when removed from the ground nearly one hundred years after they had been set, were perfectly sound, and gave no indications of decay. C. M. Allen, of Vincennes, writes: "During the last thirty years I have seen much of catalpa, in fence-posts and timber of buildings in contact with the ground, and esteem it the most durable of all timber; in fact it may be regarded as imperishable under or lying on the ground." Another gentleman of the same place says he has fence-posts of twenty-two years standing, as firm and sound, apparently, as the day they were put in the ground. Catalpa posts set by General Harrison about the Governor's house, in 1808, Mr. Pidgeon says, were taken up a few years ago, and being sound were re-set in another place. The early settlers of Knox County, Ind., found a catalpa log that had fallen across a stream, and used as a foot-bridge until it was flattened on top by the pressure of the feet. An old Indian, in answer to the question, how long the log had been there, replied, "My father's father crossed on that log," thus making it a hundred years old. In Southern Illinois was another catalpa tree fallen across a stream, still sound. A man, now living, says that forty years ago an old man told him that he crossed on that log when a boy, making it nearly or quite one hundred years old. This log was sawed into boards, and one of them, perfectly sound, was exhibited at the Centennial by Prof. Burrill, of the Illinois Industrial University. Large catalpa trees, back of New Madrid, on the Mississippi River, in South-eastern Missouri, killed by the eruptions in 1811, I am informed in a letter received August 10th, from a gentleman living there, are still standing, perfectly sound, after 67 years, and to use his expression, plenty of them. One of these was recently cut down, and seven feet of the but and seven feet of the top sent to me. The top, though worn to a point by the action of the wind and rain is perfectly sound. The but, though showing on the outside the result of long exposure, is as sound as it was sixty-nine years ago when killed by the eruption. At Poplar Bluffs, Henly, the ferryman, had a canoe made of catalpa, three feet

across the gunwales, perfectly sound, after constant use twelve years.

Capt. Kurtz knows of catalpa trees killed by the ice on the bottoms of the Wabash River, in the January flood of 1828, still standing, and sound after fifty years. Prof. John Collet says, "this timber is universally accredited with wonderful power to resist decay and time, and that rails made by Col. Decker in the year 1800, were in use forty-eight years afterwards, and that after diligent inquiry among those familiar with catalpa timber for a great number of years, I could find no one willing to say it is liable to rot." Fifteen years ago, W. F. Howell, of this vicinity, saw, in the *Rural New Yorker*, a statement that catalpa was the most durable wood known, and especially valuable, and excelling black locusts, red cedar and mulberry, in that it had no sap wood, so that trees of three or four years growth would not rot when set in the ground for fence stakes, hop or bean poles. The above named trees have a larger proportion of sap wood while young, and therefore are of far less value while young. Mr. Howell says he has verified this statement most fully, on his farm near the Soldiers Home, on which a large number of catalpa trees are growing.

Small catalpa limbs and sprouts of two years' growth, placed in the ground to support peas and vines, and used for that purpose year after year, show no signs of decay.

Mr. J. F. Tallent, of Burlington, Iowa, writes that some years ago he observed that the trunks of two catalpa trees which had stood in the ground for more than twenty years, used for clothes-line posts, showed no signs of decay, and began to study up the tree from books, from which, and personal inquiry and correspondence, he soon learned its great value. Some years ago, Suel Foster, of Muscatine, Iowa, observing that limbs cut from catalpa trees, after lying on the ground for years, did not rot like the limbs of other trees, began to make inquiries and comparing observations with others, learned its great value.

In 1860, S. H. & J. B. Binkley, living near Alexandersville, Montgomery County, Ohio, while repairing a fence with stakes and a rider, fell short of stakes. As a temporary make-shift they trimmed up some catalpa limbs, cut from two catalpa trees in their yard, and used them for stakes. Five years after, the cattle ran against one of these stakes and pulled it out of the ground. Greatly to their astonishment they found the stake perfectly sound, both in the ground and out. All the other catalpa stakes were the same. These stakes, on examination last summer, were found to be sound, after being eighteen years in the ground.

So well do farmers, in Southern Indiana and Illinois, understand its value for fence-posts that it has been nearly all cut

down, where it was formerly abundant, and transported in wagons fifty miles or more. One man, who has large numbers of catalpa trees in his river bottoms, writes me that persons living on the uplands come down, cut and haul them away, by night, for posts.

A catalpa gate-post, set in the ground by Col. Decker, of Indiana, in 1780, was found to be sound in 1871, after doing duty ninety years. Col. Corkum has known catalpa in use without a stain of decay after fifty years. A catalpa bar-post was sent me from Indiana, after it had stood in the ground seventy-five years, by J. S. Miller, of the Indiana Central R. R. It is perfectly sound, as you may see in the samples before me, cut from the bottom of the post. Horace J. Smith, of Philadelphia, writes: "I had occasion to remove and re-set a gate-post that had done service thirty years, and found it abundantly sound to last indefinitely longer." In 1834, J. M. Bucklin, a civil engineer, with Governor Davidson and others of Illinois, visited Vincennes, Ind., to get information as to the durability of catalpa for bridges. They found their preconceived opinion of its remarkable durability fully confirmed. The facts were notorious and unquestioned. J. P. Epping, Grahamville, South Carolina, writes: "I use catalpa for fence-posts in preference to any other wood." Daniel McNeil says that "both in Indiana and Louisiana, where he has resided, the catalpa is regarded as the most valuable timber, for posts and fencing, on account of its great durability."

Capt. Bournes, Falmouth, Mass., says he has used the limbs cut from his catalpa trees as stakes in his field fences, and thinks it as durable as red cedar.

President Harrison, in an address, reported in the *Prairie Farmer* in 1843, says: "Catalpa is more lasting than locust or mulberry, is indigous on the Wabash and branches, and its power to resist decay has been fully tested, both under ground and in contact with it. A catalpa log, known to be lying over the Desha in 1785 and used as a foot bridge, was in 1840 but a little decayed. Major Andrew Powell says, "a catalpa bar post made by his father-in-law and set up in 1770, was taken up and reset on his farm and was still sound in 1845, after being in use seventy-five years." James Clark, of Southern Illinois, writes: "Catalpa posts that have been in the ground forty years are still good and still retain the bark above ground." James Bell of Southern Illinois, writes, that "catalpa fence posts have been taken up after being in the ground forty years, and reset as being good for forty years more. That catalpa is much sought after by old settlers for fence posts and blocks in place of stone to set buildings on; has been nearly all carried off to the hill country for fence posts." He has sent me a fence post and a gate post that had been in the

ground forty-seven years, from one of which the samples shown here are cut. D. Axtell, Superintendent Missouri Division of the St. Louis and Iron Mountain Railroad, writes: "In regard to durability of catalpa it is useless to multiply words; fence posts twenty years in the ground are always as sound as when first put in, and no decayed catalpa logs are ever found in the swamps. A section of a catalpa log known to have laid on the ground in the swamps fifty years, is now in the office of the land department of the road, in St. Louis, and is as sound as it ever was."

CAN THE CATALPA BE CULTIVATED?

No tree more easily, very few as easily. It can be grown from cuttings, but much the more readily from seed. Plant in the spring, in warm, rich, light soil, in rows 3 to 4 feet apart, cover lightly one inch unless the ground is liable to bake, in which case much less. If pressed for room, $1\frac{1}{2}$ to 2 feet apart, placing the seed 3 inches apart in the row, as all may not germinate. When a few inches high, thin out to 1 foot in the row, transplanting those taken up. At 1 foot apart in the row they will make a better growth than nearer, and at that distance, if desired, they may be left in the seed bed two years. They are more easily transplanted at the end of one year, though they may be left in seed bed two or even three years. When transplanted, place them 4 feet each way. Some prefer 3 feet by 3 feet. A year or two after transplanting, if any tree is not straight or puts out branches too low, it will make all the taller and handsomer tree if cut down to the ground. When the trees are large enough to make fence stakes, hop and vineyard poles, cut out each alternate row one way. When large enough to make fence posts, cut out each alternate row the other way. In from twenty-five to thirty years, on good ground, the remaining trees should be large enough to make six railroad ties each. The first two cuts should be sawed through the middle; the next two being smaller, may be flattened on two sides. The rounded side of the ties sawed through the middle should be placed down; this can be done, because most catalpa trees show no sap wood, and none more than from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch, a fact that adds largely to its economic value. As catalpa is fully equal to the best white walnut or cork pine for any purpose for which they are used, and is susceptible of finer finish and higher polish than either; it may pay better to let the trees grow till they are two feet or more in diameter and use the timber for cabinet work or inside finishing.

WILL CATALPA MAKE A SERVICEABLE RAILROAD TIE?

This is matter of conjecture in part. I think it will, for the following reasons; Its durability is unquestioned; it is very elastic, and contrary to what most suppose, tough. I subjected pieces of catalpa, oak and ash, one inch square, to a breaking pressure, twelve inches between supports. The catalpa broke under a pressure of 703 pounds; ash, 890 pounds; one piece of oak broke at 577, one at 709, and one at 1141 pounds. The catalpa deflected three times as much as the oak or ash before breaking. Five thousand pounds pressure on a block of oak, three inches long and one inch square, compressed it to $\frac{10}{16}$ of an inch; a second block was compressed to $\frac{10}{16}$, and a third to $\frac{8}{16}$ of an inch. The same pressure compressed one piece of catalpa, same size, to $\frac{7}{16}$, one to $\frac{7}{16}$, one to $\frac{9}{16}$, and one to $\frac{7}{16}$. White pine was compressed to $\frac{5}{16}$; Norway to $\frac{6}{16}$; white walnut to $\frac{5}{16}$; yellow pine to $\frac{6}{16}$; black walnut to $\frac{10}{16}$ and $\frac{8}{16}$; ash compressed one way of the grain $\frac{14}{16}$, another $\frac{6}{16}$.

These samples were taken at random, and would indicate that catalpa will bear the pressure to which it is subjected when used as railroad ties. Two catalpa railroad ties were placed in the track, near our office, five years ago, and twelve one year ago. All hold their spikes well, and show no signs of mashing more than oak each side of them, and over both of which heavily loaded trains pass almost hourly. The road-master, who has watched them with much interest, says he has no better ties on the line of his road.

D. Axtell, Superintendent of the Missouri division of the Iron Mountain Railroad, writes, that "catalpa ties placed in the track of his road ten years ago are perfectly sound, that the rail has worn into some of them from one-half an inch to an inch, and it has been conclusively proven that the catalpa is far superior for ties to white oak or any other kind of timber grown in that latitude."

TWO VARIETIES OF CATALPA.

There are two varieties of catalpa in Ohio, Indiana, Illinois, Missouri, Kentucky, and Tennessee, grown for shade, one of which at least is native to the forests of the last five States. They vary fully three weeks in time of blooming. The earlier blooming, called also *Speciosa*, and the hardy, when grown singly, is taller, straighter, with more compact top, with whiter and larger blossoms, and longer and larger seed-pods, but less in number, and is usually the handsomer tree. After a few years the bark grows darker, is furrowed and rough, resembling black locust or elm of same age. It is much more

hardy than the common variety, and has withstood the severest winters up to and even beyond 42° North latitude.

The later blooming, or common variety, resists the frosts of winter usually below 40°. If the young trees of either variety freeze, they should be cut down the following spring close to the ground. They will shoot up a straight, vigorous stalk, and after that, most likely, resist the frost. The common variety, when planted singly, is often leaning, crooked, and scraggy. But planted in groves, grows tall, erect, and makes a handsome tree. The bark, when the tree is grown, is light silver gray color, comparatively smooth, the outer coat in flakes or scales. There are before me samples of the wood of both varieties, and also samples of the bark.

GROWS ON ALMOST ANY SOIL.

While rich river bottoms, particularly such as are subject to overflow, seem to furnish the most natural soil for catalpa, it thrives well on almost any soil. J. P. M. Epping, Grahamville, S. C., writes, "Catalpa springs up in old fields, near roads, or in old abandoned plantations; seems to like high land with sandy clay loam best. It only grows spontaneous in such places." Robert W. Furnas, Brownville, Neb., writes: "Grows best on table or second bottom land." G. C. Brackett, Kansas, writes: "Makes a fine tree planted on deep black soil; adapts itself to groves, and becomes more luxuriant than in open, exposed places." E. Gale, Manhattan, Kan.: "Makes a good growth in a forest plat upon a high, gravelly ridge; makes a wonderful success upon low, rich bottom lands; grows finely on all kinds of land." Wm. G. Burk, Medina, Delaware Co., Pa.: "No tree springs up along the line of the Philadelphia & West Chester R. R. so freely, or grows more rapidly." Horace J. Smith, Philadelphia: "The catalpa flourishes remarkably well on railroad embankments, roadsides, and other newly turned up ground. On the spoil barren dirt of quarries, of the hills, and on the raw clay of Philadelphia level meadows, before any other vegetation takes hold, the catalpa plants itself and grows finely." Charles Mohr, Mobile, Alabama: "Thrives wonderfully well on our light soil." Joseph Kirk, Morrill, Brown County, Kan.: "Have a catalpa tree of the early variety, seven years old, that is seven inches diameter two feet from the ground. The catalpa is a very fast grower here." Robert Millikan, Emporia, Kan.: "Grows through the central and Southern part of the State with the greatest luxuriance, on second bottom, low upland, river bottoms, and high upland." J. W. Foster, Livingstone, Pratt Co., Kan.: "My catalpa seedlings stand the dry weather very well, and grow finely." D.

Axtell, Charleston, Mo.: "Catalpa, in South-eastern Missouri, is found native only in heavy, stiff soil, subject to overflow, though it thrives well when planted in dry places."

A. M. Chapman, Apalachicola, Florida, writes: "Catalpa grows here, but is too small a tree for any useful purpose."

J. H. Foster, Pratt County, Kansas: "Catalpa seedlings stand the dry weather very well."

James Bell, Ullin, Illinois: "I took from the forests, catalpa trees two years old, in 1869, one and a half inches at the ground and planted on high hill land, in 1878 they measured twenty-four to twenty-eight inches six feet from the ground. They had but little root when planted."

E. P. Morey, Sterling, Kansas, "Planted catalpa seed May 25th, that made a fine growth of two feet high and three-fourths of an inch in diameter.

Robert W. Furnas: "My grove of six thousand catalpas three years old are from ten to fourteen feet high. Twelve years ago I set out quite small catalpas, for shade, about six feet high. They now measure forty-one inches in circumference."

Prof. T. J. Burrill, Urbana, Illinois: "I have just measured a common catalpa of nineteen year's growth, grown in ordinary prairie soil, and find sixteen and one-half inches across the stump. The last twelve years it increased over fourteen inches in diameter."

J. F. Tallant, Burlington, Iowa: "My catalpa trees two years old are sound, even to extreme tip, having withstood the frost when the mercury was 30° below zero; though on a dry clay hill, with thin soil, grew four feet the first year, in a very dry season; the second, a rainy one, they grew so rapidly as to be ten feet high and two inches diameter."

In Marshall County, Illinois, are several groves of *Speciosa* catalpa, planted in the prairie twelve to sixteen years ago. They are all very straight, thrifty, handsome trees.

The catalpa seems wonderfully well adapted to the soil and climate of Ohio, Kentucky, Tennessee, Indiana, Illinois, Missouri, Iowa, Kansas, and Nebraska, and grows luxuriantly on most soils in these States.

CONCLUSION.

Such are a few of the facts I have gathered, and tried to impart to others. From them it seems to me clearly shown that the catalpa occupies a prominent position among the trees that should be cultivated. It can be so easily propagated; so readily cultivated over so large an extent of territory; it is so rapid in its growth; it is of such economic value, not alone

for its durability, when exposed to moisture, but also for all purposes for which white walnut and white cork pine, the two woods that season the quickest and keep their place best, may be used, that I do not know any tree that presents higher claims for general cultivation. From the experiments I have made, there is no one tree I would as soon use for the entire structure of a passenger car, including sills, plates, posts, and the entire frame work, also for outside and inside finish, as catalpa.

What I have said, I think, shows that the tree is worth a most careful study. There is very much that needs to be known about it. I have arranged with horticulturists of thirty years experience with catalpa, to visit several places where it grows native in the forests, also some groves of catalpa grown from the seed, to gather such facts as may guide in its successful cultivation.

Any one having any facts or information pertaining in any way to catalpa, will confer a favor on the public if they will communicate them to me. There has been such a demand for a pamphlet I published last January, on the catalpa, that the edition is nearly exhausted. I hope to reprint a portion of this with such other facts and information as I may obtain up to that time. I wish to make this as full and complete as may be, for the benefit of the public, and therefore ask its aid in gathering these facts and this information.

THE CATALPA.



Prof. C. S. Sargent, of the Arnold Arboretum and Botanic Gardens of Harvard University, has kindly furnished the following paper:

E. E. BARNEY, Esq.:

Sir: I have examined with much interest the various specimens of catalpa wood, with which you have favored me at different times.

I find that the specific gravity of the wood of the common *Catalpa bignonioides* is, when perfectly dry, .405; and that the specific gravity of the wood of the early blooming variety, also perfectly dry, is .462.* The ratio of weight of any wood to the weight of an equal body of water, that is its specific gravity, gives in many respects the surest indication of its value for construction and fuel. But to show the relative value of catalpa, it will be well to compare its specific gravity with that of some better known or standard woods.

Specific gravity of common Catalpa,	.405.
" " " early blooming Catalpa,	.462.
" " " Eastern Hickory,	.838.
" " " " White Oak,	.662.
" " " American Elm,	.649.
" " " Rock Elm,†	.832.
" " " Black Walnut,	.577.
" " " Canoe Birch,	.539.
" " " Wild Cherry,	.488.
" " " Ailanthus,	.614.

By this comparison it will be seen that catalpa is inferior in weight, and consequently in strength and heat-giving qualities, to even such soft woods as the black walnut, the canoe birch, or even the wild cherry, which up to this time is the

*These specific gravities have been calculated by Mr. S. P. Sharpless, State Assayer of Massachusetts.

†*Ulmus racemosa*.—Thomas.

lightest of American hard woods, which I have examined critically. It is remarkable that so soft and light a wood as the catalpa should possess the power of resisting decay to a degree almost unknown in the hardest and heaviest woods. It is unnecessary for me to dwell at this time on the indestructible nature of this wood, for so many examples of its wonderful durability have of late been brought to public notice that the fact is now established beyond question. But why the soft wood of this fast growing tree, which is traversed with large open ducts, nearly as broad as those of red oak, a wood which notoriously rots very quickly, should be able to resist decay to such a degree is not clear; and this fact presents an interesting problem, which the chemist or the vegetable physiologist may perhaps be able to solve.

As fuel the catalpa has but little value. For the cabinet maker or the architect it will rank with such North American hard woods as the cherry, the black walnut, the ash, and the butternut. The wood is close grained, very easily worked, and susceptible of an excellent polish. In color and general appearance it resembles chestnut, but unlike chestnut it is easily "filled," and shows none of the tendency to warp or start, which renders that wood unfit for the best cabinet work. It is, however, for fence and telegraph posts, hop and vineyard poles that the wood of the catalpa has no known equal among extra-tropical woods. It is for these, and other employments, where a cheap material capable of resisting decay, when exposed to the action of the soil and weather, is required, that catalpa can be more profitably employed than the wood of any other tree suitable for cultivation over so large an area of the United States. Catalpa wood seems particularly suited for the manufacture of coffins, for which purpose it promises to rival the famous *Nan-mu* wood of the Chinese; and it is not altogether improbable that before many years, we may see large quantities of catalpa exported to China to take the place of that scarce and high-priced material for the construction of coffins. Incidentally, it is suggested that catalpa may prove an excellent material from which to make permanent garden labels. Much has been said in various quarters of the excellence and durability of catalpa railway ties. Of the power of this wood, when so employed, to resist decay, there can be no doubt. But whether a soft wood like the catalpa will bear the crushing and wearing of the rails, or hold spikes as well as harder woods, like white oak and chestnut (the best materials from which American ties are made), only carefully conducted comparative experiments can demonstrate. Such experiments, by which the comparative value of the several woods used or recommended for railway ties is to be fairly tested, have been lately inaugurated both

in Massachusetts and Ohio; and information is expected from them which will lead to important practical results.

The catalpa can be safely planted in strong, rich soil, in any portion of the United States south of the 42d parallel. Further North it often suffers in severe winters, especially when young; and in the New England States, except in a few exceptional situations, the soil is not rich enough to make the planting of this tree as profitable as that of many others better suited to reach maturity in this section of the country. For that portion of the treeless region of the West, south of the 42d parallel, especially for Kansas and Southern Nebraska, I am satisfied that no tree, which has yet been suggested for general planting there, will at all equal the catalpa, either in the rapidity of its growth or the value of its wood, with the single exception, perhaps, of the *Ailanthus*.

The growth of the catalpa in the rich prairie soil is simply astounding. I have now before me a specimen cut from a tree which grew at Brownsville, Nebraska, and which shows but four annual layers of growth from the seed. It is $9\frac{3}{4}$ inches in circumference, and the growth of the first two years, $1\frac{1}{2}$ inches in diameter, is already changed into heart wood.

During the autumn of 1877, the Missouri River, Fort Scott & Gulf R. R. commenced experimental plantations of various trees on their land, near Fort Scott, in Kansas. The superintendent of the road, in his report to the president on the condition of these plantations at the end of their first year, says: "The catalpa has certainly proved to be the strongest grower, and most tenacious, standing the dry weather better than other varieties, and at present rate will come to maturity years before other varieties are of sufficient size to be of any utility."

I have said that as fuel the catalpa is of little value. Such a statement is comparative rather than absolute. As compared with the cotton woods, box elders, or white maples, which have been heretofore almost exclusively planted on the prairies, it is of very great value; and, though not yet proved to be the equal of white oak or chestnut for railway ties, it is far superior to any other tree which can with certainty be grown quickly and profitably, where there will always be the greatest scarcity of material for ties, namely, in those States watered by the Missouri and its tributaries.

I add a few brief and simple characters of the only Catalpas now known, which can be cultivated in the United States North of the extreme Southern portion of Florida, in the hope of aiding horticulturists to more readily determine the various species now quite generally cultivated, and in regard to which there seems to be much confusion.

1. *Catalpa bignonioides*.—Walt.

Leaves ovate, heart-shaped at the base, pointed, and rarely somewhat lobed. Flowers white, tinged with purple and dotted with purple and yellow in throat; appearing (at the North) from the 1st to the middle of July. Pods nearly cylindrical, or often somewhat flattened, rarely ever one foot in length. Seeds $1\frac{1}{2}$ inches long, their wings gradually narrowed to sharp points, and ending in tufts of long, white hairs, often an inch in length. Bark thin, scaly, silver gray.

2. THE "EARLY FLOWERING" CATALPA.

This can be distinguished from No. 1 by its more gradually pointed leaves, its larger white flowers, appearing (in Ohio) during the first week of June; by its larger and much flattened pods, often 16 to 18 inches long, and with much thicker walls; by its shorter, broader seeds, with wings of equal width to their rounded ends, which are terminated by a copious fringe of stouter hairs; and by its darker and thicker, furrowed bark.

I have already shown that the wood of this form is considerably heavier than that of the ordinary catalpa. Further investigation is necessary to determine whether this is a distinct species, or only a well-marked form of *Catalpa bignonioides*, and connected with it by intermediate forms. If distinct it should be known as *C. speciosa*.

3. *C. Kämpferi*, D. C. Native of Japan.

Leaves smaller than in the American species, ovate, heart-shaped at the base, abruptly sharp-pointed and often with one or more sharp-pointed lateral lobes. Flowers smaller than in the American species, spotted with purple, sweet-scented, appearing (near Boston) during the first week of July. Pods about one foot long, cylindrical, slender, not more than $\frac{1}{8}$ of an inch in diameter. Seeds much smaller than in the American species, the wings short, blunt, and ending in a copious fringe of soft white hairs; the seed and its appendages rarely $\frac{3}{4}$ of an inch long. Bark in young plants thin, scaly, light gray.

I have no information of the size this tree may attain under favorable conditions, although it is spoken of as a small tree in all works on Japanese botany. Near Boston it is rather hardier than the American species, and flowers and ripens its fruit freely when not more than twelve feet high. I have no information whatever as to the economic value of this species.

4. *Catalpa Bungei*, C. A. Mey. Native of Northern China.

Leaves much smaller than in No. 3, oblong, ovate, *wedge-shaped at the base*, very gradually tapering in to a long, sharp point. Flowers smaller than in the other species, color unknown to me, but probably white. Fruit unseen by me.

C. Bungei is said to become a tree, but it only appears in cultivation in this country as a spreading bush, eight to ten feet high, and sometimes twenty feet in diameter. I have never heard that it has flowered in this country, and I am ignorant of the quality of the wood it may produce.

C. S. SARGENT.

Cambridge, Mass., Dec. 23, 1878.

Dr. Warder's Report on the Catalpa.

THE CATALPA (JUSSIEU).

Natural family BIGNONIACEÆ.

Genus *Catalpa* (Juassieu), Scopoli, Endlicher.

Synonym: *Bignonia* (Michaux).

There are six species:

1. *Catalpa Bignonioides* (Walter); U. S.
 Syn.: *Syringefolia* (Sims, Pursh).
 Cordifolia (Nuttall, Elliott, Duhamel).
 Bignonia Catalpa (Michaux, Willdenow, Linnæus).
 B. Americana (Duhamel).
 Kavvarra Pisaga (Kæmpfer), according to Semonie.
2. *Catalpa longissima*; W. Indies.
 Syn.: *C. longisiliqua*.
3. *Catalpa punctata*; W. Indies.
4. *Catalpa hirsuta*; Brazil.
5. *Catalpa Bungei*; China.
6. *Catalpa Kæmpferi*; Japan.

This conspectus is after Hooker and other botanists of eminence, and was prepared with the valuable assistance of Messrs. Geo. Vasey, A. P. Morgan, and others.

Our own native *Catalpa*, or *Catalpas*, alone are now to be considered. This report will relate to their range and habitats in nature, and indicate the limits to which the trees have been extended by human agency in our own and other countries. Reference will also be made to the char-

acters of the two distinct kinds we have in cultivation, their respective merits, as to habit and hardiness for economic planting, the methods of their propagation, and treatment, also to the character of the timber and its value in the various purposes to which it has been and may be applied.

This paper has been epitomized from a much larger and fuller memoir of the tree, which was found to be too voluminous for the present occasion; it will briefly treat of the *catalpa bignonioides* of Walter, and of its western congener, but recently recognized as a distinct variety or perhaps species, and known in Ohio as the *Speciosa* variety since 1853, as the Early Blooming, and in Iowa as the Hardy Catalpa. The typical tree, that from which the species was formed, is spoken of as the Georgia Catalpa, from its earliest known habitat; it is often referred to as the common kind, and as the eastern kind, in contradistinction to our favorite western tree, which is considered so very superior in form and hardiness, that it alone is recommended for extensive propagation and planting for economical purposes.

At the request of Mr. E. E. Barney, and as a labor of love, the serious and extensive investigation of the habitats of these plants has been undertaken within a few months. By the kind assistance of many correspondents in numerous States, accompanied, in many instances, with samples of the fruit and seeds from various parts of the country, a large collection of these has been gathered, and they have proved of great value, as aids in settling the range and the native habitats of the two kinds, the eastern and the western, which, though not absolutely settled, it is believed will be found on the eastern and western slopes of the Appalachian water-shed, toward the southern extremity of that mountain range.

The history and description of the species, or the Eastern Catalpa, has been very fully set forth by the botanists; though for a long time after it had been introduced into cultivation, and after it had been spread all along the Atlantic coast, and was known in every town, as we are told, from Louisiana to Massachusetts, few of the writers had ever seen the tree in its native wilds. It was indeed for a long time a question whether it was really indigenous any where within our borders. Meanwhile the tree had been taken to Europe and was planted in many countries; and as the population of the United States progressed westward, this catalpa accompanied or followed, until it has reached far out into the plains West of the Missouri River, crossing over and beyond the native range of its western congener, and even mingled with it in some places, so that both kinds may often be seen side by side in the same avenues or groups of planted trees. This Eastern Catalpa has been so widely planted that it may well have been called the common kind.

The earliest accounts we have of the *Western Catalpa*, were reports of the observations quoted by Mr. Nuttall from General Harrison, who made its acquaintance when residing at Vincennes, Indiana, as Governor of the North-western Territory, but it does not seem to have been suspected that this was different from the well-known eastern tree, for which the species, *bignonioides*, had been erected by Walter.

The attention of the writer was called to the showy flowers of this, the early blooming kind, by his friend, Jno. C. Teas, of Indiana, who referred him to the streets of Dayton, Ohio, where it had been propagated and planted quite extensively by the late Dr. Job Haines. These were visited when in bloom. In 1853 it was described and presented to the public in the columns of the *Western Horticultural Review*, published in Cincinnati, Ohio.

As a variety name, it was called *Speciosa* on account of its large and showy flowers. A further study, especially within the past few months.

inclines the writer to believe that this catalpa may be worthy of being erected into a species; in this opinion some eminent botanists concur, and they have kindly promised their valuable assistance in diagnosing the plant when again in blossom. The peculiarities observable in the fruit-pods and seeds, which prove most valuable means of discriminating between the two kinds, were suggested by Mr. R. Douglas, of Waukegan, Illinois, whose long experience, and his acumen in the observation of these organs, has enabled him to detect characters that might have been overlooked by a less observant eye.

The earlier history of this Dayton group has never been traced beyond the two trees from which Dr. Haines first gathered seed for propagation—but it is now clear, that as they are the same with those found in the delta lands of the Mississippi, they were of the western stock. They may have come to Ohio independently, or possibly through General Harrison, who, on retiring from office, brought plants to his home at North Bend, Ohio, some of which were distributed, and those of his own planting, with their self-sown progeny, are still to be found in that neighborhood almost naturalized.

From one or other of these groups, this form of catalpa was sent from Cincinnati to Massachusetts many years ago, and trees are now to be seen near Falmouth, as reported by Mr. Jos. S. Fay, whose timber plantings at Wood's Holl have been very successful.

Mr. Arthur Bryant, Sen., of Princeton, Illinois, gathered catalpa pods at New Madrid in 1839, from which he grew trees of this variety, and he has since propagated and distributed plants, which have been very successful in Northern Illinois and elsewhere, in places that were not adapted to the eastern kind. On his grounds plants spring up naturally from self-sown seeds, showing their adaptation to the prairie soil.

Mr. John Litchfield, after settling on the prairie in Middle Illinois, South of LaSalle, procured seeds of the catalpa from his old home in Vanderburgh County, Indiana, from which he has planted groves that have been very successful. They are all of the *Speciosa*—not a single tree of the specific type was to be found in the neighborhood.

The Omaha group has been received by a circuitous route. Many years ago a traveler visiting a friend in Washtenaw County, Michigan, left a seed-pod that he had brought from Kentucky. Ignorant of its character, Mr. Bennet planted the seeds, and from him Mr. Joel T. Griffen purchased two plants that were taken to his home near Omaha, Nebraska, where they have been multiplied and are scattered in that region.

The Iowa group has been traced directly to the Dayton trees by Mr. Suel Foster, who procured them from a trader who had brought them from the Messrs. Teas, then nurserymen of Indiana. It is curious to observe how universally other nurserymen have introduced the eastern form, and how widely it has been disseminated through these western States at the expense of the native *Speciosa*.

THE HABITATS OF THE CATALPAS.

The Species:—In his work upon the American Forest Trees, Mr. Michaux referred to several places where this tree had been found in the upper parts of Georgia and Carolina; following these indications, Nuttall wrote that at one of the habitats thus indicated, near Columbus, Georgia, he “for the first time in his life, beheld this tree decidedly native, forming small, haggard, crooked trees, leaning fantastically over the rocky banks of the Chatta-hoot-shee River.” Correspondents in Georgia and Alabama have referred to the catalpa as being found along the streams, clearly indigenous, and they describe it as a tree of large size. All the seeds received from that region, whether from wild or cultivated

trees, are of the eastern kind. Indeed it is believed that all of the plants now found on the eastern flank of the Alleghenies are of that stock, except a few in Massachusetts which were sent from Cincinnati; though others may yet be identified that have a western origin and form.

The habitats of the western plant will now be indicated. The tree is found on the bottom lands of the Wabash and its tributary, the White River of Indiana, on the lower Ohio and its tributaries, the Cumberland and the Tennessee, as well as the Wabash, the Little Wabash, the Saline, the Cache, and other streams. It is also found on the extensive swampy region of the Mississippi about New Madrid, in South-eastern Missouri and the adjoining portion of Arkansas, as well as in the neighboring low lands of the western portion of Kentucky and Tennessee, particularly along the Obion River.

In all this region of silty soil known as the Delta country, the forests produce this particular catalpa, the locality being in these six neighboring States. It has also been found by Mr. Teas, on the Arkansas River near Little Rock, and on the waters of the Red River near the south-western portion of Arkansas, and presumably it exists on most of the tributaries of the lower portions of the Great River; to which region, however, these recent special investigations have not been extended.

In all the territory above indicated, which has been critically explored, the *Speciosa* variety alone has been discovered in a state of nature—one of the Georgia kind, the recognized species, *C. bignonioides*, of Walter, has been seen except where planted by the hand of man.

It is now so fully demonstrated that there are in nature and in cultivation two distinct trees that it may be well to point out their differences. This will be done as much as possible in popular terms.

DIAGNOSIS OF THE TWO FORMS.

The species, the native of Georgia, or the common Catalpa:

Tree—As described by the botanists, usually low-branched, short-stemmed when in open lands, often leaning. When planted in thick groves the stems become taller, but are seldom really straight. Young plants often winter-killed, and older ones frequently injured North of latitude 40 and 41 N. on the West of the Alleghenies.

Bark—Gray, and in mature trees, or those of ten or twelve years or more, it is scaly, and easily detached in small, thin plates.

Leaves—Similar in both kinds, but in their young state having less of the purple tinge that is common in those of the *Speciosa*; at maturity they are a shade darker.

Flowers—As represented in Michaux' plate, white, tinged with violet, having purple and yellow spots inside the throat of its bell-shaped corolla; fragrant,—blooms come later by from one to three weeks than the western form.

Fruit—Usually very abundant, pods from 8–15 inches long, somewhat flattened, the valves meeting at an angle form a ridge that can be felt when it is rolled between the thumb and finger, hence the section is lenticular; the surface is slightly uneven, somewhat grooved in some specimens, color light brown, especially on trees cultivated in this latitude; the pods received from Georgia and Alabama, are darker.

Seeds—Applied end to end in one or more layers to a rather flat and grooved placenta or pith. They are winged as described, in their entire length, from one to one inch and seven lines, breadth two lines; average 100 seeds to a pod. The coma or fringe of hairs projecting from each end, is sharply pointed as though they had been wetted and drawn together.

The variety *Speciosa*, or Western Catalpa:

Tree—More erect, naturally growing taller, and better furnished with limbs when exposed to the light. In thick groves, erect, straight and tall, often fifty feet high to limbs, which are not unfrequently broken in the forests when old. In cultivation this is more hardy than the species.

Bark—In young trees is light gray, becoming darker with age. Adhering closely, and moderately furrowed vertically, thicker, because it does not scale off, and in old trees it may become quite dark.

Leaves—Like the other, but of a paler tint of green; when first expanding on young seedlings they often have a dull, livid hue.

Flowers—Much larger, nearly pure white, markings in the throat clear yellow and purple, very showy, and expanding from one to three weeks earlier.

Fruit—Often less abundant, pods usually larger and longer, 15–20 and more inches, cylindrical, 6–7 lines in diameter. They are generally of a darker brown color, and usually marked with distinct parallel grooves extending their entire length.

Seeds—Decidedly winged and fully fringed at both ends—heavier and larger than the species, and wider, 4 lines. The texture of the membrane and tuft is more silky, compared with the satiny and harsher tissue enveloping the seeds of the species, or common catalpa.

RANGE AND RELATIVE HARDINESS.

Let us now take a glance at the range to which these trees have been taken in their migrations, and we shall see that they differ in their relative hardiness. This is a very important consideration to the practical tree-planter who is looking to the production of groves for economical purposes. In the milder climate of Western Europe our trees may reach a much higher latitude than here. Thus we find that the Georgia Catalpa thrives in the South of France and in Italy. Its limbs or twigs are sometimes cut by frosts in Paris, where, however, it has attained fair proportions. It has grown to a good size at Vienna, Austria. Dr. F. Brendel, of Peoria, Illinois, to whom the writer acknowledges indebtedness for many botanical references relating to the genus catalpa, has just written that in 1846 he collected flowering specimens in Bamberg, Germany, latitude 50 N., and 700 feet above the sea. The trees were then about ten inches diameter, and he thinks they were of the eastern kind. In the South of England it has grown well, blossoming in London at midsummer, but rarely perfecting its seeds. In Glasgow, Scotland, it is almost an herbaceous plant, not perfecting its woody fiber; and at St. Petersburg, in Russia, it requires the protection of the green-house. All these foreign trees are believed to be of the Georgia kind.

In very early times, in our own country, this catalpa was planted for ornament and shade in all the towns along the Atlantic coast, and it may be found even in Massachusetts, where, however, Professor Sargent says, though it has survived for 75 and perhaps for 100 years, it does not always perfect its seed, and can not be considered a perfectly hardy tree; nor does he recommend it to planters there, "except perhaps in favored localities, like the valley of the Connecticut."

In the later edition of Darlington's *Agricultural Botany*, where it is described as a small tree, Dr. Geo. Thurber, the editor, adds this observation: "In the latitude of New York the larger branches, and frequently whole trees are killed by a severe winter."

About Philadelphia, Mr. Meehan, editor of the *Gardener's Monthly*, considers it perfectly hardy, and indeed the writer himself long ago noticed that it was becoming naturalized there and springing up spontaneously.

From Eli K. Price, Esq., Chairman of the Committee on Trees and Nurseries in the Fairmount Park, and a devotee to sylviculture, the following facts have been kindly furnished:

"I have been here since 1815, and have known the tree as common since that time." He then quotes a catalogue of Dr. Mühlenberg's, dated 1791, which included the catalpa, but not native. "There is one growing before my window on the north-west corner of Washington Square, with a girth of eight feet, four feet from the ground. This was probably planted in the spring of 1816. * * * We have one in the Fairmount Park, a larger catalpa, on the west side of the Schuylkill, now surrounded by a dense growth of its seedlings." * * *

This is a pretty good showing for that side of the mountains; let us trace its westward migrations, and look at its deportment on the other slope, in the valleys of the St. Lawrence, the Ohio, the Mississippi, and the Missouri, the Platte and the Kaw rivers, for, with the men of the East, this south-eastern tree has also followed the Star of Empire, reaching out into the borders of what used to be called the Great American Desert, or what is now more appropriately named, smiling Kansas.

At Rochester, New York, it is not considered perfectly hardy, for it "suffers in severe winters," as reported by Mr. William Barry; though it lives, grows finely, and perfects its seed, by which it has been identified and distinguished from the western form.

At Painesville, in the north-eastern part of Ohio, Mr. J. J. Harrison says his trees have not suffered, but appear to be hardy, perhaps protected by the lake influence. His plants were imported from France, and the fruit and seed bear a close resemblance to those received direct from Georgia and Alabama, where, it is most probable, M. Michaux obtained the seeds he sent home to France, whence their progeny have now been returned to us.

In the north-western part of this State, however, at Toledo, Ohio, as reported by Prof. E. W. E. Koch, the catalpa is killed to the ground almost every winter. All through the southern part of this State, and in the adjoining portions of Pennsylvania, West Virginia, and Kentucky, the tree survives, and thrives, though in the middle range of counties, and generally on the parallel of 40 degrees and northward, the young plants are sometimes cut to the ground. A similar report may be made for Michigan, for Northern Indiana, and Illinois, for Wisconsin, for Iowa, Nebraska, and for Kansas, at least North of the Kaw River, as well as for the North part of Missouri, and even in St. Louis, in latitude 36.37, where thousands of this kind of catalpa are to be seen in the streets and parks, it is reported, upon the best authority, that they have suffered in severe winters.

Let us now look at the more satisfactory record of the *Speciosa Catalpa*, so far as it has been possible to trace its history and behavior through the forced migrations it has made under man's interfering agency. As informed by Mr. Jos. S. Fay, of Massachusetts, this tree was carried from Cincinnati, Ohio, twenty-six years ago; it has thriven and grown to good size at Falmouth, near the coast, and maintains its high reputation there. Some other trees were planted in the same neighborhood forty-five years ago, and have attained a large size without injury.

Seeds taken from Kentucky to Michigan grow well, and are perfectly hardy on sandy uplands in Washtenaw County, while those on clay lands, especially where low, had been injured; so writes Mr. Joseph Bennett. Some of this lot of trees were taken to Nebraska, and were planted on the high exposed rolling prairie, near Omaha, where, in the hands of

Mr. Griffen, they have proved the nucleus of a large group of the Western Catalpa in that region. This may, perhaps, be considered nearly its northern limit along the Missouri River. Still this tree may be recommended for all the south-eastern quarter of Nebraska, if protected by wind-breaks of the hardy trees of the country. It appeared to be perfectly hardy on the grounds of Governor Furnas, at Brownville.

The existence of the Speciosa Catalpa at Dayton, Ohio, has already been referred to; there indeed it is historical; it is also found to be hardy in Columbus, the capital, and in other places on the same parallel where the eastern kind has suffered to some extent.

In Fort Wayne, Indiana, the speciosa alone is reported as the catalpa that will stand the climate. At Indianapolis, as at Terre Haute, and all along that range it thrives, and is considered very superior in habit and hardiness to the eastern kind.

In all Illinois, North of the Illinois River at LaSalle, the speciosa is the only kind that can be recommended as hardy. It was introduced by the venerable tree-planter, Arthur Bryant, Sen., who gathered the seeds at New Madrid in 1839, planted them at Princeton, and has ever since been propagating and distributing these trees. He finds them perfectly hardy where the eastern kind has succumbed to the winters. The noble tree in his door-yard is a beautiful specimen, having grown from seed sown in 1839, to a height of forty or more feet, with a beautiful crown spreading over an area of equal extent, and supported by an erect shaft that measures almost three feet in diameter.

At Waukegan, in the north-east corner of the State, the speciosa survives, while some plants of the eastern kind are frequently killed to the ground, and are represented by a bunch of sprouts springing up from the base of the dead stem, rarely producing flowers or seed.

At Galesburgh and other points on that range, the trees of the speciosa catalpa thrive and do well; they are, of course, highly appreciated.

In Iowa the common kind was first planted. On the grounds of Snel Foster, at Muscatine, on the bluffs of the Mississippi, in latitude 41 N., they grew well for awhile, and a lot of the speciosa variety was planted beside them. The winter of 1855 and '56 proved a crucial test, as in the following spring these were perfectly sound, while the common kind were all killed; then and there was the survivor christened The Hardy Catalpa, and since that time it alone has been selected by the intelligent planters of that State, who claim that it is perfectly hardy even beyond latitude 42 degrees, in the bleak climate of their open prairies.

Having now traced the migrations of these two trees, noted their behavior, and learned their relative hardiness over a wide extent of country, further discussion is deemed unnecessary, and the intelligent tree-planter may be left to his own judgment in the selection of trees for his groves.

QUALITY OF THE LUMBER AND USES.

Little need here be added to the mass of facts collected by Mr. Barney, and which have already been presented to the public, to prove that this lumber is possessed of great economic value, and yet it may be well to report some observations in support of the statements that have been made.

The wood of the catalpa is light, and yet sufficiently strong, and it is hard enough for most purposes of construction. It has been highly approved for bridge-timbers where it was exposed to the weather; it has been the favorite material for fence posts in a large tract of country; it has been used, in the absence of stone, for the foundation supports of buildings; it has been found an admirable material for covering buildings as shingles, and it takes a good surface to receive a beautiful polish.

with a sufficiently varied grain or figure to make it a desirable wood for the inside finish of our houses.

Dr. J. Schneck, the botanist of the Lower Wabash, writes, that though the trees were formerly very abundant and sometimes very large, the supply is now becoming exhausted, on account of its high repute for skiff building and other purposes, especially for posts, it is in such demand that it is carried to considerable distances, and very often stolen and carried off by night. So in most of the Delta region that has been visited, the trees which are accessible, have been nearly exhausted; this is an evidence of its high appreciation by the people.

On the St. Louis and Iron Mountain Railroad, a part of which runs through this alluvial region, there is a section near Charleston, Missouri, where a portion of the track was laid eleven years ago on catalpa cross-ties, which are yet sound, while the oak ties near them have been twice renewed. Some of the fence-posts along side the road, presumably of oak, have already needed replacing.

Mr. David Axtel, the intelligent engineer, in charge of this part of the road, reports that catalpa holds the spikes sufficiently well, and he said that when the ties had suffered from mashing after this long use, they were not rejected, but turned over so as to present a new bearing for the rail. Some that had been thrown out by the trackmen were eagerly appropriated by them as garden fence-posts where they bid fair to render good service for many years.

Near New Madrid, in the same region, there are many fence-posts which have stood and remained perfectly sound for long terms of years, twenty, thirty and forty, or perhaps more, as their value has been known since the settlement of the country. The story of the catalpa trees still standing in the water where they were killed by the submergence of the earthquake in 1811, which has been looked upon as a traveler's tale, may now be fully confirmed by ocular demonstration. In those lagoons may yet be seen the broken shafts of noble trees that were then killed. All other species of trees that were submerged by the same catastrophe have crumbled with decay and have fallen into the water long years ago, but these grim monuments of that event still remain as silent memorials of the disturbance of level which caused their death—and there have they stood defying the elements and resisting the tooth of time for nearly three-fourths of a century, during which many of the finest have been cut and removed for economic purposes.

The peculiar ligneous structure of the catalpa is too important to be ignored, for though there be no sensible qualities in the wood to preserve it from the attacks of insects and from decay, it is known to be very durable and it must be possessed of some antiseptic properties that escape the senses and remain to be detected by scientific investigations. There is however a physical constitution that can be noted by the common observer; this consists in the remarkably small amount of alburnum or sap-wood, that part of all trees which is most subject to decay. In these trees the sap is reduced to the minimum, being only one or at most two layers of woody fiber, while all within consists of duramen or heart-wood.

This fact makes the timber especially valuable for railway construction, because a stick of twelve or more inches diameter, instead of being hewed into the usual shape, may be split or sawed into two ties, which have the maximum extent of bearing for the rail, and, having only the bark and a thin layer subject to decay, when laid with its convex surface next the soil, the tie is in the best position for tamping.

There are many subordinate purposes to which this lumber may very advantageously be applied. It will be particularly desirable for all situations where wood is to be used in contact with humidity in the soil—such as wooden drains and culverts. It has been found very durable when

used as vine props in the vineyard, and as stakes for supporting the riders of our worm-fences. It will prove very valuable on account of its durability, if used for the permanent label tallies of the nurserymen. Add to this its lightness, and the thinnings after six years' growth may be well utilized as poles in the hop-yards.

PROPAGATION.

The multiplication of the tree is very easily accomplished. Though it has been grown from cuttings and layers, the better mode is to sow the seeds. The pods should be collected after the fall of the leaf, when sufficiently dry, and before the seeds fall from the opening valves. They should be stored in a dry place, and may very easily be threshed or tramped out at any time during the winter, and the seed separated from the piths and shells. It must be secured from the mice.

The seeds should not be planted until the earth is warm and well prepared. They may then be rather thinly sown in shallow drills, about an inch or two apart, with sufficient intervening space for cultivation between the rows; the covering of the seeds should be light, from a quarter to half an inch, according to the present and probable amount of moisture in the seed-bed. They vegetate at once, and will need to be kept clear of weeds and grass while small, but their broad foliage soon overcomes all intruders.

The leaves fall with the first frost, and so soon as the tips have hardened off, it is well to take up the plants with a spade or with the small tree-digger plow, and they are ready for storing in cellars, or they may be snugly heeled-in out doors, unless immediately shipped or planted out in their permanent stations. It is most desirable at this time to assort the seedlings according to their size, so that all of equal vigor may be planted together and make an even growth in the grove.

PLANTATIONS.

Having made a proper selection of the variety, no one need hesitate attempting a plantation of the catalpa tree within the limits that have been pointed out. Though in its native habitats the tree is found in the richest bottom lands of our rivers, it seems to thrive equally well on the uplands and on soils of very different texture and constitution, when planted singly or in avenues, and, so far as we can yet judge from limited observations in the artificial groves, which have been seen in very different situations.

The question of grouping or mingling of species arises with this, as with every other tree, nor have we yet had sufficient experience to decide whether the catalpa should be massed alone or mingled with other kinds, but the brief experience already had would induce a conclusion in favor of the former plan. Because of the rapid growth and of the broad foliage of these young trees, and perhaps because of their odor, other trees do not thrive with them. Several experiments instituted for a solution of this problem are now in progress, and seem to show that most other species will die out when crowded among these, being unable to compete successfully for air and light.

In the prairie countries, where this tree will be largely planted for a supply of ties, posts, and other timber, land should be selected that is deep and rich, and such as has already been in cultivation for one or more crops. This should be well plowed in the fall, and may then at once be planted, or left to lie fallow over winter. Where practicable, the former course is recommended, as the soil is generally in better condition then than in spring.

The planting is a simple affair; after the surface has been marked out with furrows four feet apart, the little trees are dropped every three or four feet, or at the intersections of the check-rows if the furrows cross; the planters follow at once with spades, setting them in the furrows and tramping the mellow soil about the roots. As the rows are set a one-horse turning plow should follow to bank them up slightly.

In the fall-planting this furrow may be made rather heavy so as to protect the little plants during the winter from heaving by the frost. This bank of earth needs to be harrowed down in the spring before the buds have started, and this cultivation will destroy a multitude of weeds that are springing from the soil. Cultivation should be continued at intervals during the summer, so as to keep the ground clear and mellow, which will also encourage the growth of the plants.

If some of the little trees be crooked or branched, be not concerned, for, during the winter or very early in the following spring, they may all be cut off together near the surface of the ground, to secure a strong, thrifty and even growth the next summer, when, if they have been well cultivated up to July, the result will be most gratifying and encouraging. There should be an even stand of sturdy trees, averaging not more than four feet apart, and reaching a height of five or six or more feet, covered with broad foliage, so completely shading the ground that no further cultivation will be needed, beyond cutting out a weed here and there during the next season.

The after treatment will consist in the occasional cutting back of a tree that may have been bent with the wind when wet, while the succulent stem was soft before the deposit of woody fiber in the young shoots.

Owing to the peculiar arrangement of the leaves and their buds, the natural habit of this plant is to throw out two or three shoots from the top of the stem which will make a low-branched tree, and close planting is the more necessary to aid in preventing such a result. Occasionally it may be advisable to cut back all but one for a leader, but when planted sufficiently close the forces of nature will generally check and destroy all superfluous growths, and produce tall, straight trees.

THINNING.—This may become necessary in the coming years; but, "sufficient to the day." In the limited experience and observation of artificial groves, so far, this work appears to be in a fair way of being executed by the forces of nature, without the necessity for human interference.

INSECTS.

The almost universal testimony in regard to the catalpa tree, and often cited in its favor by amateur cultivators, is that it is not troubled by insects. These pests have not been known to attack either the foliage or the woody fiber of those which are cultivated in this latitude.

Wherever grown, the wood that has fallen under the writer's notice is entirely free from all traces of injury or invasion by the larvæ of beetles or other insects.

But the fruit, particularly the pith of the pods, has been found disorganized and consequently the seeds were defective. This injury is supposed to be caused by the larva of a small fly—species unknown.

In its native habitats, both western and southern, the foliage is eaten to such an extent as to strip the trees at mid-summer. This is done by a large greenish naked caterpillar. On all the southern streams this is known to the fishermen as the favorite bait for catching bream; one correspondent described them as becoming six inches long at full growth.

Dr. J. Schneck, of Mt. Carmel, Illinois, cites the ravages of this caterpillar as one reason why the tree has not been cultivated in that region.

It is quite common upon the trees about Vincennes, Indiana, and it has migrated to those at Flora, Illinois forty-three miles west, where catalpas were planted by Mr. L. B. Parsons, President of the Ohio and Mississippi Railway, who was unwilling to have the trees ruined, and destroyed the insects by applying Paris Green and water with a garden syringe.

After seeking for sometime in vain for information as to the scientific classification of this insect, which is entirely unknown to our region, the needful information was promptly supplied by Professor C. V. Riley, United States Entomologist at Washington, District of Columbia, who identified it as the *Sphinx Catalpa*, of Boisduval. He says it is one of the most beautiful of the tribe.

The accounts of the Rocky Mountain Locusts' behavior when meeting catalpas on the plains, are quite contradictory, some correspondents declare that the hoppers give this plant a wide berth, while others say that they luxuriate upon the succulent leaves, and then eat the bark and even the wood fiber of young plants.

Before concluding this report, it may be well to remind the reader that pains have been taken to point out that we have in America two distinct catalpa trees, one of which appears to be peculiarly western, and that it is possessed of qualities that especially adapt it to our use in forming artificial groves for economical purposes. It is superior in its habit and in its hardiness. The timber of one may be equally durable as that of the other, and may resemble it in every particular, and yet the tree-planter may ask which will be more available for his purpose, when he undertakes to grow the trees for practical application in the arts.

Having distinctly set forth the differences that exist between them, the writer leaves every one to make his own selection, but he desires to impress upon the readers the propriety of their trying other trees in plantations, also, and not to expect all excellence in any one kind. We have a noble sylvia, a rich inheritance of trees of many kinds, with properties that adapt them to the various requirements of the arts of civilization, and with characters and constitutions that adapt them to various soils, climates and elevations. Some are peculiarly adapted to almost every portion of our extended country.

Think not, that we, who have been so much interested in the catalpa, and who have so warmly introduced it to you, would recommend you to plant nothing else; far from it, we plant many kinds and we advise you, and all others, to use your own good judgment in the selection of the several kinds that may be, and such as are supposed to be, best adapted to your own conditions.

Perhaps in the rich prairies of the west you may prefer to plant the Cotton-woods, Box-elders, White-willows, and similar trees of their class; plant them, then, only plant trees; you will have the benefit of their shade, shelter and fuel, and with these you have a preparation for more extended sylviculture with a more extended range of varieties. In such situations, you may feel assured that no trees will be likely to make quicker returns nor of greater pecuniary value, than the one which has now been presented for your consideration — The Western or Hardy Catalpa.

The greatest, the largest and most extensive plantations of forest trees in our country must be made by the great railway corporations. They will always need supplies for maintaining their lines; they can furnish the necessary transportation from the several points of production to those of consumption, and very many of them are at present the greatest land holders. Surely it is incumbent upon them to take a deep interest in everything that relates to the subject of forestry, which will ere long

exert no small influence in the development of their immense domains, all which will retro-act upon the interests of their business.

The managers of many of these corporations do seem to appreciate the importance of tree-planting, and some have even begun operations along their lines upon a scale commensurate (as initiative steps) to the great interest involved,—in these noble efforts they are congratulated. The liberality which has been extended toward one who has recently traveled extensively in the investigation of the catalpa, is hereby thankfully acknowledged—with the well-founded hope, however, that while he has labored willingly and without expectation of reward, the favors of these corporations will be amply repaid to them, if they do but put into practice the suggestions so freely offered by their friend.

Contributed by request of Mr. E. E. Barney, the disinterested patron of a useful tree, by one who has long known it, who stood sponsor for it in 1853, and whose more intimate acquaintance only heightens his admiration for its excellent qualities.

JOHN A. WARDER, M. D.,

Pres't Am. Forestry Association.

NORTH BEND, OHIO, Feb. 25, 1879.

INTERESTING LETTERS.

RALSTON STATION, TENN., *Feb. 1st, 1879.*

E. E. BARNEY, Dayton, O.,

Dear Sir: Your letter came duly to hand, and in reply would say that time alone can tell how long the catalpa wood used here will last; posts that were planted when the country was first settled, in 1810 to 1830, are yet sound, and show no sign of decay. If there are two varieties, there is but one here, at least I have never seen but one kind—the black bark variety, or *Speciosa*, as some call it. It grows abundantly along the Obion River, attaining a girth of sixty to ninety inches, and sixty to seventy-five feet high. In open situations it does not grow so tall, but often reaches the height of forty feet, with a clear trunk of twenty feet; among other timber they will be clear of limbs three-fourths their height; have never seen one but what would split straight, at least comparatively so. Their peculiar habit is in rich river soil subject to overflow, but will grow on our high ridge lands, and will make astonishing growth. I have a specimen block from a tree fourteen years old, fourteen inches in diameter. It is strictly a forest tree, and is used for posts almost exclusively. All the finest specimens have long since been used up, but nearly every stump has thrown up sprouts, some of them are now ten to twelve inches in diameter, and forty to sixty feet high. During the month of July it is attacked by a large black worm, perfectly harmless in its nature but a repulsive looking creature. If the tree is isolated it will often be completely

denuded of foliage, but, along the river, often one-half the trees escape their ravages entirely. Here people care nothing about cultivating the catalpa, our ridge lands furnishing an abundance of first-class post oak.

But those living in the prairie States are greatly in their own light if they do not plant extensively of the catalpa. Its growth is extremely rapid, and its durability is beyond question; and, when grown close together, ought to make the finest of timber trees. If one wants a shade tree, there is none more beautiful; if a post is wanted that will last forever, and then turn to stone, the catalpa will come nearer filling the bill than anything else.

Yours respectfully,

F. P. HYNDS.

PORT LAVACA, CALHOUN CO., TEXAS, *Feb. 5, '79.*

E. E. BARNEY:

Dear Sir: I planted the catalpa seed I received of you last of March, very late for this latitude, still they grew from two to seven feet. I transplanted them in nine months, and yet the roots were so long, many of them four to five feet, that I shall hereafter plant where I want the trees to stand, and thin out while very young, and replant where I wish them to stand. If I had let them remain till second year, I should have had a hard job to remove them. I think the catalpa is just what we need here where timber is so scarce.

D. W. HATCH.

The Roadmaster of the Missouri River, Fort Scott & Gulf R. R. makes the following report of trees planted: report dated October 14, 1878:

During November, 1877, the following varieties were set out:

Catalpas, 3 years old, 150 set out. Now living, 150; are looking well, but have made small growth.

Catalpas, 1 year old, 2,928 set out,—2,700 living; have grown 3 to 4 feet and look thrifty.

Black walnut, 2,850 set out; 1,600 living; look sickly and have made slow progress.

Chestnut, 2,050 set out, 1,214 living; look badly.

Cherry, 1,000 set out; 600 living; do not look well; have grown but little.

White ash, 15,000 set out; 9,472 living; have grown 6 inches, but do not look thrifty.

DURING 1878.

Box elder, 2 years old, 1,012 set out; 944 living; have grown 12 inches.

White walnut, 2 years old, 1,010 set out; 791 living; growth 2 inches; not looking well.

Catalpa, 2 years old, 2,600 set out; 2,449 living; have grown on an average 3 feet; look well.

Catalpas, 1 year old, 8,355 set out; 8,100 living; have grown on an average 2½ feet; look thrifty.

Pecan, yearlings, 1,000 set out; 641 living; have grown 6 inches; look well.

Osage orange, yearlings, 18,000 set out; 16,100 living; have grown 6 inches and look well.

Evergreens, 410 set out; 50 black spruce living; grown 5 inches; looking well.

A hedge of Osage orange was planted around the entire section, and is doing well.

The catalpas have made the greatest improvement, especially the yearlings, and in my judgment it is economy in time and expense to plant none older than one year. The Osage orange tree does very well in this climate, but is of slow growth.

I planted seeds enough last Spring to grow 30,000 plants: 5,000 came to maturity, and have grown from one to four feet.

European larch all dead; do not think they will prosper in this climate.

The box elders look well, but I do not know that they are of much value when grown.

The catalpa has certainly proved to be the strongest grower and most tenacious, standing the dry weather better than other varieties, and at present rate will come to maturity years before other varieties are of sufficient size to be of any utility.

The evergreens planted were too large, being 3 to 4 feet high, and the wind having such pressure on the large foliage, caused them to become loose in the ground, which allowed the air to circulate around the roots, thereby killing them.

A limited number of ornamental trees would be desirable, and I think if very small ones were set out they would thrive.

(Signed)

J. M. BUCKLEY, R. M.

George H. Nettleton, Receiver of the road, writes that in November last, 128,000 more trees, purchased by the president of the road, were being planted; of these, 100,000 were catalpa, of the early blooming, *Speciosa*, or hardy variety.

CATALPA IN ICE.

A correspondent of the *Prairie Farmer*, writing from Stillson, Cherokee County, Kansas, says that region has been visited by a severe storm that loaded all the trees with ice. Many trees and shrubs, too tender to "stand the pressure," broke beneath the enormous weight of ice. "In the forests," says the writer, "the Lombardy poplars and the cotton woods suffered the most; they are badly broken. The ground is well strewn with their tops and branches. The maples being more elastic, would bend without breaking. Some of them, twenty feet high, bent until their tops touched the ground. A row of Lombardy poplars along the road-side were so stripped of their branches and tops that they looked more like telegraph poles than trees. The catalpa seemed to be the only tree that escaped the injury. The weight of ice seemed to have no effect on them. They neither break nor bend, in my forest, where they have grown tall and straight; they stand perfectly upright, while the trees all around them are bent or broken. The power to stand up under such a great weight of ice is another thing that will recommend them as a timber tree."

The following letter from D. Axtell, Sup't of the Missouri Division of the St. Louis, Iron Mountain & Southern Railway, is of much interest:

CHARLESTON, Mo., Feb. 22, '79.

E. E. BARNEY:

Dear Sir: There is nothing to indicate that the catalpa ties in our track, near Charleston, Mo., do not hold spikes sufficiently well. Nearly all the spikes are in the same holes originally made when driving them.

over ten years ago. There has been no spreading of the track. I have examined the few ties the rails have settled into, and find none that will not last for a number of years yet by turning them over. These ties are six to eight inches face. If they were wider, as you suggest, there would be more resistance to crushing. With the joint fastenings now in use, I see no objections to making ties, as you propose, from logs twelve inches or more in diameter, by sawing them through the middle and placing the round side down. The bearing surface would thus be increased 50 to 100 per cent.

The section of catalpa log* sent you was from a tree lying on the ground in a swamp, on a place owned by Mr. Henson, seven miles from Charleston. Mr. H. says when he moved on the place forty years ago, the tree was lying on the ground and looked as old as it does now. He says it must have then been lying there at least ten years, and probably very much longer.

Mr. Henson recently made three hundred and thirty fence posts from one catalpa tree. He also got some good split posts from catalpa trees six years old.

Yours respectfully,

D. AXTELL.

The following letter from the *Chicago Tribune* of May 21st, 1878, should be carefully read and seriously pondered by all who regard the future welfare of our country. Every farmer who has even forty acres of land may do something, by tree planting, to avert the impending calamity so graphically described:

FOREST-VANDALISM.

OUR DEVASTATED WOODLANDS—A CANADIAN MERCHANT ON THE UNITED STATES TIMBER SUPPLY—VAST FORESTS WANTONLY DESTROYED.

The subjoined letter was received by the Hon. David A. Wells recently from Mr. James Little, a prominent lumber merchant of Montreal. Mr. Little has investigated the lumber-producing regions of the United States, and he sets forth the result of his investigation with clearness and candor. The result as far as the older States are concerned is startling. Already there are only four States among the twenty-six North of the old slave line and East of the Rocky Mountains whose forests are capable of supplying lumber enough for transportation beyond the State limits. Mr. Little goes over the ground thoroughly in his letter, which should commend itself for its combined terseness and comprehensiveness, and for the vital importance of its subject to all legislators and public-spirited citizens:

MONTREAL, *May 16, 1878.*

THE HON. DAVID A. WELLS:

Sir: The deep interest you are known to take in the subject of political economy and the freedom of trade induces me to bring under your notice what is, beyond dispute, the most important question in relation

*This section of a catalpa log, now in my office, is perfectly sound, showing no signs of decay, though it has lain on the ground certainly fifty years, possibly one hundred.

to the industries, necessities, and well-being of your people that has ever been presented for their consideration, namely, the question of the timber supply and consumption of the country,—a matter in which every individual, high and low, rich and poor, of your forty millions of people is interested. Being engaged in lumbering,—a business I have followed for close on half a century, mainly with the United States,—and witnessing as I did how rapidly one extensive timber section after another in Western Ontario, where I operated, was stripped of its commercial woods, my attention was necessarily drawn to an investigation of the sources and extent of the supply to meet the ever-increasing consumption of both the United States and Canada. I now proceed to give the result of my researches in relation thereto, so far as the United States are concerned, as briefly as the subject will admit.

I find of the twenty-six States comprising the New England, the Middle, the Western, and Northwestern to the Rocky Mountains, only four, namely, Maine, Michigan, Wisconsin, and Minnesota, are now able to furnish supplies beyond their own requirements, and I will now point out the condition these States are reduced to touching their supply of building-timber, and how long they may be expected to stand the drain on their forests, at the rate of consumption going on, of this indispensable material. The State of Maine, which not long since could boast of most extensive pine forests, is now all but stripped of that valuable wood, and is besides so far denuded of its once-supposed inexhaustible supply of spruce that the lumberers are forced to the headwaters and tributaries of every river in the State to hunt for supplies, and are stocking their mills in a large measure with logs cut from sapling poles of from six to eight inches in diameter, and this reckless and wasteful slaughtering is carried on to such an extent to supply the neighboring States, and for shipment abroad, that a few years will find the people of that State without building timber, either pine or spruce, for their home consumption. The Northern sections of Michigan, Wisconsin, and Minnesota are the only localities of the whole twenty-six States that are able to furnish supplies of white pine beyond the wants of their own respective States, and the demand on them is so heavy for all sections of the country that it will not be possible for them to respond to it for more than six or seven years longer. Their main streams are all stripped, and the lumberers are now operating at the head waters of their tributaries, where they are forced to bank many of their logs in dry gullies, depending on the winter's snow and spring rains to produce freshets sufficient to float them to the main streams, and which often fail, as will be the case with many of them this season, for want of water to move them from where the loggers have hauled them. A number of railways have also been built to secure the lumber traffic of these timber sections; no less than six are now running through every patch of timber otherwise inaccessible to the loggers on the lower peninsula of Michigan, hitherto the greatest lumber-supplying State of the Union, and the mill-owners themselves having, many of them, exhausted their timber within team-hauling distance, are busy at work building railways on their own account to enable them to reach what are now the outskirts of their once supposed inexhaustible timber resources. And here in these timber sections, and in the positions I have pointed out, is to be found the whole white pine supply for the consumption of your whole country East of the Pacific slope, and, were the whole of that supply brought to one point, it could all be covered with the palm of one's hand on any ordinary map of the United States; and yet, notwithstanding this state of the case, the lumberers keep slaughtering away as if life depended on how soon they could rob the country of its timber wealth and bring about a timber famine, to the utter ruin of the wood industries of the country, in which every member of the com-

munity is deeply interested. Not satisfied with the havoc they are making to keep their own markets continually largely overstocked, they have also made extensive preparations by fitting up their mills for the manufacture of deals, to drive, as their lumber papers boast they will, the Canadian supply out of the British markets, and they are besides at work using up the best of their white pine in the manufacture of boardwood and square timber for the same markets, a course most destructive to the forests. In fact, lighting the candle at both ends would fail to fitly describe the utter recklessness and folly of their proceedings,—they are casting it bodily into the fire.

We have theories and speculations on the forests as influencing the rain-fall, and their value as reservoirs to keep up a supply of water for your rivers, water-courses, and canals, and afford power for machinery, but who has given consideration to the consequences to your whole country of a dearth of timber? Who of your statesmen has given his mind to think on its effects on the 173,450 industrial establishments, and the 1,093,202 operatives, who, as shown by your census returns, as far back as 1870, are engaged therein, providing your people with the finished wood materials so indispensable to their well being? Who of the delegations from the Northwestern timber sections, that are now praying Congress to prevent Canada from giving any assistance to prolong the life of these industries, has taken into account the consequences of a failure in their timber supply on the settlement of your boundless, treeless prairie country, or the deprivations it will entail on its inhabitants, and the millions who are to make it their home? Who of your whole people has given himself the trouble to understand that it would require you to raise \$500,000,000 to send abroad to purchase an amount of lumber equal to your present consumption for a single year, or that all the tonnage of the whole world would fall far short of being able to freight it from your Pacific Territories to your Atlantic seaboard? The aggregated freighting capacity of the world is only about 18,000,000 of tons, while the 12,755,000,000 feet of lumber shown by your census returns of 1870 to have been sawn in 1869 would make a tonnage of 21,000,000, from which it will be seen that, without taking into account the thousands of millions of shingles and the millions of feet of timber consumed at the same time, there is not tonnage enough in existence to freight that single item of sawn lumber alone around Cape Horn, and how inadequate it would be to meet the shipping requirements for the whole consumption of all kinds of building timber and wood for other industrial purposes of the present day, and how much more so by the time your present stock is exhausted, with so many more millions of consumers to be supplied.

And what have your authorities been doing to meet this state of things? Have they been making provision to keep up the supply by tree-planting, as in Northern Europe? Have they been husbanding their forest wealth and preserving it from spoil and waste? On the contrary, have they not been prodigal in their efforts to get rid of it by making presents of it to corporations and disposing of it for a trifle of its value to individual speculators—one of whom, in the West, boasting that he owns three-fifths of the cork pine in Michigan, Wisconsin, and Minnesota, and another in the East, claiming to be the owner of over 500,000 acres of land selected for its timber value? Have they not been standing quietly by looking on at the extensive robberies committed on the public domain that have been carried on for years in the South and Northwest, by which not only the home-markets have been kept largely overstocked, to the injury of all legitimate operators, but the foreign markets as well have been kept glutted to such an extent that even the plunderers themselves received nothing for the timber, and but little for the labor expended in preparing it for market? And have they not, for the sole benefit of these

corporations and speculators, and to the injury of every other individual of the community, been forcing Canada to find markets abroad for her timber and lumber by the imposition of duties? And are they not even now, with the present condition of things staring them in the face, preparing a tariff in which the same obstructions are to be continued to prevent this country from giving assistance to mitigate or protract to any extent the impending deluge so soon to sweep over your whole country?

From the utter indifference and neglect with which this momentous question of the supply and consumption of timber is treated by your people, it might be supposed you could dispense altogether with its use, or that you could reproduce it as easily as raising a crop, or that you would have no difficulty in finding a substitute, but it takes a century to grow a standard pine saw-log, and if there is a country on earth in a position to do without or find a substitute for timber, that country is Great Britain, and yet she increased her wood consumption at an average rate of 10 per cent. a year for the last ten years, and last year, as shown by her trade returns, it was 31 per cent. more than in 1875, and the import of that island, not half the area of your State of Texas, and being, as it were, thoroughly finished up throughout its whole extent, showing no further room for improvements, amounted to no less than \$100,000,000. But large as that sum is, it is comparatively small to what the United States will soon yearly be called on to supply for its own wood consumption, and it is not a luxury that can be thrown aside at will; it is indispensable to the national well-being.

I know that the impression prevails, and it is often stated by interested parties, that it matters little what is the condition of your supplies, as you have but to look to Canada, where can be found "enough for the most exacting populations of the world for centuries," which is the statement usually made by those utterly ignorant of its true condition, or those who do so for a purpose; and I will here assert from a personal knowledge of most of the timber sections of Canada, and trustworthy reports from others, that we have not, from the far-off Province of Manitoba to the Gulf of St. Lawrence, as much pine, spruce, hemlock, oak, ash, elm, whitewood, and other commercial woods as would supply the whole consumption of the United States for a period of three years, and the whole accessible pine localities have besides been run over to such an extent for such pine and board wood timber as would pay to ship, that many of our lumberers have been forced to seek for these descriptions of wood goods to supply the English demand in your Northwestern timber territories, where they may now be found cutting down on an average three trees to get one stick, and leaving the others, from some trifling defect, to rot in the woods,—a waste of this valuable material that you can ill afford. I will further venture the prediction that the near future will reveal such a state of things in regard to the timber question as will bring your Government fully to realize it would have been a wise policy on its part to have paid a bonus for the importation of our lumber, if by such means it could have been saved for the use of your people, than the course it has adopted in driving it away to foreign markets by the imposition of duties to any amount.

The first of the timber famine will begin to be felt in the next three or four years, and will be fully reached throughout the Eastern, Middle, Western, and Northwestern States in the short period of six or seven years, if the present wasteful course is kept up; and when the pitch pine of the South, a description of wood unsuited for many purposes, is called on to supply the whole consumption, all the building and saw-log timber from the Eastern boundary of Maine to the Rocky Mountains and the Gulf of Mexico will be swept away in as short a time as has passed since

the close of the war with the South,—a mere moment in the future of your country.

I have, sir, here endeavored to give you some idea of the state and extent of your timber resources, and the ruinous consequences sure to follow and be felt throughout the length and breadth of your entire country when a failure in the supply which a few short years will bring about is reached, and am, sir,

Respectfully Yours,

JAMES LITTLE.

I do not think Mr. Little at all overestimates the annual consumption of lumber or the rapidity with which our country is being denuded of its forests, or the impending calamity resulting therefrom, if no means are taken to avert it. The annual consumption of my own manufactory is over 10,000,000 feet, and it is but one; and by no means the largest of the 175,000 referred to by him, over our whole country, as consuming our forests all the day long and all the year round, that have been the growth of the last 100 to 500 years.

One means of averting this calamity is the extensive yearly planting of well selected forest trees. I have urged the cultivation of catalpa, believing it will give the largest return in the shortest time. Its economic uses are more varied and extensive than any one tree with which I am acquainted.

If I had a grove of common catalpa that would not be affected by the frost, I should certainly let them grow. If I wished to plant a grove of catalpa, above or below the frost line, I would most certainly plant only the *Speciosa* variety, as clearly better adapted to forest culture.

I by no means ignore the fact that there are other valuable trees for forest culture—notably the white walnut or butternut, black walnut, yellow locust, red and black mulberry, Osage orange, ailanthus, cherry, ash, oak, and many others, of the respective merits of which I leave others to speak.

At the time I printed my first pamphlet I was under the impression that the examples of durability given were mostly, if not wholly, common catalpa. As it became more and more apparent, on further investigation, that the *Speciosa* variety was much preferable for forest planting, I felt it to be of the greatest importance to know, beyond any question, that this variety was equally durable.

I therefore arranged with Mr. Jno. C. Teas, of Carthage, Mo., a horticulturist who had been familiar with the common and *Speciosa* variety for thirty years, to visit those localities in the West where the catalpa was known to be indigenous, and make a thorough investigation as to the durability of the *Speciosa* and all other matters of interest pertaining thereto. He obtained much valuable information; the full report of which, sickness, I regret to say, has prevented his preparing in time for this pamphlet. His letters establish beyond any

question the durability of the *Speciosa* variety. Indeed all the numerous examples of durability were found to be all *Speciosa*, and that it was the only variety found in the forests of Illinois, Missouri and Arkansas.

December 2, '78, he writes from New Madrid: "Two important facts are clearly established, viz.: that the *speciosa catalpa* grows wild, or native, in its pure and perfect distinctiveness, at various points along the Mississippi River, not to speak of other localities not yet explored: and secondly, that its timber possesses the wonderful durability for which the *catalpa* has become so noted. Just now a new idea occurs to me. May it not be possible that the *catalpa* growing east and south-east are what we call common, and all the wild ones west *speciosa*?"

"As the trees in cultivation have nearly all been distributed by the nurseries, or grown from seed of trees so distributed, and as in nursery work, as in other matters, it is 'westward the star of empire,' &c., it is hardly to be wondered at that the eastern variety should have covered the east half of the continent before the difference and great superiority of the western was recognized."

The more I thought of the matter, the more its importance grew upon me, and I felt so important a question should be established by the testimony of at least two unimpeachable witnesses. I therefore also arranged with Dr. Jno. S. Warder, President of the American Forestry Association,—and who, in 1853, had, with Mr. Teas, christened this variety *Speciosa*,—to make a full investigation of the same subject. The railroads, deeming the matter of sufficient public importance, promptly furnished passes to both.

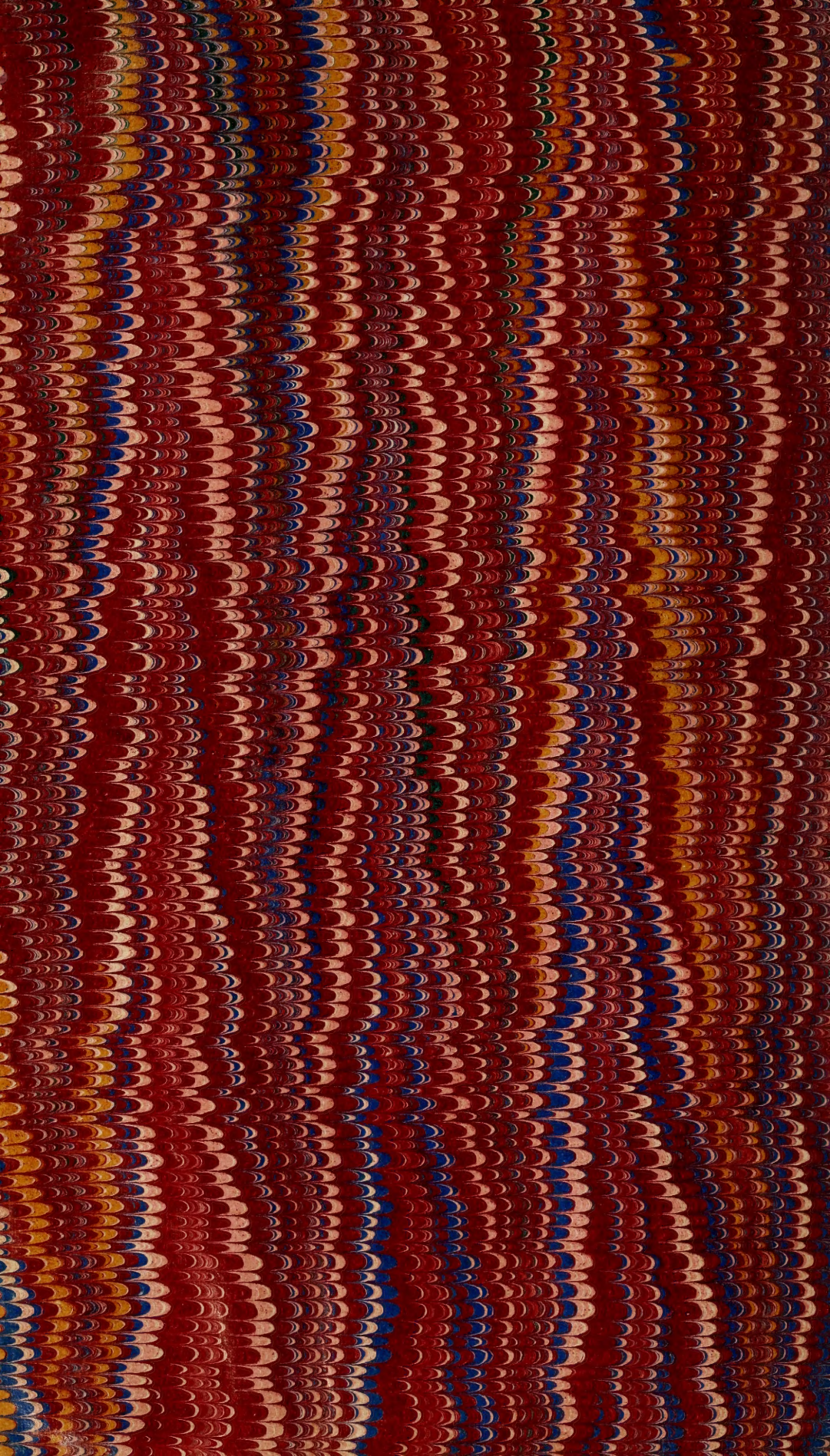
Dr. Warder's investigations confirm Mr. Teas' in every particular as to durability of the *Speciosa*, and establishes the fact that it is the only variety of *catalpa* native to the forests, also of Indiana, Western Kentucky and Tennessee, as well as Illinois, Missouri and Arkansas; and that it is unmistakably a western tree, having clearly defined and well marked characteristics that are uniformly transmitted in the seed.

His report, condensed for this pamphlet, from a much fuller and more elaborate one, will be found on page 17.

The facts that seem to be so clearly established by Mr. Teas and Dr. Warder's investigations are exceedingly important and interesting to the botanist and the practical forest tree-planter, and richly pay for all the time and money expended in obtaining them, and the gratitude of the whole country is due the two indefatigable workers who, through great labor and much personal discomfort, have obtained them.

If what I have printed shall incite to an increased interest in forest tree-planting, I shall be amply remunerated for all time and money expended.

E. E. B.





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