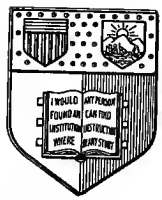

EVERGREENS

HOW TO GROW THEM

Including varieties and characteristics of the principal Evergreens of the United States

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INTRODUCTION.

EVERGREENS—HOW TO GROW THEM.

This work, like its predecessor, "The Gold Mine in the Front Yard," is designed chiefly for the great Prairie States. The writer having raised evergreens by the million under adverse circumstances, and being acquainted with leading growers East and West, has the pleasure of presenting facts and he is sure he has made instructions so plain that the intelligent farmer can do his own planting successfully.

This is written for the common people and not for experts. In the main he has used English names, and why not? For instance, over twenty names are given to the Douglas Spruce and its varieties. How much better off would one be for piling up lumber which would never be used? So we give you the Douglas Spruce straight and you will know it just as well as if we piled a ton of names on it.

The Real Riches.

The Real Riches:—How greedy men are for gold! Let a mine be opened at the North Pole, and adventurers would go there no matter what risks or discomforts they would have to encounter. Strange that men cannot see wealth all around them. There are values rising into untold millions to be had for the taking. They are safe. You incur no danger in possessing them. The farmer lives in the very midst of gifts that have been waiting patiently for him. I think much of the possibilities of the prairie. Since 1844 I have lived in six of our western states and have seen them grow up from babyhood. I find myself dreaming often of the possibilities of these western homes. Soon the farmer will turn a little from the mere money getting department of his work and give more attention to the comforts, conveniences, and pleasures of life. So many improvements are being made in grain growing and stock raising that millions will be added to farm values and beautiful homes will rise like magic from our fertile soil. Our farms will be like the splendid estates of the rich in the suburbs of our great cities. So much adornment will surround the home that living in the country will be like living with God.

There is no spot on earth so susceptible of improvement as the prairie farm. It is a broad canvas on which you can paint any picture you please. It has an advantage in being barren of trees at first, so you can lay out your grounds to suit yourself. The soil is absolutely hungry for trees and has an affinity for evergreens if the proper varieties are selected. The Conifers are an extensive family. Not all of them are adapted to one locality. Each has its preference of soil and climate. Out of their own habitat they seem to pine and die of homesickness. The stalwart Ponderosa, the hero of the arid west waving defiance to drouth and storm out in the foothills of the Rockies, becomes a pitiful and helpless thing down on the Atlantic coast. Though we have not as wide a range of varieties in the west as in the east, yet we have enough for a fine selection.

Take a home on a bleak windswept plain with no protection and it is a picture of desolation. It is bombarded by the storms and the snows swirl around it. There is the barn out in the open. Turn the stock out to water when the cutting north wind is below zero, and they stand shivering as they drink. The terrible cold eats their flesh away. To them winter is a martyrdom.

But all this can easily be changed. We have given years of study to this subject and have made tedious and expensive experiments in the semi-arid regions of the west, and we are sure we can give our readers such information as will enable them to have homes of comfort on our bleakest prairies; even the Dakotas can be dotted with farms which will be as Elysiums of beauty dropped down amid the winter dreariness. To me there comes at times a sort of second sight. I see beautiful groves, myriads of flowers, charming trees, splendid landscapes floating like flocks in the air, waiting to alight and glorify the farm. When the farmer is ready for them he can have them. His land lies on the borders of marvelous wealth and amazing beauty.

CHAPTER I.

A MUTILATED LAND.

When God turned America over to the Anglo Saxon race it was a series of splendid forests, magnificent parks, broad prairies, with views unsurpassed by any land or age.

When the Pilgrims landed in that dreary December, they were in the midst of a winter desolation, and disease carried off half their number in a few months. But when spring came, scenes of wonderful beauty opened all around them. The trees put on their robes of green, the ground was covered with flowers and the air was laden with their fragrance and tremulous with the blithesome songs of the birds. Nature gave them genial welcome to a new world. They stood on the margin of a vast empire which unfolded before them scenes of beauty and grandeur unknown before. Look at the condition. In New England there were great forests of spruce, pine, and noble deciduous trees, oaks of mammoth size in rich variety, the different families of the ash, and the stately and wide-spreading elms in all their majesty. Away in the North were magnificent forests waiting to welcome the settlers, furnish material for his home, and defend him from the storms. Here were broad rivers lined with trees languidly seeking the ocean. Charming brooks, fringed with ferns and flowers, were murmuring songs of content. Beautiful lakes were flashing like diamonds in the bosom of fair Mother Earth. The inland waters were margined with trees whose majestic forms and drooping branches were mirrored in their placid faces. There were mountains clothed with verdure to their very summits, and from their sides springs were gushing, carefully protected by trees and sheltering bushes so they could not run dry. To the West great prairies spread out into a vastness which was sublime. They were God's great parks on which He had bestowed especial care and forethought for long milleniums. They were

carpeted with a rich covering of green, interwoven with flowers. How broad and grand they were! Their emerald horizons touched the sapphire of the heavens and the vast expanse was domed with that arch kalsomined with deepest blue, unstained, untarnished with the smoke and dust of our modern civilization. At night how glorious when the moon came out and the stars were lighted, when the silence came down upon you, and you could listen to the stillness and feel that you were tenting with God.

Further to the West are the great plains—not all a desolation, for those wide expanses have charms peculiarly their own. Yonder, on the borders of the vastness, mighty mountains are lifted against the sky,—the hoary Rockies, seamed with age. What tremendous convulsions in those far-off eons, when those masses of granite were torn from their resting places and hurled skyward! The horizontal transformed to the perpendicular—rugged rocks torn and rent from earth's bosom are tossed heavenward—great turrets, domes and steeples, thousands of feet high, pointing giant fingers of stone to the Creator whose power upheaved them.

Let us go among them. Here are furrows a thousand feet deep, plowed among the rocks. Listen to the roaring of the streams as they leap over the falls and rush down the rapids in their mad race to reach the plains. See all those mountain sides covered with trees; the unsightly brown of the somber rocks covered with green. What wonderful conifers, with sheen of emeralds and ermine, softest green and sapphire, noble sentinels are they, standing in robes of state waiting, in Nature's courts, to receive and welcome the visitor. How patiently and wisely faithful Nature has been toiling all the long eons, grinding up the rocks, mixing them with the leaf mould to give sustenance to the tree. Yonder is a grove of the Engelman spruce, like a fringe around the brow of a bald mountain rising above the timber line. On that sharp peak, pointing skyward, there are trees clinging to the fissures in the rocks. Little nourishment they get but they are there; brave trees, adding their part to the beauty of the scenery. All those steep mountain sides are covered with forests, the work of ages.

Stand on that lofty peak and overlook it all, and it is like some mighty sea tossed with the fury of the wildest storm, with billows thrown to dizzy heights and all turned to stone and covered with green.

Go further West and you see other mountains tossed out of the arid plains like Sinai, "the Mount that might be touched." Their crests are crowned with forests; their sides are covered with grass; bushes fasten the soil like flesh to the rocky ribs. Go further and you see the Yellowstone Park wedged and packed with the Lodge Pole Pine, where the brave trees grow even in the spray of the geysers. Go further still and you

reach the finest ever seen on this old earth of ours. There the Douglas Spruce, like a forest of masts crowded together; there the Giant Redwood the Sugar Pine, the king of all the race and the mighty Sequoias, emperors of the forest kingdom.

There are trees standing strong and vigorous today that were giants when the mysterious Babe lay in the manger at Bethlehem. With the wisdom of God and the forethought which looked down through the ages, Nature had planned against deluges and catastrophes. Rains might fall in floods but they were held in check by millions of dams formed by the roots of the trees, fallen branches and leaf mould, which, like sponges, retained the moisture, compelling it to filter out slowly to the rivers. On the prairies the floods were held in check by the rank grasses so they could not wash away the soil. If there were heavy snows in the North, God had it so planned that the thick trees spread out their branches as protection against the sun, so that they must thaw slowly, and then the myriad dams beneath were ready to hold the released waters in check.

Under such a wise provision all the rivers and streams would have an even flow. Till vandalism stepped in, the Mississippi was navigable to the falls of St. Anthony and the Ohio was an artery pulsating with a busy commerce. Such the primal condition, beautiful forests of noble trees, hill and mountain sides and rolling prairies were guarded against the washing of the soil. No one could depict the beauty of the virgin land which was adorned as a bride for her husband. And the husband came, commencing a system of cruelty, persecution, and indignities which present to us today the spectacle of a murdered land.

In the East the forests were cut away. No thought or care was given to the hillsides and the rich soil was carried out into the ocean, only bare and stony fields remained. Farmers said the stones seemed to grow. No; they gathered them up year by year, releasing more earth to be carried away. In a generation or two the soil was gone, the stones remained and the land would no longer support the family.

The forests were cut from the sources of the rivers; Nature's dams were swept away and the mighty Hudson and the Connecticut feel the wrong and yearly swell with anger at the indignities inflicted. Often rich valley farms, that never were troubled before, were overwhelmed with floods and desolation took the place of beauty.

Take the Appalachian range in the South. It was a region of marvelous beauty. The mountains and hillsides were covered with noble trees and flowering shrubs, the streams had an even flow, the valleys were defended from the floods by the rich vegetation which clothed all the sources of the streams. Then fools climbed those steep declivities with their axes. In some cases they girdled the trees and planted

corn and before the great trees fell the soil was swept away. Then they moved higher up and continued the work of destruction. What was the result? Those rich farms in the fertile valleys were ruined. Great masses of sand and rock were hurled upon them, houses and barns were swept away. The valley of the noble Catawba river became a scene of awful desolation. In the southern Appalachian region, in a little over a year, the damage was estimated at over eighteen millions of dollars, and this only the beginning of the ruin which must go on. Did the vandals get eighteen millions out of the forests they destroyed? This thoughtlessness is like children playing with dynamite, lighting the fuse and throwing it into a neighbor's yard. Hundreds of lives and hundreds of millions have been destroyed by this fearful heedlessness and wanton disregard of the wise provisions of Nature. God can work thousands of years to adorn a land with marvelous beauty and in a short time civilized barbarians can destroy it all.

In Arizona the streams which flow through Texas have their beginnings. Greed drove in great herds of cattle and horses and vast flocks of sheep. These destroyed the grass and bushes which bound the soil to the mountain sides. The forests were cut from the mountains, only a small portion of the timber was used, the rest was left to invite the fires. The young timber was ruined, leaving a track of desolation. The floods came. There was nothing to hold them back. Nature's dams were all torn away. The rains ripped the soil from the rocks and poured avalanches of mud into the streams. They plowed great furrows thirty feet deep through the rich valleys. The beds of the rivers were filled with mud and rock. Of course they overflowed. Then they poured into Texas; hundreds of lives were lost and millions of property destroyed. All because men, heedless as a drove of donkeys, could not see the result of such diabolical indifference.

Look at our northern forests. A casual observer would have said, "They will last forever." They might have done so if cared for, giving a perpetual harvest. But to the lumberman there was no future—only a today, and into that the work of destruction must be crowded as fast as possible. The ax, firebrand and railroad engine found "a Garden of Eden before them, and left a desolate wilderness behind them."

Go to the West and how the forests have been stripped from the mountains of Colorado! Further West the track of civilization has been the track of ruin. As fast as human ingenuity can devise, God's noblest work and the grandest forests which ever sprung from earth are doomed to destruction. Only a little while and blackened stumps will be all that is left of God's richest legacy to man. Fortunately the Government has stepped in and is saving shreds and patches here and there—oases left in the desolation.

The South suffers every year from Northern heedlessness. The headwaters of our great rivers have been denuded. The bottom of the Mississippi is constantly filling up. There must be great expense in keeping those banks from breaking and pouring the floods over vast areas. Almost every spring there is danger of an overflow. And all this is the result of the selfish indifference of men who cannot look beyond their own pockets. As the result of this barbarism a mighty timber famine is upon us. With the growth of our civilization more and more timber will be needed when there will be less and less. The loam from our rich prairie farms is being rapidly washed away, and there is no thought of retaining the escaping soil. Stand by any of our western streams after a heavy rain, and they are thick with mud. They are bearing the very cream of the land down to the gulf. I have known a heavy rain to carry away the entire furrow, just leaving the marks of the plow behind. Strange that the farmer should join the lumberman in the awful mutilation. In the future the devastation from the floods will be greater rather than less. And when we think that all this could be prevented, there comes a stinging sense of wrong. This is a dark picture, but it is true. In some respects our vaunted civilization is double distilled barbarism.

The wild Indian in the darkest depths of savagery never dreamed of such soulless, heartless murder. He would not think of charring dear old Mother Earth to cinders—stabbing, scarring and scalping her, despoiling her of her glorious beauty, making her sit in dust and ashes.

The Restoration.—When we think of these awful devastations wrought in so short a time, there is no wonder that in the last few years a strong forestry department has arisen which will soon demand the services of thousands of skilled men. No wonder that forestry societies spring up in almost every state and that men with soul aflame would, if possible, dip their pens in liquid fire and write words that would burn.

Though this picture is so dark and the desolation wrought in a short time is so fearful yet we need not despair. Suddenly the eyes of the nation have been opened and an interest unknown has been awakened.

After ages of loss and waste the nations of Europe awoke. Forests were replaced and millions of acres of drifting sands were crowned with woodland beauty. The conditions today are better than ever. We have an efficient forest bureau, a President who loves our mountains and trees, and a Secretary of Agriculture who reflects the will of the people. We have forest reserves of millions of acres. The Government holds sole jurisdiction over immense tracts which are the sources of our streams and rivers; with the splendid system of irrigation now inaugurated the forests, which are the mothers of the fountains and streams, must be preserved. Many states are now replant-

ing the denuded lands and many private owners see the need of saving the young trees that there may be a perpetual lumber harvest. The Government from now on will retain the timber lands and have the lumbering done under their own supervision, cutting out the ripe trees and saving the younger ones.

One of the most powerful factors in this work of restoration is the persistent and tremendous energy of Nature, which with a motherly forethought hastens to the rescue.

If you visit the Rockies or the Black Hills you will notice that everywhere she is following up the ax and the firebrand with an alertness which is remarkable. Here is a vast tract; every tree sound enough for use is cut away. A few charred and marred ones are left standing. Threaten a tree with death and what does it do? It is in tremendous haste to reproduce itself. No tree believes in "race suicide." Apple trees are threatened with death by root pruning and girdling and in alarm at the danger of extinction they load themselves with fruit. So these charred remnants of the forest are laden with seeds and the seeds have wings. The strong autumn winds whirl them out over the ground. They come up by the million and grow like weeds. You visit one of these young forests—the ground is covered with vigorous little trees from twelve to twenty-four inches tall. Ten years after you go again and they are twenty feet high. They are busy day and night, eager to restore the waste. Nature has so arranged that some varieties retain the seeds locked up in the cones with a vicelike grip, and they are not released till a fire passes over, when the cones are unlocked, and the seeds shoot out to take root in the ashes—springing up by the million. When Nature is aided by man the work of restoration is soon under way. In the East, farms are often worn out and deserted. The soil is washed away, and the people have gone. Then Nature moves in. The seeds of the White Pine come merrily whirling and dancing through the air, with hop, skip and jump, they take their places among the chips, stones and brush and lo, in a year or two there are thousands of thrifty little pines. They grow rapidly. In thirty or forty years those fields have made better returns than they made in the same period with all the grubbing and stone gathering, all the sweat and toil which the owner gave to those reluctant acres.

You have noticed a peculiar kind of lumber used for shoe boxes. It is harder, and the grain is coarser than the common White Pine from the northern forests while there are a great many sound knots in it. This is the vigorous second growth of the White Pine of New England. The logs are sawed up three or four feet long. They are cut into thin boards and then are edged so as to save all the lumber possible. I think one of the finest spectacles in the old Bay State is to see these young and thrifty groves with their bright green foliage taking

possession of a worn-out farm. There is much White Pine in the East, but I think you seldom see a grove with trees of a century's growth. Old as the country is and crowded with eventful history, it does look refreshing to see kindly Nature cleaning up after men and making the country new and fresh again.

The same condition is found in the South. The old wornout plantations are buried with fresh forests; everywhere the trees are edging into the fields and there is a constant warfare between the forest and the plow.

Again, the soil of the great prairies is absolutely hungry for trees. I came to this place, where the city of York now stands, in 1871. There was not a bush or a tree growing then. We began immediately to plant. Now ours is called the Forest City. In comparatively few years we have trees three feet through, and some of them would make 1,000 feet of lumber. Conifers planted in the early days have done remarkably well, and if, thirty or forty years ago, forests of Ponderosa and Austrian Pines had been planted by this time they would have brought fabulous returns.

Every farmer on his own place can help in this universal work of restoration. He can stop the wash from the side hills by planting them to trees. He can dam up the ravines and catch and hold the soil which would otherwise go to the gulf. He can plant his lowlands to cottonwoods where nothing else will grow and those trees will pump gold out of the rich mud.

CHAPTER II.

THE MISSION OF THE CONIFERS.

In the economy of a kind Providence these trees stand well to the front among our benefactors. The wonder is that men do not surround themselves with these faithful sentinels which in great armies, would stand guard around their homes, defending them from the fierce storms and icy blasts.

Evergreens bring the freshness and beauty of summer into the dreariness of winter. For mingling of color the green and the white form the most beautiful blending. I was once in the heart of the Rockies when a great snow storm fell the last of August. The green branches were laden with the purest white. Above, the sky was of the deepest blue. The sun shone out in his splendor. Whichever way we turned there was the harmonious blending and it seemed as if we were riding through an enchanted land. The snow crystals were sparkling in the light. Every tree, large or small, was wrapped in its mantle of richest ermine.

What an important part our evergreen forests have played in the building of a great nation. The apparent intent of these trees seems to be, first beauty, and then use. First, the tree is a pyramid of green, the branches pushing outward as the main stem aspires upward. Then in after years it loses its lower branches and gives its attention to developing the trunk.

While visiting the home of Professor Sargent, who has given us that monumental work on the "Sylva of North America," and walking in his beautiful grounds he said to me: "I am disgusted with most of our evergreens. They will not hold their lower limbs. The Picea Pungens is a disappointment. The Norway Spruce and White Pines will lose their branches. They are unsatisfactory. I want a tree that will retain its branches down to old age and be a great pyramid of green." I replied, "Professor, a tree seems endowed with a sense of beauty and forethought. First comes beauty. We all know that a young evergreen is one of the most charming of trees. The next stage is usefulness. Its ultimate destiny is a sawlog. It seems endowed with a conscience as if it knew its mission and wanted to be faithful to it. All along its history it is intent to please and benefit."

The marvel is that when these might be raised by the mil-

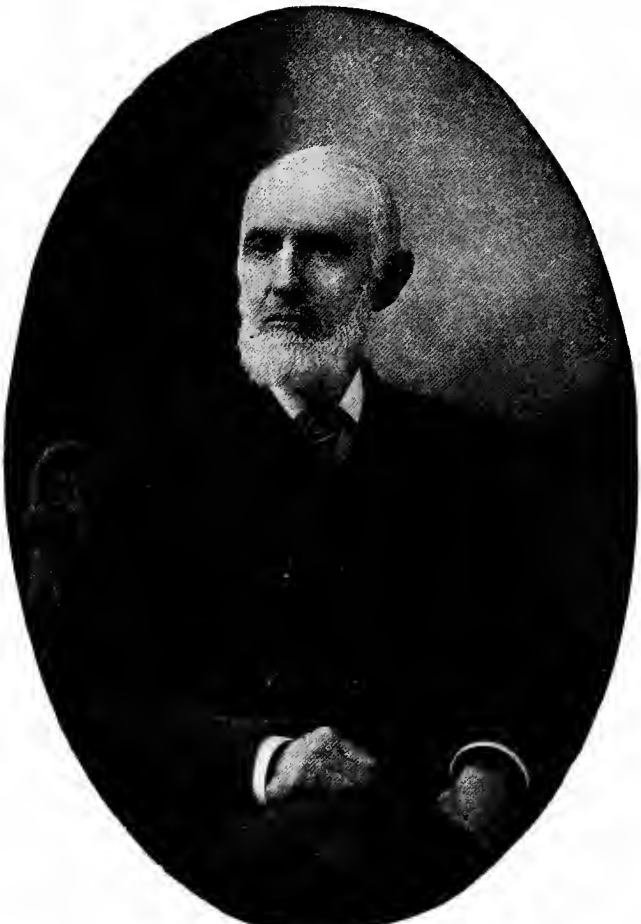
lions, when the very character of our somber landscapes might be changed, giving waves of health and healing to the air and perennial freshness all around us, we pay so little heed to them.

A Winter Foliage Garden.—We love to have a rich variety in summer. Each tree has an individuality. The effect of the various shadings of color is always pleasing. Some have brilliant leaves of varnished green, others have a softer tone. Some have large leaves, and others very small ones. Among the elms many of our natives show a very rank and vigorous growth, while the Japanese, the English, and the Scotch varieties will have extremely delicate foliage. Some are of yellowish green, others have so deep a color as to be almost blue. The effect is enhanced if we have now and then a Silver Poplar or a Russian Olive with its various shadings.

In autumn our mountains and forests are gorgeous in their brilliant robes, when all Nature goes into a carnival of display before the sober Lent of winter. In planning our landscapes we should always study autumn effect, so that, when our choice summer flowers succumb to the frosts for a brief season, all the trees around us should break forth in a wondrous profusion of beauty.

But who ever plans for a Winter Foliage Garden, thus making beauty perennial, with charms that encircle the year? When we study the individuality of our evergreens we are impressed with the fact that there is a vast empire of attractiveness which is as yet hardly touched. Live among these trees, study them closely, and you will be delighted with their variety. The rich and various colorings of our Rocky mountain trees give effects unknown before, as though the great Horticulturist had held in reserve the very choicest things with which to enrich our landscapes. Here we have a marvelous diversity in form, in growth and foliage, which makes a collection of Conifers a perpetual joy. In the trying climate of the West we cannot have so wide a range of variety as in the moister air of the East. Trees from the northeastern states and the charming evergreens of Japan cannot endure our winter drouths, and yet we do have a rich variety which will add much to our comfort and pleasure.

Tastes differ: In the East I have seen men at great expense move the Rocky mountain trees away from the native Evergreen, as though their presence was a contamination. You can plant these choice trees together or you can have them in groups. As, for instance, you can have a Rocky Mountain section, a space devoted to our northern trees, and one to the trees of Europe and Asia. In your winter garden what an amazing and rich diversity you will have! There are a dozen forms and shades of foliage in the Douglas Spruce alone. This is true also of the Picea Pungens and Picea Engelmani. The Aus-



T. C. Thurlow.
West Newbury, Mass.

trian Pine has a color so deep that it is a vivid green bordering on blue. The Scotch Pine is much lighter. The Concolor is simply radiant in its blending of silver and emerald. Here you have the long glazed needles of the Ponderosa and the charming foliage of the Sub-Alpina. The Scopulorum looks as if sprayed with the moonlight, while the sturdy Brown Cedar is solid green. Many of the spruces of our northern Minnesota and Black Hills forests have a silvery sheen which often is very clearly pronounced. So you take all these trees and there are now at least fifteen varieties which do well on our prairies, and you have material out of which a garden of glorious beauty can be made and the kindly sentinels which keep guard around you will not stand there in shabby and ragged garments but they will be attired in uniforms fit to grace the palaces of kings.

The Formal Planting of Conifers.—We love the informality of Nature as she sows the seeds broadcast and they come up in groves and forests. And yet, when art aids Nature and we have the long, straight rows, the effect is fine. You can plant as Nature does and mix them all together or you can use the straight rows which, for conveniences of cultivating, will be far preferable. At the home of T. C. Thurlow in West Newbury, Mass., there is a formal plantation of Norway Spruce—the rows about eight feet apart each way. The trees growing so thickly have trimmed themselves as they do in the native forests. The bodies are like pillars in a grand cathedral. Above, the branches have woven a canopy of green, so dense as to shut out the sun. Was there ever a more delightful place? What a resort for children in the heat of summer—playhouses scattered all around and plenty of seats and carpets of needles on which they can frolic and tumble. How the joy of childhood is enhanced by such a delightful retreat, and what a contrast to the wind-swept and sun-scorched plains of the treeless west!

Isaac Pollard of Nehawka, Nebr., has an evergreen forest of marvelous beauty. It is wonderful how so much attractiveness can spring up out of the dull earth. There we saw a clump of Douglas Spruce in its perfection and stately rows of White and Austrian Pines with here and there the Silver Pungens flashing in the sun. What one man has done, another can do. J. Stirling Morton has a famous formal grove of White Pines. His home is near the Missouri river whers they could thrive. A hundred miles west they would have failed, but the Austrian would have succeeded admirably. Prof. Green, at St. Anthony Park, Minn., has given fine examples of formal planting. What a place for a nooning when a man is tired! Those rows are as straight as a line can draw them. The stems are like rows of posts sustaining a roof of green. The sun is shut out and the cool breeze, laden with the aroma of the pines, wanders through, fanning you into drowsiness. What an ideal place for

consumptives! There is no such sanitarium on earth as that the Great Physician has devised, if men will only carry out his plans. What a charming place for tired mothers; even the childless new woman could find here a sweet rest after her struggles to reach fame instead of home.

Prof. Green's grove, I think, is fifteen years old. What will it be in twenty-five years? These columns will be taller and the green roof will be raised higher and a sense of grandeur will grow on you as you walk through it. Here are conditions every farmer can have at a little cost. But too often he wants the cattle and hog pens near the door. The barn yard smells are sweeter than the odors of the pines. He prefere the broad prairie to the charming forest. He lets the blizzard rage and the storms howl, and the northwind sting with his cruel lash instead of such a shelter as the waiting evergreens would give. Strange, when a man might have a heaven of peace and beauty he chooses a very purgatory of storm revels, where tempests hold their high carnivals of fury.

Toplary Work Among Evergreens.—This term refers to or-

Showing toplary work in Red Cedars.

namental work or trees shaped by shearing or clipping. We see too many attempts at this work which amount to mutilation or distortion. A little will go a long way. If your trees are healthy and will stand clipping, and are not overshadowed by others of ranker growth which will rob them of their sym-

metry, then you can try it on a small scale. Of all evergreens the Cedar is adapted to this style of ornamentation.

Some men seem born with an instinctive skill in this direction. Mr. Robinson, a farmer in Fillmore Co., Nebr., had some vigorous Platte Cedars in his yard which he commenced

Red Cedar Trained in the Form of a Lantern.

trimming. He has the eye of an artist, the skill of a sculptor, and we give you in these illustrations a sample of his work.

On the famous estate of H. H. Hunnewell, opposite that charming lake at Wellesley college, Mass., you will see an Italian garden in which this topiary work is prominent. One tree is cut into the shape of a house. One has a watch dog lying in its branches. On another tree is a rooster in the act of crowing. Mr. Robinson has given several forms. The most conspicuous is a lantern near his door. In some instances you will see the art carried to extremes. One tree is cut into the form of a horse. Another is clipped to represent a cow. Another is a sheep. It is needless to say that this work requires the highest skill, and the most delicate touch and constant care. For in the growing season that rooster must be watched, or he will get out of shape, and the dog will have a tree growing out of his back, and the horse will have horns. Where the White Pine is used it can be more easily managed as it makes all its growth in a month. But the Red Cedar grows all summer and if not constantly watched will play some jokes on your designs.

Evergreen Shrubs and Plants.—As we reach the drier air of the West, these for the most part disappear. They may live through the summer but the winter drouth will wipe them out. Rhododendrons, Kalmias, Azaleas, Hollies, creeping Euonymus, and most evergreen shrubs which do so well in the East cannot live in the West. Even the hardy Lonicera Sempervirens will often lose both leaves and branches. And yet, we need something to enliven the winter dreariness if possible. Yuccas are all right, and continue green the year round. I have been experimenting for years with the Berberis Repens or creeping Berberry of the Black Hills and the Rockies. This, in a measure, promises to meet the want. It often covers the ground in its native forests. The leaves are like the Holly. Those from the Black Hills are the hardiest. In the spring they bear great trusses of sweetly scented yellow flowers. They are so fragrant they fill all the air so completely, you feel that you are wading in their perfume. The blossoms are followed by purple berries. These plants are known as the Oregon Grape. In the mountains when the fruit is ripe you will see women and children gathering them in immense quantities for jams and jellies. They have a somewhat rank taste but I think if Professor Hansen could get hold of them and improve them as he has the sand cherry we then would have one of the finest of ornamental plants that we can depend on. Without doubt it will thrive all over the northwest. The Holly

is almost indispensable for Christmas time, and the foliage of this plant so much resembles it that it can take its place.

Berberis Repens.

Add to this its glorious bloom with delicious fragrance and its great masses of fruit and you have a combination seldom gathered in one plant. We are fortunate in having a cut to represent this berberry.

I have carefully gathered seeds from the open spaces in the Rockies and have raised plants by the thousand; but they should be planted in sheltered places on the prairie or be covered with hay in winter. If a screen of some sort were provided, they would do well. The Black Hills are full of them, and they would do well in Minnesota and the Dakotas.

CHAPTER III.

EVERGREENS FOR PROFIT.

One serious trouble with Americans is that they are impatient and cannot wait for results. Too often anything that will last longer than a corn stalk or a straw stack is not to be taken into account. Then we are too restless, inclined to sell and move. In this respect our foreign-born farmers far surpass us. They do not sell; and, strange as it may seem, the nurserymen have more calls for trees, shrubs and flowers from them than from the American born. The memories of the fatherland come over with the emigrant. He remembers the permanence and beauty of the old estates of the rich, and when he becomes rich himself and owns those broad and fertile acres he remembers how it was in the old country. His land becomes his home and he plans accordingly. Too often the "get-rich-quick" spirit invades the farm and nothing must be thought of which does not bring in quick returns. Too often the rich lands of the West have been pushed and crowded like slaves. They have been forced to their utmost without any returns made—no manure—no fertilization; simply pushed to the point of exhaustion.

But few men sit down and plan for the future or look ahead for half a century. Often there will be low, wet places which produce nothing but weeds. I frequently ride on a road which separates two farms. On one side is a grove of cotton woods, which are making a splendid growth, and in 30 years there will be lumber enough on an acre to build a good barn. The other side has a piece of land just as rich, with loam 10 feet deep, and it has never raised anything but weeds. and those weeds might have been turned into splendid trees which in time would have been worth $200.00 to the acre. It pays to have a little planning. Farms are all the while rising in value and every nook and corner should be put to some use. Plant groves and windbreaks. Those side hills will be ideal places for evergreens. They will hold the soil that remains and their needles will form a new humus.

There is profit in evergreens. Millions of acres of worthless sand in Nebraska and the great West can be made worth $100.00 per acre in twenty-five or thirty years, and more in fifty years. This seems a long time to wait for sawlogs but

a young man can have no better life insurance, much safer than the great institutions in the grasp of frenzied financiers. You need not wait very long for assured returns. You see them growing and they are valuable assets. In the Nebraska sandhills in fifteen years Jack pines made a growth at the rate of thirteen cords to the acre. No one would cut them at that stage. But there was the actual value—$40 worth of wood to the acre in fifteen years. They are costing nothing. They just rent the land and do all the work, you simply look on and they will pay you a rental of four to five dollars a year. So in time you or your children will get so much per acre from land which, unimproved, would not be worth $5.00 per acre. The United States government, taking this matter in hand, has now commenced planting an immense reserve of hundreds of acres with every assurance of success. Many portions of Europe, which were nothing but drifting sands, are now bearing grand forests of conifers. How can a young man make surer, safer provision for his children or for old age than by planting trees? If the timber lands of the North had been kept from fires, there might have been a continual harvest every few years by cutting out the larger trees and saving the smaller ones.

It takes about 1000 Jack Pines to plant an acre, and these set down will cost about $4.00. Surely not a large outlay considering the future which lies before them. The money a man pays to insure his life, if laid out judiciously in tree planting, would bring in greater and surer returns. A good healthy tree knows how to figure a high rate of interest. Remember that lumber is going to be much higher in the future than now. When I was a boy we used to buy fencing in Chicago for $5.00 per 1000 feet. Such times are past forever. I have known men to build fine houses almost entirely from trees they had planted twenty-five years before.

There is nothing visionary or chimerical about this proposition of tree planting. In Kansas there is a grove of Austrian Pines twenty-five years old, that would turn out a good deal of lumber. The amount of evergreen planting in the west has been ridiculously small, and yet what little has been done gives encouragement to go on on a larger scale. While the most barren and unproductive lands can be made beautiful and profitable by planting them, the richest lands would bring in much larger returns. So plant evergreens. Remember that beauty is wealth, and when a piece of brown earth is covered with forests of that deep, rich green which retains its freshness summer and winter, the view is a perpetual delight.

Then these groves arrest the fury of the storms, check the hot winds and stop the fearful evaporation they cause, and in this way protect the land. You cannot estimate the indirect value of whole sections planted to Ponderosa Pines out on the

plains. How much they would add to the beauty of the landscape! The reflection of the heat would be light compared with that which fairly burns from the bare earth where the fierce hot winds are generated. All these things, with the intrinsic value, give strong incentives for planting on a large scale.

Value of Individual Trees.—For instance, the Picea Pungens, with its peculiar and lustrous bloom, is like a rare flower in itself.

I have known $100. to be refused for a single tree. Look at it. In shape, a glistening pyramid of mingled blue and silver, the joy of the beholder, the delight of the owner. I have seen single specimens of the northern White Spruce which would add $100 value to a front yard. Often you see the silver type, and with its perfect proportions this makes it an ideal tree. I have seen the stately Concolor so beautiful in foliage and imposing in form that money could not buy it. Often the Austrian Pine, where it has a chance to put out its branches, will present a fine spectacle. The Silver Cedar with its trim form, cone-like in shape, as if run in a mould, scintillating with those frostings of silver, wins your admiration, and if growing in your own yard would be above price. And where it will thrive the White Pine is a great favorite, healthy in growth, shapely in form, and its colors pleasing to the eye.

Incidental Values.—There are many things you cannot put into dollars and cents. A tree is worth more than its cash value in cordwood and boards, just as a fine, thorough-bred Jersey is worth more than the price of beef. If you have a forest of evergreens on the north side of your house you can put no estimate on its worth as a retreat from the burning sun in summer, or a defense it gives you from the fierce attacks of old Boreas.

The Evergreen Barn.—In many places in the West the air is so dry in the winter that if cattle can be sheltered from the winds they will do well without a roof over them. In fact, there are thousands of feeders who give their stock no shelter whatever, save a barbed wire fence. The growing scarcity of lumber makes the building of a large barn very expensive.

I hereby present a feasible plan for the shelter of stock cattle. Lay out one-fourth, or an acre, as the case demands. Have it well cultivated. Plant around it two rows of Cedar Austrian, or Ponderosa Pines. Have your rows eight feet apart and plant eight feet apart in the row. Plant so as to break joints. In about five years you have a snug enclosure, and your barn is getting better every year. As your trees grow larger, trim off the limbs on the inside. By the way, a word about trimming evergreens. Never cut the limbs close to the tree. It will bleed pitch and turpentine so as to enfeeble it. Cut off leaving a stub six to eight inches long. Let this die and become dry, then saw off close to the tree. In only a few years you will have quite

an evergreen roof over your stock. Your hay barn and racks can be put in the center of the lot, just a movable roof is all that will be needed for the hay as your growing trees will shelter it from the driving rains. This enclosure should be cleaned out and plowed every spring, and perhaps sowed to something which could be used for fodder. Here you have a building which is alive, growing better all the while. It has cost but little. You do not have to insure it and after 15 years, when a lumber barn begins to show age, your evergreen barn will be a beauty, and it would take several hundred dollars to buy it. Ten dollars would be all the frame would cost, and it will put on the sides and do the shingling itself.

The Wind Break.—I have noted in those years when the hot winds raged that while whole fields of corn in the open were burned up in August, those places sheltered by trees or bluffs produced good crops. It is well known that heavy windstorms often injure and lodge the grain. Suppose in the North you have a hedge row of White Spruce, and further South the Ponderosa. When once established they grow about two feet a year. Think of the beauty of a farm thus enclosed, with these staunch defenders, growing taller and stronger every year. They would soon be so large as to baffle the winds. It is well known that in a hot, drying wind, raging at the rate of thirty miles an hour, the evaporation is six times as great as during a calm. So we must devise some way to encourage the calm and discourage the wind.

Here then are your groves, shelter belts and evergreen enclosures. Each year gives you greater protection and comfort till it seems as if your northern home was moved several hundred miles to the South.

CHAPTER IV.

RAISING EVERGREENS FROM SEEDS.

This is a broad subject and there are many points to be taken into consideration.

In the first place, the question comes up "What is the difference between collected and nursery-grown trees?" That depends on the condition of the wild trees, and how and where they grow. For instance, the Concolor Fir and the Ponderosa Pine are difficult to transplant from the wild state. But if you find them growing in gravel or disintegrated granite, where you can get all the fibrous roots, there is but little trouble. If they grow on rocky ground, let them alone. The Douglas Spruce and Picea Pungens, if growing in favorable conditions, transplant very readily. Of the 3,000 of the latter sent to a firm in Massachusetts 95 per cent lived.

Perhaps it takes a year longer for them to be fully established, yet there is quite a gain by using them, and then you have a chance to pick the choicest colors.

The Ponderosa are raised so easily from seed and they grow so rapidly, there is no use in trying collected ones; though of these I generally save fifty per cent and gain a year or two of time.

As to Jack Pines, they generally grow in sand and often in the open; in which case there is little difference between the wild and nursery-grown.

In raising from seed it makes a great difference what kinds you plant and where you get the seed. If you wish to raise Ponderosa for the semi-arid regions, get the seed from the Colorado foot-hills, where it is usually hot and dry. But these will not do so well in Minnesota or the Dakotas. If you are raising for those states, get the seed from the high altitudes of the Rockies or from the highest sections of the Black Hills. I am convinced that this tree has more to do than any other in foresting the great, bleak West. In the first place it is the most easily grown; besides it is best adapted to all that region. In scores of instances I have seen the soil scraped off by the railroads down to the hard pan and the whole space would be filled with little trees; the seeds having been whirled there by the winds in the fall. They were covered with snow

in winter and in the spring they sprouted in the mud and threw down that taproot for which they are famous, and defied the blistering sun and the hot winds with no protection whatever.

For years I sowed them in the spring and under the screen along with other Conifer seeds. But they can be sown in the fall without any screen, or if you have one take it off as soon as they come up. I found they damped off much more under the screen than in the open. Here you have it then: You buy the seed which will not exceed three dollars a pound, sow in the fall or early in the spring, protect from birds and squirrels, be sure they do not dry while germinating, and you can raise them by the thousand. And where you make a business of it they will cost you about $1.00 a thousand. If you have a section of the sand-hills, raise your own plants. Let them grow two or three years; then plant them out, about a thousand to the acre, and your expense is light. You lay the foundation for a fine forest; only, have a good fireguard and keep out the fires.

If you are raising seedlings, much depends on the quality of the soil. In Franklin County, Nebraska, under the 100th meridian, the soil was fine and porous and full of humus. I could get river sand to cover with and I had splendid success, though that section bordered on the semi-arid regions. Here in York the conditions are different. The original humus is worn out of the soil, and it takes time to restore it by artificial means; then, too, those pests of prairie loam, the angleworms, have come in. They work over the soil and leave it tough and waxy, and when it dries it is like a brickbat. Then we have nothing but bank sand, and if this is spread over the beds, there are impurities enough in it to form a hard cement. So under these circumstances we will discontinue raising anything but the sturdy Ponderosa.

In central Nebraska, and in the other western states, buildings should be constructed for raising evergreens from the smaller seeds, for by no known process can you raise Pungens, Engelman Spruce, or Jack Pines, as you would other Conifers. Again, you cannot put these trees in the open till they have obtained some size. I have often lost two-year-olds by planting in the open; the reflection of the sun in a dry, hot summer would burn them. When three years old they would do better and you should not lose more than 5 per cent in planting. We must have more evergreens for the Prairie States, and each state should have stations to attend to the growing of them. It is most too much to expect that the average nurseryman can attend to it besides all his other work.

I think this a good rule to follow: Instead of trying to raise Jack Pines in Nebraska from seed, let them be grown in their own habitat. An open space of sand in the woods is the

ideal place where they could be raised by the million. I once planted 2,000 two-year-olds. They looked insignificant enough, but I failed to find a dead one in the whole lot. So with Pungens and Engelman, raise them where they grow naturally. I know scores of rich valleys in the Rockies where seedlings could be raised by the ton for I have dug them by the thousands there. And nature will do better, assisted by art. There are sections where they do well elsewhere.

The Screen: This is a sort of artificial forest to give, if possible, the conditions of nature out on the prairies. This was devised by Robert Douglas, the father of the modern system of Evergreen growing. He told me of his experience. He first bought a bushel of White Pine seed. They were carefully sown and came up beautifully. The beds were fairly green with them. Then came a heavy thunder storm with a deluge of rain. Then the bright sun came out, and his little trees were mowed down with the damps. Then he thought "I must have forest conditions." so he devised the screen. He covered acres, putting up posts and then cross pieces covering with brush. In this way he raised them by the millions and gave an impetus to the business by showing others how to do it.

While living in western Nebraska, I had half an acre of screen. I put up poles, 8 feet apart each way, strips of corncribbing 1x4 inches were nailed to the tops of the posts, so they would be four feet apart. Growing on the river bottom were large groves of fine, straight willows about eight or nine feet tall. These were cut, bound in bundles, placed on these cross joists and fastened on with binding twine or baling wire. This made a good covering. In some respects it was better than lath, for the drip from the rains was not so heavy. In building a screen always have your lath or brush run north and south, for if you have them east or west, the sun will strike through the same cracks all day and some of your plants will be in the shade all the time and some in the sun. There is one trouble with a pérmanent screen of this kind. After a year or two a fungus seems to creep in, and there is a black cut-worm that works fearful havoc, mowing down whole beds in a short time. You need a lot of toads to take care of them, and then you will have to furnish wings for your toads, for the great lubberly fellows will crush down your little plants. A good way is to sow lettuce and then poison that. The worms will leave the trees for this.

The Tall or Low Screen: Your tall screen should be 7 feet high, so that you can walk under it without any trouble. I have always had the best success with the low screen. Build a pen 8x32 feet, about eighteen inches high. Run a cross piece through the center lengthwise to catch the ends of your lath squares, which we

mention later. Prepare the ground thoroughly, level it down carefully, and sow the seed at the rate of a pound to an 8x8 foot space. If the seeds are very small much more space will be needed. Cover the seed with river sand or sand and loam. In a close pen like this there will be but little evaporation. You can remove the lath squares for watering and weeding, and then replace them. You have two advantages by this temporary screen system. The drip from the high screen is often a serious matter, and by this plan you can have fresh ground for each planting. In this way I have raised immense quantities of fine trees and could dig up a hundred at a single spadeful.

If you have plenty of screen room you can transplant when the trees are two years old. Have them covered the first year and uncover the second year. Then put them in the open for a couple of years, and they are ready to sell or to plant, as you like. Please note these points; Ponderosa Pine, Concolor Fir, and other beautiful evergreens, grow in the Sierras and on the Western Slope, but you cannot grow them in the East or Central West. The finest evergreens in all the world grow on the Western Slope, but let them alone. One of the leading nurseries of Pennsylvania, some thirty years ago, secured a fine lot of seed and had a good stand of plants, and had great hopes of them, but when they were about four years old there came one of those mysterious northwest death waves which wiped them from the earth. I think there are a few Sequoias growing in Rochester, New York, and I think there are some in different portions of the East, but they are uncertain and by no means can they be made to grow in the blistering suns of the West. Time and again collected trees, handled with the greatest care, have been planted in Nebraska, but one might as well try to raise oranges. On the other hand, trees from the eastern slope of the Rockies do remarkably well on our western prairies. For remember that vast system of mountains was lifted out of the great burning plains and the climate and conditions are much alike. This is the case also with trees from the Black Hills. They generally do well on the western prairies. So if you want to raise White Spruce get the seed or trees from the Black Hills. Those raised from seed grown in Maine cannot grow in Minnesota or Nebraska to advantage. For the extreme north and Manitoba secure seed and trees from the northern forests. Going on the cars west of Winnipeg I saw beautiful White Spruce growing in the dunes of drifting sands. They were self-planted and in several instances those trees had been planted around the homes on the bleak prairies. They were doing well, but because they are a success in Manitoba don't think you can move them into Kansas or Oklahoma, for there they would sunburn. You cannot move southern Conifirs far north. The beautiful long leafed pine of Alabama is not

hardy and cannot be made to grow as far north as Nebraska. If you want to raise White Pine get seed from the native belt nearest you. And now have a care; for the White Pine, no matter what the brand, cannot be made to grow west of the 100th meridian.

I had a beautiful lot of fine thrifty ones, 6 feet tall, that grew there, and it seemed as if they would succeed, but with the American Sirocco blowing a gale, with the mercury 112 in the shade, you could smell them as they were cooking. Yet in the eastern part of Nebraska there are fine groves of them, but as you get 100 miles west of the river the conditions grow more unfavorable. There are, perhaps, 20 in York County today, remnants of the thousands that have been planted. It don't pay to plant a hundred trees to get one to live. The Scotch Pine will grow in the eastern part of many of our western states, but beware how you try to move it too far West. Experts found fine groves of this tree growing in western Kansas, and recommended it for that region. How does this happen? The wet and dry seasons move in cycles. There will be a succession of wet ones, as we have had for the last four years, and are deluded with the thought that it will always be so. In these wet years Scotch Pine, and perhaps Norway Spruce, and even White Pine may grow a few years and then come the dry and scorching winds and the mercury soaring—so hot you can smell the scorching prairie grass, and down go your hopes and your groves of White Spruce, White Pine, Norway Spruce. But the Ponderosa will be there with its long plumes waving defiance to all that comes, and beside it will stand the Austrian Pine unmoved. But take care how far north you move this same Austrian. While the Scotch Pine with its soft foliage cannot endure the intense heat of the plains, it is hardier in the north than the Austrian, or the foot-hills Ponderosa. As a general rule trees with hard, stiff needles will endure the heat better than those with soft foliage. Red Cedars from southern Illinois are not hardy in Nebraska and the Platte Cedars are not hardy in North Dakota, though they are of the same species. The delicate and beautiful evergreen of Japan—the Retinisporas—do well in Massachusetts, but what bedraggled, despondent and homesick-looking things they become when moved to Kansas. So, take Pinus Ponderosa to the eastern sea coast and it is the picture of despair.

These suggestions are the result of years of close observations, and if you are going to raise evergreens there are always some kinds that are waiting for you and will succeed in your locality. But be sure of them before you begin to raise them on a large scale. I can imagine a man from the East coming to a western prairie farm. He is all enthusiasm, he will show the natives how it is done. He has had a thorough training in a first-class agricultural college and he knows just what to

plant. He loves Birch and Maple; he likes the Norway and White Spruce and White Pine, and he orders them from the East and plants them all in the best manner. But there comes in a year or two one of those hot waves which kills every tree on his place. Such attempts have been often made with like results, yet, if the right kinds had been planted there would have been no failure.

Damping Off: This is the terror of despair of the Evergreen grower. The seeds will come up all right, and he begins to figure his profits, when there will come a heavy rain followed by a bright sun and his trees go down by the thousand. This usually happens when the trees are quite tender and the stem is weak and before the second set of leaves has formed and the stem has become woody. After this there is not much danger. It is then highly important to give the trees as early a start as possible, so they can harden up before the excessive heat of summer. Many kinds will do best planted in the fall, or they may first be sprouted in warm water, and then planted quite early.

Many plans have been devised for circumventing this difficulty. We must follow the lines of nature. I have often watched seedlings in the forest. How are they started there? The cones open and the seed falls in the leaf mould. Deciduous trees are often near and when the seed falls they are covered with needles and the leaves of the neighboring trees. The point of danger, where the damps attack the seedling, is just between the air and earth. Nature guards this point carefully. One cause of the trouble in the nursery is that the rain spatters the mud on the tender plant and this in some way induces the damps. I have found Nature's plan to work well, and after sowing the seed have covered the beds with a coat of moss or crushed leaves, worked up fine so that the seedlings could come up through them; pine needles also may be used. Mr. Scott, of the Dismal River station, has devised this plan: he carefully sows the seeds and covers them with fine gravel. This prevents the spattering of the mud when it rains and he finds the danger with this method comparatively small. So there are several things to be taken into consideration:

1st: There should be a location chosen with congenial soil and climate. While you cannot raise trees from the smallest seeds like the Pungens, Engelman and Jack Pine in Kansas and Nebraska, yet in many parts of Illinois, Ohio and the eastern states they can be grown to advantage.

2nd: In the West plant those kinds which are the least liable to damp off, mainly Ponderosa, the Chinese and Siberian Arborvitaes, and with care you can grow the Austrian Pine, Douglas Spruce and Concolor Fir.

3rd: Defend in some way the seedlings most liable to the damps or blight. Many growers have dry sand ready to use with the first symptoms of the trouble.

How to Make Lath Sections: After using various methods for years, I finally adopted the following plan, which has the approval of Prof. Green and others: Lay aside sixteen common lath for a square. Take three picket lath, about a half an inch thick, put one in the center and one at each end. As you nail them on, push every other lath about four inches beyond your end cross piece. This makes your section a little over four feet wide, so that it will readily catch on the four foot sides of your pen. Understand, your pen is made 8x32 feet with a strip running through the center, which really makes two spaces, 4x32. It takes eight lath squares to cover one space and sixteen to cover the whole. As the sides will sometimes spread you will see the need of having your squares a little more than four feet wide. Saw one of your thick laths in two, and brace your square or it will work all out of shape. One thick lath will make a brace for two squares. I often have a dozen of these pens and squares to match. When not in use the squares should be stored. These pens with their coverings are just the thing for raising perennials or starting early garden vegetables, as by their use you avoid the drying winds of spring. If you use the tall screen system, these squares can be placed overhead, and you can fasten them with binding twine so you can remove them and let in more sun, if you choose. They are good things for the average farmer or gardener to have. You can make your pens 4x12 or 4x16, or use the double pen mentioned above.

Other Modes of Propagation: While Conifers are mostly raised from seeds, in some cases grafting is done. For instance, the Pungens is put on the Norway Spruce. The work is usually done with potted plants in a greenhouse and none but an expert need attempt it. Grafting evergreens out of doors, as in the case of the deciduous trees, would be an utter waste of time. There are an almost infinite number of types and variations in the different species. Take for instance the Chinese, Siberian, and American Arborvitaes, their name is legion. These sports are propagated by bottom heat in greenhouses, but it takes great skill and care and I have known hundreds to be killed by a slight oversight.

Some claim they can raise any kind of an evergreen by cutting off small thrifty shoots in the fall, shearing off the lower leaves and putting in cold storage, or in a cold place for two or three months, and then subjecting them to bottom heat; but the process will seldom work.

CHAPTER V.

DIGGING AND HANDLING EVERGREENS.

One great obstacle in the way of growing these beautiful and profitable trees is the way in which they are too often dug and shipped. A man who grows them should have a tender conscience and do business with the Golden Rule. The greatest deception is often practiced but there is no more truthful "tell tale" than the little evergreen. It always speaks the truth. Often the largest growers are at fault. When the rush is on, there is so much to do that inexperienced help will often be used, the roots will be exposed only for a short time and the tree is killed. A fine, healthy tree, properly set out at the right time, in the right way, will live. If it dies its death tells the story of misuse and injury. Sometimes, after they are thoroughly ruined the dealer will dip them in mud and pack them carefully in moss. When the purchaser receives them he says, "That man knows his business. I shall know where to buy after this." But the trees all die. They tell the truth, that they were carelessly handled and that a ten minute exposure to the hot sun had killed them. And yet I have known men to be just so careless and pack trees they knew were dead, when fifty cents worth of care would have saved 10,000 of them.

I once bought 5,000 Black Hills Spruce. They were beautifully packed, and came with plenty of wet moss. But my experience told me they had been badly handled. I had dug trees in the Black Hills myself. However, I planted them with the greatest care under screen, and all but ten of them died. Just a little care would have saved them when they were dug. One spring I purchased quite a lot from two nurserymen. The trees were fine and looked much alike. I knew one dealer was a little short on conscience and I implored him to be very careful, but ninety-five per cent of his trees died and ninety-five per cent of the other man's lived. Did it pay? One man never sold me or my friends another tree, and orders for thousands on thousands were poured in on the other man.

Mr. W. is a fair sample of an intelligent and conscientious grower. If a dealer sends him an order he is sure of good trees, well packed. Several firms, with myself, buy of him and have for years We always know just what to depend on.

He does not try to do so much that he cannot supervise things himself. I have had trees three weeks on the way, and nearly dried out through evaporation from the foliage, and yet plunged immediately into thick mud and planted I have sometimes lost not over two per cent. It is just as easy to handle evergreens and just as sure as it is to plant Elms or Ash, and there should be no more loss and need not be. I wish it to be distinctly understood that it is just as easy to raise an evergreen as a deciduous tree. Once establish this fact and you will have evergreens in abundance. They should be very carefully dug so as to get all the roots possible. Then to avoid all danger they should be immediately dipped into a puddle of mud, stiff enough to completely coat the roots. This seals them up from the air. In puddling them the richest loam should be used. When this process was first used clay was taken, but it was found that this made a hard covering through which the tiny rootlets could not penetrate. If you take the richest earth you can find, the tree is virtually planted from the start, and I have often received trees the new roots of which had already penetrated the coating. They commenced growing on the way. After the mud has stiffened a little, then pack them. Mr. W. usually packs a double tier, roots against roots in the center of the box, and the tops towards the ends which are open for the trees to breathe. If evergreens are packed in a tight box they will immediately begin to heat. The first box I ever received was so hot many of the trees were ruined. Your box has a strong cleat in the centre. Lay some paper or moss over this and then put in two or three layers root to root. Now pile in plenty of wet moss. Don't be afraid of it; use no substitutes. Excelsior and rotted leaves will not do; anything but moss is a failure. After putting a few layers, put cleats across them—good strong ones. Get onto them and press them down all you can, and nail them by driving into the ends through the sides of the box. Now fill up with moss and cover the cleats so they will not bruise the trees. Put on more layers, and then use more cleats. Everything depends on having them solid. Do the best you can, there is a constant evaporation from the needles, and they may get dry, but if packed so solidly that the air cannot get in they will be safe with that mudcoat and moss. I once collected a lot of evergreens in the mountains and shipped to one of the U. S. Government stations. When the bill was presented report was returned "your trees came dry." However, they had accepted and planted them. Fortunately they had fallen into good hands, and when I visited the station they were doing far better than nursery-grown trees shipped from the East and there was no trouble in getting pay for them. Of course, if possible, trees should be packed so wet

that they cannot evaporate the water unless unreasonably delayed.

I once ordered a lot of Jack Pines from Wisconsin. Fearing the man did not understand evergreens, I charged him to pack and cleat solid, because railroad men will tumble boxes around, the trees will break loose, the air will get at the roots and that ends it. The trees came standing upright in the box, and so poorly fastened they shucked about and let in the air, while the moss worked down from the roots. That was one mistake. The other was that the trees had started to grow before they were dug. They had new sprouts from one to four inches long. Now if an evergreen grows like that it is preying on itself with no root-backing. The upshot was that with the very best care I could not save five per cent. There was the aggravation of paying for the trees, including a heavy express bill, with the stock, which was fine, killed by maltreatment.

Next spring I ordered Jack Pines from another man. These were cleated solid and packed with wet moss containing a deluge of water. Now expressage on water is just as heavy as on trees, and the cost was just three times what it should have been, then too, it is bad for the foliage to have trees packed so wet. Turn such a box wrong side up and the water saturates the leaves and rots them. Remember in packing evergreens you must have the roots wet and the tops dry. It is just as fatal to pack with wet tops as with dry roots. Perhaps it is wet weather and the foliage holds a good deal of moisture. Hold on! Don't pack till the tops are dry or you will kill your trees.

A man once sent me a few Colorado Blue Spruce of the finest brand. Fortunately there were only a few. He packed in a tight box in hot weather and packed wet moss around the tops. When I saw them it made the toe of my boot ache. They commenced to grow, the shoots were pale and white. Though planted under a screen the sun burned them or the needles fell off. Some died, and it took the rest two years to recover.

I once shipped a beautiful lot of Blue Spruce and Concolor Firs from the Rockies to Massachusetts. Complaint came that though they seemed to come in excellent condition the needles were falling off. Now there happened to be on the line where a transfer was made a very conscientious and faithful expressman. Said he, "Here are a beautiful lot of trees and we must get them through in the best of shape." So he gave the tops a good soaking. That did the mischief. In the moist air of the East, however, they rallied and put on new foliage. In the dry air of the West they must have died.

Evergreens should, if possible, always be sent by express. It costs a little more but live trees are much cheaper than dead

ones. When it takes a month to send trees 500 miles by freight it is cheaper to express them.

As soon as the trees are received dip them again in a puddle of stiff mud. Heel them in where the sun will not shine on the tops for they will often be sun-scalded when the tops are compact. Stamp the earth solidly about them. If you are not watchful you will be surprised at the evaporation through the tops, and the roots will be dry again before you are aware. It is better to plant them out immediately if the conditions are favorable.

Planting. The finest and best-handled trees in the world can be ruined by being poorly planted. Hardly one man in a hundred knows how to do it. I have had men work for me for years who must be constantly watched. The earth must be packed solidly around the roots or they are sure to die. They must be packed solidly at the bottom. Take a tree eight to twelve inches and a man, if he does it right, can set out two to three thousand. If he does it wrong he will work harder and plant perhaps 500. I had a good, faithful man work for me for years. I would say "Now, Charlie, watch me." I would insert the spade, put in the tree, and then strike one hard blow with the heel pressing the earth solid. One stroke well directed is enough. Then pass on and leave that heel mark to catch the rain. Invariably Charlie would put in the tree, be careful not to press the earth about the roots, and then he would get up a war dance on top and stamp and stamp, and then say "I've got him this time." Then I would take the tree and it would work up and down like a churn dasher, and if twenty-five per cent of his trees lived they would do well. Robert Douglas often used a tamper, a good solid one, to pack the earth around the roots, especially if the ground was a little dry.

Time to Plant. In the New England states many men plant in August because at that time the evergreen commences to throw out roots to carry it through the winter and give it strength for the spring's work. People do not understand this. They see the tree make that vigorous push upward of a foot or two in June, and the new growth is matured in a short time. They think that is all there is of it and often neglect the tree the rest of the year. But August and September are the months when the tree is doing its most important work, laying in strength for the winter and gathering force for that tremendous growth which it makes the last of May and the first of June.

While August planting may be done with safety in the moist climate of the East, it will not do in the West. I have tried it repeatedly, but the loss is too great.

The best time to plant an evergreen in the West is just before the buds begin to swell. If you plant too early, the dry

air pumps the moisture from the tree before the roots are established to supply the waste. While living in Pueblo, Colorado, the mountaineers would bring down trees with a lump of earth the last of February and guarantee them to grow. But the hot sun and drying winds, playing around the tree before it is well established, would do the work and almost every one would die. When the ground is thawed out in March and the conditions seem favorable you are tempted to plant your evergreens. Don't do it. The drying winds would like nothing better than to wring all the moisture out.

Planted just at the right time the tree is bound to go forward if the conditions are right. It is a bad plan to plant in a high wind for the evaporation is too strong. It can be done, however, if you mud the roots as heavily as possible. The ground should be moist also, so that it will pack well about the tree.

If you are making quite a plantation, the better way will be to get a few thousand seedlings or small trees, say eight to fourteen inches, and put them in nursery rows and let them grow two or three years. If the conditions are just right you can put them out after two years. If not, you can let them stand a year longer. You can watch the right time. If the ground is moist and the weather cloudy you have just the conditions. Dig up your trees and put them on a sled or stone boat with all the earth on them and you can transplant them without their knowing it and they will make quite a growth the first year. By this process you can continue the work even after they have started a little.

Some theorists insist that June is the time to plant. This is sheer nonsense. Often the trees have made a foot of growth which is sure to wilt down as soon as they are planted you have a poor, sickly, droopy thing. It is the worst time possible to move a tree.

One year, when the work was crowding, I had a few thousand Ponderosas to move. They were three-year-old seedlings, and had made a growth of four inches. I knew it was wrong, but they would be too large if left another year, and I wanted the ground. The earth was moist and the weather cloudy, but with the best care only one-half lived and the shock was such they could make no growth. Had they been moved two weeks earlier they would have been all right.

The Ball of Earth. When an evergreen is from two to five feet tall, if possible, it should be moved with a ball of earth about the roots. In Holland they have a process of grafting the brightest forms of the Silver Spruce which are sent back to us by the thousand and are invariably shipped with the ball of earth. Foreign-grown Azaleas and Rhododendrons are sent in the same way. In short, this is the only way in which evergreen trees of whatever kind should be handled. In Florida and California Lemon and Orange trees must always have the

ball of earth, for they are evergreens and would die if shipped like Apple and Pear trees.

A firm on Long Island, N. Y., ordered fifty fine Pungens of me one fall. Now the fall is a bad time to handle them, but they stipulated for the ball of earth. The trees were eighteen inches tall and I put four or five together with all the earth that would adhere to them, and sent them on. They were three weeks on the way, but they arrived in the best of order, and were immediately planted out and made a fine growth. If you have a large tree, dig it with the greatest care and then bind up the ball of earth tight with burlap. Dig a hole for it and set it in, burlap and all, if you choose. Put fine earth about it, pack it solid. Always plant a tree, like this, in a depression that will hold a barrel of water, for it may need watering some the first year, and a little sprinkling on the surface will not answer. I have known people to water with the hose every day all summer, still the trees would die in spite of them for not a drop of water had reached the roots.

In one of our western cities I passed by the grounds of a gentleman who took great pride in his trees. "What is the matter with my elms?" he asked. "I paid a great price for them and they are dying." "The roots are dry" I said. "That can't be, for I have given them water every day. See for yourself." I went to examine them and sank in the mud half way to my shoe tops. He laughed and said "Now you see you were mistaken." "No I am not, the roots are dry; I will show you." He got a spade and used it with vigor and sure enough his trees might as well have been in a bed of ashes. "Well, that beats me." "What shall I do?" "Dig a hole as close to the tree as you can, and then run in a full barrel of water. Let that soak in and fill it again. You must wet those roots." He did so. Two days after I went that way; the drooping leaves were erect and the whole company of them seemed to say, "Thank you, sir."

If you plant a fine evergreen in your lawn take care of it, especially for a year or two, till it is well established. You should allow no grass to grow around it. Keep it well cultivated or mulched and it will reward you with a sturdy growth and a bright foliage. Keep the dogs away from it. Their system of irrigation is death.

Transplanting From the Seed Bed. On the United States Government grounds on the Dismal river the trees are planted in rows. Two boards are placed together with hinges a little distance apart. The seed is scattered along with the edges of the boards lifted, and they fall in a row in the center where they are covered. When they are a year or two old a root pruner is run under them to cut off the tap roots, and make the rootlets spread more near the surface. It is thought much

benefit is derived from this process, for instead of a long tap root you have a mass of fibrous ones.

The root of a two-year-old seedling will be from twelve to eighteen inches long, and if you are not careful you will cut off a good portion. A good way is to dig a trench by the side of the bed and drift under, and spading off a great clump of them, and getting the root at full length. You need not dig a hole as deep as the length of the root; you can double it up in the hole as you plant it, and have the whole of it nourish the top for it is needed. In shipping small trees and seedlings you can save expressage by packing in snug bundles in wet moss. Wrap them in oiled paper so there can be no evaporation from the roots. Roll them up in burlap and bind as solid as possible. It is well to put a strap and buckle around them, and draw them snug and then bind them. This is an excellent way to treat small trees. But as they get larger, the stiff limbs will rebel against too much pressure, and if you are to ship a quantity they should be boxed.

Since the first edition of this work I have made some successful experiments with Pinus Ponderosa. It was not convenient to plant in the fall, so early in the spring I soaked the seeds in warm water till they sprouted, taking the precaution to change the water every 12 hours, so it would not sour. They were planted in a well prepared bed and covered with half an inch of fine earth. Precaution was taken to keep the ground moist till they came up.

They were a mass of vivid green. They grew all summer in the full blaze of the sun. Often it was very hot and dry. They were in such fine condition, I planted them out the following spring in the open. Had they grown under a screen they would probably have sunburned. As it was they were so well toughened they made a splendid stand and a vigorous growth in one of the hottest and dryest seasons on record. Next spring I tried again with the same results. I take our nurserymen around to see them and show them there is no bugaboo about the business, and it is one of the easiest things in the world to raise these evergreens.

CHAPTER VI.

HOW JOHN SANFORD PLANTED HIS EVERGREEN FOREST.

A Supposable Case.

It takes people a long time to become acquainted with the beneficent plans of God. He plants a beautiful forest, you go through it and it is a land of delight. Stony stretches of worthless land are covered with stately trees, they grow in sandy places where without them the land would be wortbless. They grow with greater vigor in rich, dark loam.

This work is not all laid out for this forest alone. There is a lesson here. If it is hot, these trees give genial shade. If the winds are lashing the wide prairies in their fury, all is calm in these deep woods. In winter, when the northwind sweeps the land, his terrors cannot invade this forest of evergreens. The lesson is "Plant a forest around your home."

With great courage Mr. Sanford moved out onto a new farm in one of the northwest prairie counties of the state. His land, save a sandy knoll, was rich, producing fine crops. But how the winds would blow! Spring and fall it seemed at times a martyrdom to live; while in the winter his home was like a fort, bombarded by all the storms that swept the land. The family was homesick. How could they help it? They held a consultation. All they had was invested there. The land was good, they had good neighbors. If they could only be screened from the winds and have forest conditions out on that bleak prairie, instead of being dreary, it would be a delightful land. They took farm papers and bought books and laid their plans. They wanted a grove of Pines on the sandy land on the North. They wanted a row of evergreens all around the farm. First they would plant deciduous trees, such as grew in the nearest forests and would be sure to live. Some one told them to plant Tree Honeysuckles around the garden. Finding where they could get the hardy Tartarian for five dollars per 100 they secured and planted them. They grew rapidly. Outside of these there was a row of Ash. All were well cultivated. North of the plat designed for evergreens several rows of native trees were planted and well cultivated. They were agreeably surprised in a year or two by the protecton these afforded.

In the meantime preparations were made for a nursery of evergreens in the sheltered garden. Mr. Sanford had heard that the Ponderosa Pine could be grown like peas, if sown in

the open, with no protection whatever. He had heard that for northern Minnesota seed should be procured from the highest northern elevation of the Black Hills. He secured five pounds which he planted in a pen eight feet by thirty-two, made thus for convenience of weeding. In the fall the ground was well spaded and levelled down, the seeds were sown and covered with a half-inch of sand. He had nothing more to do until spring. He had placed boards a foot high around his bed. When spring came he knew while germinating the seeds must not be allowed to dry. It was a dry spring and every night he watered them thoroughly. They began to come up and the family watched them in delight. How they grew! These need no screening from the sun. Keep birds, chickens and mice away and they will care for themselves. They do not damp off, like other evergreens and so do not need the screen.

In the spring he sent for a lot of three-year-old Jack Pines. These were planted in nursery rows. They were about a foot high and were planted in rows two feet apart and six inches apart in the row. He had heard that there was a man in the northern part of the state who collected little White Spruce and kept them in the nursery a couple of years and sold them. He secured 2,000 of these. Then he sent for a few Colorado Blue Spruce and waited results. He gave the best of cultivation. The trees were planted thus close together for a sort of mutual protection till they should get suitable age. In the meantime a strip had been plowed around the farm and after the trees had grown two years he was ready to plant. The spring was cloudy and wet—just the condition for planting evergreens. Soon after a good rain he sent a man out to dig the holes and he and a boy followed. The White Spruce for the windbreak were about two feet tall—fine, vigorous little fellows. He dug them, leaving the fibrous roots encased in a ball of earth. These were carefully placed on a sled for convenience of lifting. They drove by the row of holes. Mr. Sanford had them dug eight feet apart. When he came to one he carefully lifted a tree and put it in its place, dirt and all. He put in a little loose earth and then stamped the roots solid packing the earth firmly. Then he passed on and was surprised at the rapidity with which the work was accomplished. The two miles were planted in a day. The next day he followed with a hoe. The trees were left in a depression and were planted two inches deeper than they were in the nursery. It was a good job well done. The wrong way would have been to shake off the earth, distributing the trees along the line for the sun and wind to play with and then plant them loosely on a ridge instead of in a depression. By planting in the center furrow he could work the earth gradually toward them and eventually have them so solid that the fiercest winds could not move them He had furrowed out his rows for the Jack Pines

and they were handled very much in the same way. These were put eight feet apart each way and the alternate rows were planted with ash so as to be cut out when the trees began to crowd. It took six hundred and eighty trees to the acre when planted this distance apart. He found he had 8,000 to 10,000 Ponderosa Pines and he managed to dig these with great care and planted just as the buds began to swell. They made a splendid stand. It took twelve hundred and eighty trees to plant around the farm and they were so well handled they hardly knew they were transplanted and they made a vigorous growth the first year. If we return to the garden we find that row of Tree Honeysuckles has done remarkably well; they have made an even compact hedge. In May they were a mass of fragrant flowers and later on they were covered with showy red berries, making them very attractive. All the evergreens were so carefully cultivated they made an excellent growth.

There is a decided advantage in the home nursery. Suppose he had sent for two thousand White Spruce two feet high. The freight would have been quite an item. Then it would have been impossible to have sent the ball of earth. They might arrive in the best condition. But suppose the ground was dry and the spring winds were blowing a gale; it would be no time to plant and if he did, he would need to water them as he went along. If he had them growing in his garden he could take his time. If perchance, the spring was too dry and the winds too strong he could let them stand another year. Besides, he would have some chance to get acquainted with his trees. Even the first year quite a change on the farm is perceptible. Another year passes and the trees seem to fairly get down to their work as though they were conscious of their mission. The row around the farm is looking finely. Planted in the open they throw out their branches and look like separate pyramids of green. The grove is making good headway. The trees are growing so rapidly they have shaded the ground so the weeds cannot grow and cultivation is no longer necessary. Five years have passed and it does not seem possible that there could be such a transformation. In ten years the trees are eighteen to twenty feet high. And now you have a land of delight.

The great prairie is gemmed with beauty. God had been waiting to help the man, and when he was ready, this miracle was wrought. As the years pass by, living is a luxury. There are cozy nooks out in the grove where the ground has a rich carpet of brown needles. Your couch is already made out there in Nature's tall room; sit down and rest. What a delightful resort for the children!

One day a dude hunter with his gun and a costly overcoat on his arm came to see the place and in walking along carelessly threw down the stub of his cigar. In almost a moment the needles were ablaze; a gentle wind was blowing under the

branches; Mr. Sanford was in consternation. In a few moments his labor would be destroyed. It was the work of an instant. He seized the costly overcoat of the dude, slapped it on the fire and in a few moments had it extinguished. Gathering the remaining smouldering needles in a heap with his feet he threw the burned coat over them and stamped and stamped until the fire was out.

The dude was mad. "It seems you are taking liberties with my property." Mr. Sanford's eyes fairly blazed. "You heedless wretch. By this time the fire would have been beyond control and thousands of dollars ruined and my beautiful place would have been a desolation. I did the only thing I could do and you know it. What is your coat compared with the ruin you would have wrought, turning this Elysium into a charred desolation." The man quailed before these blazing eyes and went his way.

"There," said the owner to himself, "is a problem to be solved. There must never be any grass left near my road trees and I must have wide firebreaks and driveways through this grove." And the next day he began cutting a wide roadway and plowing it up so that if a fire should break out in one part it would not destroy the whole. Strange, men will be so careless. Years ago a man in Albany threw a stump of a cigar in some rubbish and half the business part of the city was in ashes. In a great hotel in New York a man lately lit his cigar and tossed his match away, not knowing or caring where it fell. It was thrown into a lace curtain which caught fire. Soon a million-dollar-building was in ashes and forty people lost their lives. Innumerable prairie and forest fires have been heedlessly set and millions of property and hundreds of lives lost by such sheer carelessness.

Twenty years have passed. Some of the children have married and gone away; some cling to home as the dearest spot on earth. That farm has been an object lesson. The farmers, finding what can be done, have also planted. Some of the busy ones induced Mr. Sanford to plant a large nursery of evergreens. "We cannot attend to it, but you can." So he turned much of his farm into meadow and pasture and gave his time to helping his neighbors. Though his charges were not high, he found it much more profitable than wheat growing.

On his own place the protection was so perfect that he secured an immense number of flowering shrubs and Perennials, planting them here and there so that whichever way you went you fell into perfect ambuscades of loveliness. In those sheltered spots charming Columbines, Oriental Poppies, Delphiniums and Phloxes grew. The place became a Mecca for the lovers of the beautiful and people came and went carrying away the contagion for home adornment.

CHAPTER VII.

THE UNITED STATES GOVERNMENT PLANTATION

AMONG THE SAND HILLS OF NEBRASKA.

At least one-fifth of this great state is sand and comparatively worthless. How to save this immense area is a problem. The effort to forest this region was in a measure inspired by the remarkable success secured in France in kindred circumstances.

Forest of Maritime Pine on the Drifting Sand Dunes of France.
(By Kindness of Forestry Department.)

Between the Gironde and the Pyrenees there was a tract of drifting sands which was a menace to the fairest portions of the empire. When the gales blew, the sands swept inland like resistless armies, burying fields, meadows, vineyards, dwellings and even villages. It was a Sahara in the heart of Sunny France, widening its area year by year. In the days of Napoleon, a man named Bremontier conceived the idea of planting the whole region to the Maritime Pine and thus fasten the drifting sands. The beautiful adjoining country could be saved and a revenue obtained from a region then worthless. The idea was presented to Napoleon who immediately adopted it and the large area was planted by government aid, thus showing that if that colossal intellect had been given to the arts of peace instead of war, the emperor would have been one of the greatest benefactors of his age. The victory over the drifting sand dunes was far greater than if he had won at Waterloo.

We are happy to present a picture of this redeemed land, which is now yielding an immense revenue of wood, lumber, resin and turpentine.

The Holt County Experiment. Under the direction of the Chief of Forestry, B. E. Fernow, a piece of land belonging to the Bruner Brothers was planted in 1891 to Jack, Austrian, Scotch, Norway and Ponderosa Pines.

While all other varieties did well, the Jack Pines took the lead and made a tremendous growth, overshadowing all others. In thirteen years many of them were twenty feet tall. They had commenced seeding and little trees were springing up all around them. Probably in the long run the other Pines will catch up with and perhaps overshadow the Jack Pines but for quick results the latter will be preferred.

I wish to add that the energetic efforts of the Government in planting so large a tract of trees awakened the interest of private owners, cattle men and others, who need shelter for their stock and see gold in the sands which the trees can mine for them.

The economy manifested by the Government experts is having a fine effect. When these lands can be planted at from $3.00 to $5.00 per acre it is a matter of encouragement to all interested. From experiments conducted by the writer, reaching through a series of years, he has demonstrated that the Ponderosa Pine can be raised by the planter himself at a cost of $1.00 per 1,000, and if he does his own work the expense of planting forty acres with 1000 to the acre will be light.

Several neighbors can band together and secure seeds at the lowest cost, and they can send some one to the Jack Pine forests to collect their own seedlings as the Government have. They set them down on their plantation at from $2.00 to $3.00 per 1000. Kimberly, Minnesota, sends out a good many of these trees and millions of fine seedlings are grown there and there is access to millions of wild ones well rooted. One year the

writer secured 2000 from that place and did not lose two per cent. But, if you get Jack Pines you must be in season. To be successful you must plant them before they start to grow.

The economy of the Government is manifest in the whole of the vast enterprise. Those having charge of the work are instructed to do everything at the least cost and to keep exact record of all expenses.

For instance, when seeds are to be gathered, letters are sent to a hundred range riders on the various Government reserves and when a favorable report comes in from a certain section a foreman goes out and with the assistance of the range rider and the neighbors seeds are gathered at a much lower rate than they can be secured from wholesale dealers.

Charles A. Scott, Formerly in charge of Forest Reserve Service, now State Forester of Kansas, at Manhattan.

We are happy to introduce our readers to this gentleman. No man in the West is entrusted with a greater responsibility. He is in the van of transforming the worthless sand drifts into an estimated value of $100.00 per acre. He is a young man of fine presence, strong and robust and of excellent executive ability.

WORK OF THE FOREST SERVICE IN NEBRASKA.

Special Article Written by Charles A. Scott, Who is in Charge of this Work of the Government.

The work of the Federal forest service in Nebraska in previous years has been thoroughly discussed in former articles in The Twentieth Century Farmer and I will confine my remarks entirely to the work of the last two years. As my work has been almost wholly in connection with the federal reserves within Nebraska, I will speak first of what has been done there. These reserves, as most of you know, are situated in the sand hill regions of the state, and they are practically treeless. Our purpose is to plant the area within their bounds, approximately 225,000 acres, to trees that will in time supply the local demands for timber. Up to the present time we have planted about 1,000,000 trees on 1,000 acres of land.

On beginning this work many new problems confronted us. It was the first such undertaking the government had attempted. The question of what species to try arose. This was discussed and threshed over by men of authority on trees, and the list simmered down to two trees that were likely to succeed, the jack pine (Pinus Divaracata), and the western yellow pine (Pinus Ponderosa). Up to the present time both are proving to be valuable. In addition to these two, we are giving the red spruce (Pseudotsuga Taxifolia), a good trial, and it is promising well. We are now almost convinced that the red pine (Pinus Resinosa), will do well in the sand hills, and it will be given a trial as soon as seed can be secured.

Another question that arose was, how and where can we get satisfactory stock for planting? The advisability of using wild seedlings in preference to nursery grown stock, was thoroughly discussed. It was decided that nursery grown stock would undoubtedly be more successful, but the species wanted were not on the market in such quantities as we would require, and we would have to grow our own stock. It would require three years' time to prepare nurseries and grow the seedlings. The forestry officials and the public were anxious to see a beginning made, so we resorted to extreme measures. We shipped in wild seedlings from the forests of the Black Hills of South Dakota and the sand barrens of Minnesota. The result was, we learned and profited by success and failure. The results have been freely given to the public at all times, and I am glad today to tell you more about the results of our work.

In the beginning let me say that we cannot attribute any of our failures to weather conditions, for the summers of 1903, 1904 and 1905 have been very favorable. The winter of 1903-1904 was very dry and probably injured us some, but not severely.

Things Learned by Experience. One of the first things that we learned was that we could not ship in western yellow pine seedlings from the forests and grow them successfully. The reason is obvious to those who are acquainted with the habit of growth and nature of the tree. It is impossible to dig the seedlings from their natural seed beds among the rocks without murdering their roots, and the roots are the vital parts of a pine tree.

Another thing that we learned by experience in the spring of 1903 was that we could successfully grow jack pine seedlings from the sandy barrens of Minnesota. Of the 70,000 trees of this species planted that season between 30 and 40 per cent. grew. That is not a large percentage, but it was enough to encourage us. We saw where we could improve the methods of handling the trees and we determined to double the per cent. of living trees in another year. In our next attempt with the same kind of stock we succeeded in getting 67½ per cent. to grow. We made no changes in our method of planting, but we sent two men to the woods to see that the trees were dug from the ground, not pulled, and to see that the men digging the trees carried pails partly filled with water and that the roots were put into the buckets as soon as the trees were dug, instead of being carried around under the arm until a good big bunch had been secured. Our men also saw that they were properly packed. The moral of this is: Protect the roots of a pine tree if you expect it to live after transplanting. I have a very keen appreciation of the high degree of intelligence of nurserymen, but the fact remains that some of them do not know how to handle pine trees. The very best treatment is none too good for the roots of a pine.

The success of the jack pine as a tree for the sand hills has not stopped with our own planting. We recommended it for general planting throughout the sand hill region of this state, and to my knowledge over 6,000 jack pines were shipped into this state last spring by one dealer. Five thousand of these came to Thedford. Two weeks ago I wrote to each of the men who bought trees and asked for the results of their planting. A summary of the replies gives the following results: The average of all the reports received show that 76 per cent. of the trees are growing. The best report gives 97 per cent. of the trees growing, the poorest 35 per cent. The writer of this report states that the trees were planted on low ground near the river and that the trees drowned out. The trees were planted under various conditions, according to the tastes of the planter. The greater number were planted in the grass sod, the ground not being prepared in any way, and the remainder were planted in plowed ground. Seventy-five per cent. of those planted in the sod are growing, and 71 per cent. of those planted in plowed ground are living. The soil around Thedford, Neb., is as light and sandy as can be found any-

where in the sand hill region. As a result of the success of this year's planting there are a lot of enthusiastic tree planters around Thedford and the indications are a large number of trees will be planted in that vicinity next season.

Growth of Pine Trees. Pine trees do not make rapid growth the first and second year after they are set out in the hills, but after that their growth is quite surprising. On an area of five square rods that was staked off for a sample plot, planted to jack pine in 1903, there are thirty-four trees, the average height of which is 11 inches, the average height growth of these trees for this year is 6.56 inches, or 59½ per cent. of their entire height. This is but the beginning of their growth, and it will not surprise me if they average one foot in height growth in another year.

Planting Trees in Furrows on the Dismal River Forest Reserve in Nebraska.

Our experience with nursery grown western yellow pine up to the present time has been very encouraging, but we are not yet recommending it for general planting, because of the indifferent success so many have met with in transplanting it. Last year we planted about 350,000 1-year-old trees of this species in furrows in the hills. Between 80 and 90 per cent. liv-

ed through the planting and we were much elated over the success of our work. The seedlings used in this planting were not over four inches in height, in the fall when the grass dried up and the sand began to fill up the furrows a great many of the little trees were buried, and those surviving are not making the growth they should, but it is very probable that they will make a good growth next year.

This year we planted 275,000 western yellow pine trees, part were planted in furrows and part in the grass sod without preparing the ground in any way. At the present time 85 per cent. of those planted in the furrows and 89 per cent. of those planted in the sod are growing. Some of the stock of this year's planting is 2 years old; it is growing exceptionally well, and if future planting does as well we will no doubt soon recommend it for general planting, as it is a tree of more economic value than the jack pine. This 2-year-old stock that is doing so well with us is planted in furrows, but the 1-year-old stock is more successful in the sod.

Planting trees in the hills is a simple operation. We organize our force in squads of threes, one man carries the trees in a bucket, and the other two do the planting with spades. When planting in furrows, the furrows are plowed six feet apart and the trees are set six feet apart in the bottom of the furrow. When planting in the sod a line of stakes is set for the leader to follow, and each successive squad follows to the flank of the preceding squad.

Planting Trees in Furrows. Planting trees in furrows costs from $1.75 to $3 per thousand trees, depending upon the character of the ground to be planted, the rougher and more uneven the ground the more it will cost to plant.

We find that the direction of the slope of the ground is a tremendous factor in the success of planting, 10 to 15 per cent. more trees live on a north slope than on a south slope, and an east slope is preferable to a west slope. To sum up the results of our experience in tree planting we have reached the following conclusions:

1. For general planting throughout the sand hills of this state we recommend the jack pine; 2-year-old stock should be used, six to eight inches in height; wild seedlings grow very successfully and are much cheaper than nursery stock.

2. The best results are obtained from planting on northern exposures, followed by the northeast, east and southeast exposures; south and west exposures give the poorest results; side hills are more preferable for planting than depressions or pockets or the crests of hills.

3. On ground where the sand is light and loose the trees should be planted in the grass sod with the least possible disturbance of the soil. In the valleys or on nearly level ground, where the soil is firm and the grass sod thick and heavy, single

furrows should be plowed six feet apart and the trees planted in the bottom of the furrow.

4. Pine trees should be planted early in May in damp or foggy weather if possible. Never attempt to plant pine trees in dry, windy weather.

5. Every precaution must be taken to prevent undue exposure of the roots to the sun and wind.

In connection with tree planting, growing the seedlings has required much of our time and attention. Time will not permit me to go into detail in discussing this work. Suffice it to say that we now have two and one-half acres of seed beds under slatted roof, which gives us a capacity of from 3,000,000 to 4,000,000 of seedlings. The slatted roof over the beds gives us part shade, which is necessary the first year. The western yellow pine and the red spruce are easily raised from seed; they are strong, thrifty seedlings and require very little attention. The jack pine is a very tender little seedling, and if one-half of the plants that start out survive the first year they are extremely fortunate. The first and great calamity to befall them is an attack of "damping off." The best remedy that I have found to prevent serious loss from this source is a good dressing of gravel over the surface of the seed beds. Sow the seed on the surface of the bed and then with a shovel scatter a thin layer of gravel over the seed; it should never be over one-half inch in depth. The gravel permits the surface of the beds to drain quickly, prevents the soil from spattering up over the plants in times of rain, thus leaving the stems clean at all times and in the very best possible condition. In some experimental beds in which we sowed the same amount of seed on the same area of ground the difference in number of plants produced at the close of the season was more than five to one in favor of the gravel cover.

CHAPTER VIII.

OUR NORTHERN AND SOUTHERN CONIFERS.

Pinus Banksiana (Pinus Divaricata) called Jack Pine or Scrub Pine. This is differently described by people in different localities. Newhall calls it a small evergreen tree, or often a shrub nine to thirty feet high, with long spreading branches and wood of but little value.

Prof. S. B. Green on the other hand says "This tree under favorable circumstances will occasionally attain a height of 125 feet with a diameter of 12 inches." The fact is they differ much in their respective locations. In some portions of Wisconsin and Minnesota the forests are packed and crowded with them, much like the Lodge Pole Pine of the West. A single acre will yield 40 or 50 cords of wood and a good deal of framing timber; the timber is not worthless. It makes a tremendous growth while young. Plant it side by side with the Black Hills Spruce and in a short time it will be five or six times as large as the latter, and its growth in the sands of Nebraska is phenomenal. It has short needles, two in a sheath. It has many whorls or systems of branches which are thrown out in a single season and is unlike other Pines in this respect for they will send up a single system of branches and make one vigorous push in June and that ends it. The rapid growth of this tree while young, surpassing a dozen other kinds beside it, makes it very valuable for the speedy work of foresting. Probably in the long run the Scotch, Ponderosa, and Austrian will surpass it, but its tremendous vigor in youth makes it a favorite for timber plantations. It would doubtless make a fine nurse tree to shelter the White Pine, Red Pine, and Douglas Spruce, which with their peculiar foliage, cannot so well resist the winds and storms in the open, unprotected.

The Pinus Virginiana is much like the Jack Pine. It grows on the sands of Long Island, New Jersey, Virginia and other portions of the South.

Neither of these should ever be planted as ornamental trees. The Jack Pine has persistent cones which hang on year by year, constantly reinforced by successive cones which give the tree a ragged appearance. They commence seeding quite young and though fair in appearance at first they soon become unsightly.

Table Mountains or Pinus Pungens. This grows along the Allegheny mountains and upon table mountains in North Carolina. It is often fifty feet tall and is much used for charcoal. I have tested this in York. One to which I paid special attention died and I gave the rest to our city park where they are doing fairly well. They might do to make up a collection, but they have no special merit over other Conifers.

The Norway Pine—Pinus Resinosa, Also Pinus Rubra, or Red Pine. This has very long needles two in a sheath, which give the branches a plume shape, making a very beautiful tree. Its range is much farther north than that of the White Pine. In appearance it somewhat resembles the long leaved Pine of the

Jack Pines in the Sand Hills.
15 Years Old.

(By Permission of Forestry Department.)

South. But while that will endure any amount of heat, this will endure the severest cold but is very sensitive to the heat. I have often tried it in Nebraska, sometimes keeping it under a screen, but hot winds with 110° in the shade would always kill it. They will doubtless do well in North Dakota, the northern half of Minnesota, and in northwest Canada, for they grow wild in Manitoba. It is a more rapid grower than the White Pine. The Jack Pine at first will outgrow it but it is sure to overhaul it sooner or later.

Norway Pine In Minnesota Forest.

From "Forestry and Irrigation."

In the East, where the climate is congenial, this Pine is much used in landscape work. It must be very popular all through the north. It was reported as doing fairly well in the first plantings in the sand hills of Nebraska, though none as yet have been tried in the Dismal River Reserve. If they should succeed there, they will make a splendid investment as they

afford very valuable lumber. They live about twice as long as the Jack Pines and ultimately push beyond them, attaining both size and symmetry.

The sand hills, having a much higher elevation than the eastern and middle portions of the state, may prove more congenial to many kinds of trees which cannot endure the intenser heat of the plains further south and at a much lower elevation. There the Ponderosa will succeed the best of any. A pound of Red Pine contains about 40,000 seeds of which about 80 per cent will germinate. The seeds are difficult to gather but where a nursery is placed in a congenial locality a few pounds of seed will produce a large amount of trees.

Pinus Rigida or Pitch Pine. This tree has three needles in a sheath, three to six inches long. The bark is thick and rough. The tree grows from 30 to 80 feet tall. The wood is hard and full of pitch—good for fuel and charcoal. Its native belt reaches from New Brunswick down to Northern Georgia. It would probably be of no value for Western planting.

White Pine—Weymouth Pine. The leaves are five in a sheath. They are very soft and delicate and fill the air with a delightful aroma. This has been the leading Conifer of America. It grows from 80 to 150 feet. The wood is straight grained and soft. It is easily worked, and though so soft it is much more durable than many of the pitch-laden varieties. Where this can be raised it should have the preference. Standing by itself it is one of the most graceful of all. It builds itself up in marvelous symmetry and is one of the finest for ornamentation.

I note that in reforesting the mountains of New Hampshire the collectors find beds of thrifty seedlings and transplant them. In the humid climate of the East these trees are often found growing in the open. They will push on and take possession of wornout pastures and deserted farms and soon clothe desolation with beauty. In planting in those localities where they will succeed in the West, great care must be taken to secure seeds from the extreme Western belt. I am certain that many failures have resulted from using seed from Eastern localities. I did not know this when I made my plantation under the 100th meridian in Nebraska, and lost every one of them. I am confident that the Wisconsin and Minnesota belt can be pushed quite a distance South and West with safety.

The Hemlock—Tsuga Canadensis. This is one of our most charming evergreens. When given a chance it forms a pyramidal and shapely tree. Its lower branches seem more persistent than those of most other Conifers. So you will see these of larger size and finer symmetry than any of their neighbors. The foliage is very soft and even in states where it grows naturally it cannot be grown successfully in Southern exposures. It has often been tried in the West but in almost every instance it is a failure. There are cases, however, where it is defended from the sun and hot winds, when it does fairly well in Nebraska. Thurlow does not

recommend it, even for Massachusetts where it grows wild. There is a charming native grove of these trees in the Arnold Arboretum of Boston, where I used to recline on the soft needles which carpeted the ground. This was on a North slope where the sun had but little effect.

The Piceas or Spruces. Remember the trees with drooping cones are Spruces or Piceas. The trees with upright cones are Firs or Abies. In the old system they were mixed together and even now writers will say Abies Piceas, which leads to endless confusion.

The Black Spruce—Picea Nigra. The needles are one-fourth to two-thirds of an inch long. The cones are dark purple when young, and reddish when ripe. These trees reach from the Northern states, where they often grow in dense forests, down as far as North Carolina. They grow to a height of 30 to 60 feet. The wood is light, straight grained and strong, and is used for masts and framing lumber.

White Spruce—Picea Alba. The needles of this species are a little longer than those of the Black Spruce. This for ornamentation is a most charming tree, symmetrical and graceful; a beautiful poem in green. In the deep woods it is often of the Glauca or Silver type, having a sheen much like that of the Pungens. This grows in the North and is largely used for paper, thousands of acres being worked up every year for this purpose. We are glad to note that the lumbermen are making an effort to save the young trees, to secure a perpetual forest. Large tracts of these trees are found in our Northeastern states, a belt of them swinging over Wisconsin, Minnesota, and coming down on the Black Hills. It is this latter type which is so successful and popular all through the west.

The Balsam Fir. This is a very beautiful and symmetrical tree, growing in graceful proportions to a height of 30 to 60 feet. The leaves are silvery on the under side and green on the upper. It is a beautiful tree for the lawn in the Eastern and middle states but is not a success west of the Missouri river. But the Concolor Fir of the Rockies, a much better tree every way, takes its place in the West where it succeeds admirably.

The White Cedar. This grows largely in northern swamps. The trees are from 30 to 75 feet tall. They are often closely packed so that there is an immense burden to the acre. Tremendous inroads are being made on the swamps, posts, railroad ties and telegraph poles by the million are required and the question comes up, what substitute can be found for this valuable tree when the supply is exhausted? As the seedlings are easily gathered in the forests they are put on the market at a very low price and efforts are made to sell them for hedges all through the prairie states and thousands have been sold in Kansas and Nebraska, but they are utterly worthless. In their own habitat, in a colder climate and always with wet feet,

they are a success; but they cannot endure the scorching sun and the hot winds of the semi-arid West. One year I planted 1,000 with the greatest care under a screen and gave them the best attention, but even there our Western sirocco found and killed all but four of them. Beside them I planted 1,000 Chinese Arborvitae and lost but few of them. Our advice for the West is to let them entirely alone.

The Arborvitae—Thuga. The White Cedar and Arborvitae are generally used synonymously but Newhall and others make a distinction. This is more of a Southern tree, growing from 20 to 50 feet tall, with very close, dense branches.

Red Cedar—Juniperus Virginiana. This is the most widely distributed of all our evergreens. You see them from Maine to Florida and you find different forms of growth according to different localities. In the Eastern states they take the form of the Irish Juniper and are called Savins. In the Western states they are more branching. The Southern type is worthless in the North. They cannot be moved over 300 miles North of their habitat with safety nor is it safe to move them too far West from the humid, into the drier air of the trans-Missouri country. The Platte Cedar for years has been famous for its rapid growth and hardiness but during our recent wet seasons a blight has mowed them down by the million. W. H. Bruning, who devised a process for raising them from seed the first year after planting, lost $20,000 worth in one year, and gave up the business.

Added to this, most of our state Experiment stations East and West, North and South, charge them with generating the apple rust which has killed many of our choice trees. Notably the Wealthy, which is probably the best we have, is very sensitive to their influence and we often see whole trees defoliated with Cedar rust. So for the present this tree, usually so hardy and valuable, is at a discount. The Western type being very hardy will probably not be affected west of the 100th meridian, where it will be a companion of the Ponderosa Pine. I think there will be no trouble with it in Western Kansas and Nebraska, where it is found growing wild.

Propagation. We have more inquiries regarding the propagation of this tree than for anything else. Mr. Bruning, who made such wonderful success, having worked 30 years to perfect his process, refuses to divulge it without compensation and we cannot blame him. Two methods are used: First, put the ripe seeds on a board and with a brick rub off the pulp. Throw the seed in water to soak a few days. Wash them clean. Soak in weak lye for a day or so, then wash them and plant in a bed covered with sand an inch deep. This must be done in the fall. Put hay or coarse litter over the bed to keep from drying, and be sure the seeds do not dry in gemmating the following spring. Second method. Plant the berries in the fall

in a bed where you wish them to grow. Cover with brush or rubbish. Take it off the second spring when they will come up. How long this rust will continue we cannot tell. But few Red Cedars are being planted, while thousands are being cut down yearly.

Trailing Juniper. This trails on the ground and roots from the limbs and so can be multiplied rapidly. You see much of it in Eastern pastures, often reaching out and covering a space twelve feet or a rod square. It is of no use, only here and there one may do for ornament. You see another form, much more beautiful I think, growing in the Rockies and the Black Hills. They succeed very well when transplanted to the plains. Jackson Dawson, Superintendent of Arnold Arboretum at Boston, is our Eastern wizard. He can do almost anything he likes. He put a trailing Juniper on the stem of a Red Cedar and made an umbrella of it, selling it, as a curiosity, for $50.00.

The American Larch or Tamarack. We have two forms of this. One growing in the Sierras and the other in our Northern swamps. In the early days in Minnesota we used to cut large quantities for our log houses and framing timber. The trees grow tall and straight and there is a large burden to the acre. They usually grow in swamps like the White Cedar; but they are much more hardy and I have some fine specimens growing in York. I think we can depend on them in many localities. They are deciduous Conifers, dropping their leaves in the fall. The companion tree of this class is the.

Cypress. But this is a Southern tree. I have seen it growing in Northern Illinois, and though I have often tried it in Nebraska 30 below zero does not seem to agree with it. Perhaps a few out of a hundred might survive and it is probable that seedlings from the extreme Northern belt might succeed and we could raise a few for variety, but we cannot depend on them.

The Most Prominent Conifers of the South. The Long Leaved Pine—Pinus Palustris. This is one of the most beautiful trees. In form it is much like the Norway Pine, only the needles are much larger. It grows very straight, and is a thrifty tree. I was much interested in watching the growth while I was in Alabama. You often find a tuft of long, bright, green, glossy needles in the weeds and grass. These needles would be twelve to fifteen inches tall—a beautiful compact cluster. Examine closely and you find them all coming out of one bud close to the ground. This is a yearling tree. Next year the bud is lifted perhaps a foot higher, and then year by year it pushes upward, throwing out branches covered with those long needles. A young, symmetrical tree presents a very striking appearance. It is graceful in form and is covered with those long plumes. These are larger on young, thrifty trees than on the old ones. No tree seems more anxious to make a sawlog than this. It retains its branches till a strong root system is

Forest of Long Leaved Pine in Florida.
(By Permission of Forestry Department.)

formed, then the limbs fall and it shoots upward straight as an arrow. The grand forests of the South are being rapidly cut away but the young trees spring up in haste to take their places. There is one trouble, I understand, with the young trees. The southern razor-backed hog is always ravenous and he must eat and it takes a great deal to fill him up, and if he can find nothing else he will root out and devour the young Pine. This voracious shark of the forests seems to have the right-of-way at the South and is about as heedless as the white man and makes no more of destroying a young forest than would a Northern lumberman. He seems to be doing for the South what the other is doing for the North, and between the two they form an anti-forest trust that is doing a large amount of business.

The lumber from the Long Leaved Pine is largely used for framing, ceiling and flooring. It is hard and wears well. Turpentine is made from this tree. All along a system of tree butchery has been used which kills the tree. But recently, government experts have come to the rescue with a system which, while it secures the sap, saves the tree, and we saw many fine groves in a thrifty condition, which on inspection showed they had been tapped without material injury. It is a great pity that we cannot move such a beautiful and valuable tree to the North. But it cannot be done; the air in winter is too dry and it is too cold.

The Short Leaved Pine—Pinus Echinata presents quite a contrast to the Palustris. It is, however, a thrifty, vigorous tree.

The Loblolly Pine—Pinus Taeda. This is one of the most vigorous and enterprising of trees. It seems overflowing with vitality and is very thrifty and aggressive. It is a more rapid grower than the Long Leaved Pine. The timber is not very durable but recently the government has been giving it a chemical treatment which promises to make it valuable for railroad ties. By the way, many experiments are being made, especially in Europe, so that worthless timber like the Beech can be made to last twenty or thirty years. A process will doubtless soon be found for extending the durability of the Pines and even the cottonwoods. The growing scarcity of timber enhances the work of the chemist.

CHAPTER IX.

THE EVERGREENS OF THE SIERRAS AND THE PACIFIC SLOPE.

When we come to the Rockies we find Conifers entirely different from those of the East—a race by themselves. And as we cross the range we find most of the Colorado families, besides numerous species and varieties which belong to those regions alone. As this book is for the average reader it is not necessary to give the long array of names attached, like their own cones, to these various trees.

Just think! the evergreen trees of the Pacific slope comprise 60 species, with twenty-five marked varieties. Should you wish to familiarize yourself with them all, read "Cone Bearing Trees of Northwest America" by J. G. Lemmon. Many of these species are obscure and rare—hidden off in inaccessible places—all, of course, interesting, but, for practical use, beyond the reach of the average planter. What we want most of all is to encourage the planting of evergreens in the great prairie states where they are most needed, and to give general information regarding the great family. One of the most remarkable of all the evergreens is the Pinus Tuberculata. It is a slender and graceful tree and, I think, is also called the Attenuata. When about eight years old it begins to bear cones—not out of the branches like other trees, but on the main stem, and they stay there like ticks securely fastened. They never open to let out the seeds and never fall off. The cones are about four inches long; sometimes the bark will close over them and they will be found solidly embedded in the tree. As the main stem grows new cones appear clinging to it. Then, as branches shoot out, closely attached to them will be other cones. These are exceedingly strong and solid, coated with a sort of water-proof varnish, making them well nigh exempt from worms and squirrels. Sometimes a tree will be split open, ingrowing cones will be imbedded there, and all those seeds will be good. Most seeds of the deciduous cone bearers, like the larch, are worthless after a year or two. But these are kept so perfectly that they will be good when a hundred years old.

Now what is Nature's design in preserving these seeds? Simply this: These trees are in exposed places which are sub-

ject to the ravages of fire. It sweeps through the forest. It finds the cones imbedded in that resinous coating. Of course, the resin invites the fire. The cones are burned. The intense heat opens them. The seeds pop out, fall in the ashes, then take root and another forest springs up in the place of the dead one. If the seeds had fallen from the cones, as in the case of other evergreens, there would have been no provision for this reproduction.

The Pinus Albicaulis builds a comfortable shed for the weary traveler as he climbs up to the edge of the timber line. This often grows like an umbrella. It is frequently flat and compact on the top so that a man can walk on it. For years it has been pressed down by the great burdens of snow. It forms a fringe around the bald-headed mountain. There it clings and hangs, wrestling with wind and storm.

John Muir says, "In detached clumps, never touched by fire, the fallen needles of centuries growth make a fine, elastic mattress for the weary mountaineer while the tasseled branches spread a roof over him and the dead roots, half resin, usually found in abundance, make capital camp fires, unquenchable in thickest storms of rain and snow. Seen from a distance the belts and patches of this tree darkening the mountain sides look like mosses on a roof."

Pinus Lambertiana or Sugar Pine. This tree is by far the most kingly of the whole Pine family.

About the year 1826 David Douglas, an enthusiastic English botanist, making Fort Vancouver, then head quarters of the Hudson Bay Co., his stopping place, would often sally forth in the wonderland of Oregon. One day he saw some seeds in the pouch of an Indian which aroused his curiosity and he could not rest until he found the giant which produced them. After a perilous journey, with his life threatened by the savages, he found a grove of these monsters. He saw one that had blown down, which was thirty-seven feet nine inches in circumference, and the extreme length was 245 feet. It is no uncommon thing to find them over two hundred feet in height. This tree has immense cones fifteen to twenty-four inches in length—the largest by far of any. The wood is fragrant and of fine texture, and is used much as we use the White Pine. The name Sugar Pine is given because sugar exudes from wounds made by the axe or fire, The taste much resembles maple sugar, but like that made from box elder it has something of a cathartic nature and cannot be eaten freely. Mr. Douglas named this tree from an intimate friend, Dr. Lambert in England.

There is a variety called Purpurea, or Purple Cone, which is somewhat smaller.

Pinus Monticola or Mountain Pine. This tree occupies the same relative position in the Sierras that the Picea Engelmani

does in the Rockies. It is a hardy, vigorous, thrifty tree, ninety or one hundred feet tall, and five or six feet in diameter. It somewhat resembles the eastern White Pine. Its finest development is at an altitude of about 10,000 feet. It is possible, growing at such a high elevation, that it would be hardy in the Dakotas and Minnesota, though, in raising trees, there are more than certain degrees of cold to be taken into consideration. The soil may not be congenial; the winter air, though of the same degree of coldness, may be much drier and so not fit. But these things should be tested and all through the Northwest we should find out how large are the resources from which we can draw.

Monterey Pine—Pinus Radiata. This tree is remarkable in that it loves the sea coast and can endure the ocean air. It is found in the hot valleys of California. It often grows to the height of one hundred feet and grows very rapidly, sometimes the annual layers will be one-half to one inch thick, showing very vigorous growth.

Many of the trees of the Rockies grow in the Sierras, where they are much larger than their Eastern relatives. This is true of the Ponderosa, which in the West is called The Yellow or Silver Pine. There it has been known to reach the height of 220 feet with a diameter of eight feet. If in the Rockies you find one four feet through and 100 feet tall you will do well.

The Concolor, one of the most charming Conifers of Colorado, grows in California to an immense size, often reaching a height of 200 feet and six feet in diameter. Pinus Contorta, Pinus Flexilis, and Pinus Aristarta or Foxtail Pine are also in the Sierras, growing on a much larger scale,

Abies Magnifica. This is much like the Concolor, only taller and grander, sometimes reaching the height of 250 feet. This is called the Red Fir by lumbermen who always use the branches to sleep on. They make a delightful bed and the leaves are unsurpassed for pillows. Douglas, who first found and described these trees, went into raptures over their kingly and imposing majesty.

The Douglas Spruce, named from David Douglas, is in the fullness of its glory on the Western slope. There is probably no tree of such dimensions as closely packed in so small a compass as this, a single acre of these stately columns producing a fabulous amount of the best framing lumber to be found. Our Rocky Mountain trees, though of the same species, are like dwarfs beside their stalwart Western cousins.

The Incense Cedar—Libocedrus Decurrens. This is also a giant. I hardly know what we would have done for shingles if it had not been for this tree, available after the best White Pine material had been used up. It is used extensively for other purposes. When our house here in York was built, we used

Cedar doors. These, when finished with hard oil, show the grain to good advantage and give the best of satisfaction. Our house is also weather-boarded with the same material.

Hemlock Spruce—Tsuga Pattoniana. This is called by Muir the most singularly beautiful of all the California Conifers. "So slender is its axis at the top that it bends over and droops like the stalk of a nodding lily." The branches divide into drooping, waving sprays, the whole tree looking like a beautiful fountain, whose gently falling waters had turned to softest green.

Though apparently delicate and tender, it yet has a robustness which enables it to endure the cold and storms, the floods and snow massing. It delights in an elevation of 9,000 to 10,000 feet.

When the first snows fall the branches of the young trees quietly yield to the burden. More snow falls and the whole forest of young trees will bend lower and lower till they lie prone on the earth. Then come the great snow masses which cover them completely—packed so solid you can ride on horseback over them. Then spring comes. The burden is lifted and slowly the beautiful trees rise erect again; their plumes nodding in the gentle breeze.

The U. S. government has recently published a work on the Western Hemlock, calling attention to its strength and fitness for framing lumber. Our Eastern Hemlock was neglected for years. You might go through our Pine forests of the North, and you would see the Hemlock yet untouched. But, as lumber grows scarcer this comes in play, and though it splits too badly for finishing lumber it has its place for sheeting and scantling.

The Nut Pines. These constitute the wild orchards of the Indians, furnishing food in immense quantities for man and beast. Tons of these seeds are shipped away to be sold and eaten as nuts. They are about the size of a pea and are eaten like peanuts, either raw or roasted. One of the prominent members of the group is Pinus Sabiniana. Full grown specimens will be forty to fifty feet tall and two or three feet in diameter. This is a great favorite with birds, squirrels, bears and Indians.

Pinus Monophylla. This is a low, bushy tree, built down on the ground with cones as accessible as possible. The Indians claim these as their own and many a white man has been killed for cutting them down.

The Pinyon Edulis varies but little from the former. In short, Providence seems to have placed these trees in immense quantities where they are most needed—where the rainfall is light, and other things do not readily grow without irrigation.

What an exciting time when the Pine seeds are ripe. The Indians in wild hordes get ready—men, women, and children. They are armed with long beating poles and are loaded down with bags, baskets, and mats. It is a gala time. Men leave their work on the ranches and the women, scattered from home as servants, all rally for the great cavalcade, with men in picturesque garb and women flaunting gaudy colors—often two squaws riding astride of one pony with the papooses strapped on somehow. With joy and glee and wild abandon the great crowd pitches camp on some stream and then the work begins. The long poles bring down the heavy cones, which are chased by squaws and children as they roll down the hillside. Fires are kindled and the cones under intense heat are made to disgorge the seeds, and feast follows feast, but the principal part of the menu of the wild carnival is the Pine Nut. You can imagine the scene. The cones are covered with pitch not yet hardened. Of course, the soft pitch and the dust blend well, and you have a happy, sticky, rollicking mass of humanity; only we would think that if the Indian mother and her darling child were on too intimate terms, they would have to be pried apart.

Tons upon tons are taken home, and stored for the winter. Tons are sent away. In all our western cities you see them exposed by the bushel at the fruit stands. Dogs eat them with avidity, and for horses they make a substitute for oats and barley; if you are hungry you could make a good meal of them yourself.

The Sequoias. Here we come to the grandest work of God in the vegetable kingdom. There have been massive trees in other lands and climes, but never anything approaching the imperial grandeur of these monarchs of the woods. They have marvelous tenacity of life and are born for the millenium.

Sequoia Sempervirens. This is the mighty Redwood of the Pacific slope, and the grand forests of this majestic tree are rapidly falling before the rapacity of the lumbermen. Strange that men can see no value in anything unless it can be reduced to dollars and cents. You stand in awe before one of these majestic monuments of God's fatherly care; you think of His tender guardianship over it for a thousand years; how the rains have watered it and the genial suns have kissed its branches; how it now looms up in the majesty of its youth though ten centuries have passed over it. You linger beside it; your eyes ache as they reach its topmost branches and you take in its symmetry and grandeur. You would stay there for days in companionship of this silent majesty. Along comes a man with an ax. He sees no beauty there, he pulls out his tape line and measures it. "That will make so much lumber. Yes, there is a hundred dollars worth in that tree. Boys, cut it down!" Soon the monarch lies prone on the earth before his rapacious

greed. About one-half to two-thirds of the tree is taken. The superb crown, nurtured by the care of The Infinite, woven into such symmetrical form, gemmed with cones like jewels in a king's diadem, there it lies; its days cut short; its hope for coming centuries blighted. Say, how do five twenty dollar gold pieces look, beside that glorious shaft crowned by the hand of the Creator—a tribute to His protecting care, with eloquence unspoken, declaring His praise—the winds sounding notes of triumph through those branches as though a mighty organ voicing Nature's triumphant song to the great Creator?

Yet this tree has a marvelous tenacity. It does not want to die. Cut down a catalpa or a chestnut snd immediately sprouts will come up which will soon grow into trees. I think the Redwood is the only cone-bearing tree which does the same thing. From the stump a cluster of sprouts will arise to take the place of the one that has fallen. The force held in reserve in that root system, which sends out its feeders near and far, now rushes to the rescue and in a short time the sprouts become saplings and then the saplings, trees. But it takes a long time to restore the wreck of a thousand years.

The Sequoia Gigantea. This is the larger of the two and seems almost destined for immortality. Rings have been counted on a stump which showed the growth of 4,000 years. A mighty tree when Alexander was driving Darius to the wall—a tree which started well back with Nineveh and Babylon. Mr. Muir tells us that in all his research he never saw one that died a natural death. And he thinks that monarchs, the stumps of which have been eaten out by fire, have lain on the ground from three to five hundred years before fully decaying. The tree has a marvelous prepotency if we may apply this term. It yields an enormous amount of seed. These seeds are sent to different parts of the world. If I remember aright I have seen fine specimens growing in Rochester, N. Y., and other parts of the East. Without doubt there will be localities both in Europe and America which will be congenial to this wonderful tree. In its own habitat it seems to have an ambition to reproduce itself. Muir counted 536 promising seedlings growing on two acres of rough, avalanche soil. Often the ground, fire swept, will be covered with these trees. From all that we can gather these seem to be the most thrifty of all our evergreens, and doubtless our Forestry department will make careful research for congenial localities where they can be grown in abundance.

We cannot imagine anything grander than God's mighty Cathedral in the Yosemite, which He has been thousands of years in building. Did men ever rear such shafts? How massive! Think of pillars twenty-five to thirty feet in diameter, and three hundred feet high, supporting a roof kalsomined with

the emerald of their branches. What awe and reverence come over men as they stand In that great temple, as when they feel the earth tremble beneath them, or see the ocean lashed with tempest, and the mountain billows thundering on the rocky shore.

CHAPTER X.

COLLECTING EVERGREENS IN THE ROCKIES.

We do not wonder that President Roosevelt loves the mountains and welcomes their rugged grandeur and prefers the camp, with all its wildness to the comforts of the White House. Often in Springtime, wearied with doing the work of two men I have turned to the glorious Rockies for change and rest. Let me describe one trip. We took the stage from Pueblo to Beulah, a distance of twenty-eight miles. As we cross the intervening plains we have a magnificent view. Nature is in one of her coquettish moods, as if she was giving joyous welcome to her lover. Now she draws a screen of cloud from the foothills to the highest crest, and the whole range is hidden from view. Then the curtains are moved aside and we see the projecting cliffs, the rocks, forests and mountain sides. Then another shift is made and great gulfs and frowning precipices appear. The curtains rise and fall again and then are moved from side to side, when as if by magic, the mighty veil is lifted and rolled away, and the majestic range stands out to view, crowned with old Baldy who rises almost 14,000 feet into the heavens. As we move nearer, the scene becomes much more distinct and impressive. Now we pass Muldoon hill, where Barnum's great Muldoon, the missing link, half ape and half man, was found, which years ago created such a flurry in the scientific world. The spot was well chosen. I have dug up fine petrifactions on the same spot and right there the specimens of Selenite, (crystallized gypsum.) I was digging for specimens one day when a passing mountaineer called out, "What are you doing there?" "Oh, just gathering fossils." "Well, keep on, you may find some little Muldoons yet." As we near the mountains, two great buttes rise from the plains like two immense gun-boats, one is called Monitor and the other Merrimac. Now the road winds around the brow of a cliff and we descend into one of the most charming valleys on which the sun ever shone. Here the changes of scenery seem well nigh infinite. You have constantly new views of the mountains with their crowns of forests and snow and the play of light and shadow around the summits.

I remember one day a cloud like an umbrella slowly set-

tled down over the valley and hung there a few hundred feet above us like a great dome. There were mountains on every hand, and through the fringes of the great canopy we could see forests and rocks—the green and the brown. The whole scene was weird and awe inspiring as if a mighty cathedral had been extemporized for our worship. Now we go into the little village; and here are our cottages. In the yard are glistening Spruces which we brought years ago from the highest altitudes and here is a grove of Ponderosa Pines, one of them nearly eleven feet in circumference and its wide drooping branches and massive head make a fine carriage house and wood-shed for one of our tenants. As we go into our cottage we see over Mount Nebo a train of clouds like a flock of sheep coming down the mountain side. They come right into the yard and are over and around us, giving kindly welcome and cheering us with their unspoken sympathy. Did you ever "keep Batch?" It is just as easy and natural as can be. Here is a gem pan; stir up flour and oatmeal, half and half, put in water, a little butter and baking powder. Have your oven hot and in ten minutes you have a feast fit for a king. Fry your ham and potatoes in the meantime. What biscuits you have left, butter well and put into your dinner pail and you have something that will wear. Why make such a fuss about housekeeping? I have seen women putter and dawdle around three hours getting breakfast and it would be no better than mine—all on the table in just thirty minutes from the time of getting out of bed.

By six o'clock we are ready for our start; we have a task on hand. Eighty-five thousand trees to gather for the United States government besides thousands for other parties. We had a man out prospecting and he has found a good place for us. It is some miles away and the rough road rises up and up all the way. It is slow work for the mules. Note the trees by the wayside. Here are the hardy brown cedars which will endure any amount of heat and drouth; scattered here and there are the Scopulorum or Silver Cedars in their glistening robes as if sprayed with the moonbeams. Here is the all prevailing Ponderosa, rugged, brave, patient and persistent—growing everywhere; out of the clefts of the rocks, perched upon the cliffs waving defiance from the front of the yawning precipice, growing stately and grand where it can, doing the best possible everywhere, always full of courage in every condition. Here are groves of Douglas Spruce, each group a foliage garden of itself, some are light green, others are almost blue, some are rigid in form and others have a pendulous grace. On some the needles are long, on others they are short. To heighten the effect, near them are the charming Abies Concolor with their changing and shifting tints of light and dark green and silver shadings. Up a steep mountain we climb and come to a level

plain which is edged with drifts of snow and here we begin our work. "Now, boys, be very careful. Don't pull them. Dig every one carefully with the spade. Be sure and get all the roots. As fast as you dig, cover with earth. When you have an armful bring them to me and I will keep them under this wet burlap."

The work begins in earnest. Reader, did you ever have a taste of mountain air? Where the rich ozone goes tingling through your nerves and then comes to you the joy of living. You can almost feel wings growing. The blues and the "tired feelings" and the despondency all fly away and you are left in a delightful ecstasy. Oh, this is glorious! The white snow, these grand trees! Yonder, clear sky and those fleecy clouds which Mother Nature has washed so clean and has now hung them up on invisible clothes lines to dry.

Most of the Conifers we gather are the Douglas Spruce. It is my part to sort and tie them in bunches of twenty-five and it keeps me busy. The air is moist, so is the burlap we use. When we get ten bundles they are laid by the snow bank and the roots are covered with snow. We have a lively time until noon. I build a fire and prepare coffee and then we have our lunch and a brief chat about our work. Our nooning is short, for we want to get to camp in good season. We start about five o'clock. Our trees are packed in a great bundle, roots to roots and the tops outside. They are wrapped in burlap, the roots being layered in snow. We reach camp, find a nice clean spot of earth; a puddle of mud is made, the trees are dipped; they are then heeled in solid. Our first day's work is twelve thousand—a very good beginning. Then we get our supper and are tired enough to sleep. Some of these trees are mudded again, packed in moss and shipped to the different experiment stations. But we must build a screen and plant forty thousand ourselves. My partner says: "We never can do this." "How long will it take," I ask. "Why, a man can only plant two thousand a day." "Pull out your watch; there are one thousand and I will plant them and do it in an hour."

When you plant under a screen you put them close together. It takes two years for them to be well rooted. We do not expect they will grow much and so we mark our rows sixteen inches apart, spading down straight on one side. Now set your trees upright with one hand and with the other put the earth against them. They need be only two inches apart and the rows sixteen inches. When set you stamp them solid so that the earth is packed firmly around each tree and the loss is very small indeed. The thousand were easily planted in forty-five minutes. My man soon "caught on" and it did not take long to put the forty thousand away in good shape.

Hunting the Picea Pungens.

One Fall an order came from an Eastern firm for three thousand pungens of selected bright colors. While fall planting will do well enough in the East it is seldom practiced in the West, although here in York, in selling a piece of ground, I had to remove a lot of little two-year-old trees. I did it under protest quite late in the fall. The ground was moist and I covered them with cornstalks to secure a good ventilation and they all lived.

To secure those bright Silver Spruce I had to get up at four o'clock and start out at five, riding a burro and how slow he was. It was only by feeding him up like a horse that I could get any speed at all out of him. It took about half the time to go and come. Strange, is it not, that in this age things of real merit will come to the front? Three thousand trees were a great many. They went to a nursery near Boston where choice things are appreciated. If I found an exceptionally bright one I would say, "Here, my little fellow, you must not lose your charms in this wilderness. You were born to shine." Some of these trees sold for $12.00 and $15.00 each. Most of them went at from $2.00 to $5.00 and today you will find some in the Arnold Arboretum, some in the Hunnewell estate but most of them in the private homes of prosperous people and those long donkey rides had much to do in adding to the beauty of the old Bay State. Thus it is in this age, the rich draw the choicest things from all parts of the world and if there is a tree or shrub of real merit it must come to the front.

Most plants and trees do best under good cultivation. Take the Pungens. In its own habitat it drew the attention of the traveler. Hundreds were taken into the Western states and planted in the East. I have know instances where $100.00 was refused for a single tree and some of them at their best estate are almost priceless. The hunter delights in finding and shooting game but I have found joy more intense in hunting beautiful trees and sending them to their destination where as courtly sentinels they stand on dress parade—the admiration of the beholder.

Hunting the Black Hills Spruce.

The hunter delights in the trophies of the chase. The skin of the bear or horns of the elk are witnesses of his skill and prowess. Before me as I write there are a couple of Black Hills Spruce which, with thousands of others, are my trophies. These are the genuine White Spruce—a section of the family swinging around into the Black Hills where the climate is something like that of the contiguous regions and being but a few hundred miles away they can be successfully moved. Here the same precautions are used as in the Rockies. For years the wardens of that section have made themselves obnoxious by refusing to allow any trees to be removed, even prosecuting those who

Black Hills Spruce.

took them. But this is contrary to the wishes and intent of the Forestry department. The Black Hills are the nurseries for the great prairie states. Cattle are allowed to destroy forty to every one that is taken. And if those thickets were left to themselves they would destroy and crowd out each other. Better far for them to adorn prairie homes than to be strangled to death in the struggle for existence.

This description is not a covert advertisement for long ago I gave up collecting evergreens.

CHAPTER XI.

THE ROCKY MOUNTAIN EVERGREENS.

We find here an altogether different class of trees from those of the East, and it would not seem as if they belonged to the same continent. They appear to have been invented for entirely different conditions.

Not long ago I had a talk with M. Brugger, a banker at Columbus, Neb. He was born in Switzerland, amid the grand mountain scenery, which sets people wild with rapture. I asked him the difference between the two systems of mountains. He said they were as widely different as if belonging to two worlds. The air of one is soft and humid, clothing hill and mountain with a freshness and greenness foreign to our own. Said he:

"With the same conditions your Colorado peaks would be capped with glaciers and you would have far softer and more beautiful scenery. Your mountains are piled up in the heart of the arid regions, where rainfall is light and the air is dry. You have vastness and grandeur. We have softness and beauty."

This accounts for the fact that trees nurtured for millenniums in these mountains are fitted for a like atmospheric relation on the plains. While evergreens brought from Switzerland could not live a year on our bleak prairies, the Silver Cedar and Ponderosa thrive under care far better than in their own habitat.

The Silver Sheen. This is a striking peculiarity of our mountain trees, especially the Cedars, Spruces and Firs. What is the cause of this? Probably the high altitude and the shelter of the deep gorges. You seldom find these exquisite colors in trees exposed to the full glare of the sun and the full sweep of the winds.

The most charming and delicate shading is found in the most sheltered places, where the evolution of beauty has been going on for ages, and those garments of more than courtly splendor have descended from parent to child. This rare beauty is a sort of a bloom like that on a peach, which covers the needles and is easily rubbed off, so that a tree of rarest beauty exposed on a bleak prairie, whipped and cuffed by the winds, must lose much of its attractiveness.

It is with trees as with human beings. A girl tenderly nurtured in a city, shielded from sun and storm, has a soft, velvety complexion, and if later on her children and grandchildren grow up in the same conditions there would be even greater delicacy of features. If a sister of this same girl grew up on Western plains and was much out of doors, bronzed by the hot suns and toughened by the winds, she would have a countenance entirely different, and if this exposure should be kept up for generations it would seem as if they could not possibly have been related.

Rich Coloring Can Be Preserved. With care the rich coloring can be preserved and even enhanced. When you transplant a tree from the mountains to a prairie nursery and give it good care, it grows much more rapidly and has a deeper, finer color. You can find nowhere in the mountains such lovely trees as you see in a well-sheltered nursery. And here a strange thing occurs. In some parts of Massachusetts are places very congenial and the trees put on a radiance that is charming, and the same trees in some portions of Ohio will lose their brightness entirely in August and be green the rest of the year.

Too much wet is not favorable to the sheen or delicate coating of needles. I knew 500 bright Pungens rejected as worthless for color in a wet season, but the purchaser was persuaded to wait another year, when they came around all right.

The great Horticulturist seems to have held these trees of rare loveliness for these latter days, when the whole world is searching for the very best—an age when there is more thought of home and farm adornment than ever was known before. It is an age of parks. Fifty years ago these were unknown. Now a large area of our largest cities is given to the public and the world is searched for finest trees, shrubs and flowers.

If you want to see the most exquisite robes that trees ever wore, seek some deep gorge, where there is such a blending of beauty as will photograph a picture of loveliness on your memory. There, kind Mother Nature has been performing work no artist can copy. Lie in the shade and let the sun and a gentle breeze put that beauty on exhibition. On the background is the gray granite. There is the Ponderosa, waving its plumes of deepest green. There is the Douglassi in soft colors, from light green to richest silver, and there the Silver Fir, so true to name, with green and ermine commingled; and there the Cedar, with fine, rich, deep foliage, so different from its relative of the plains.

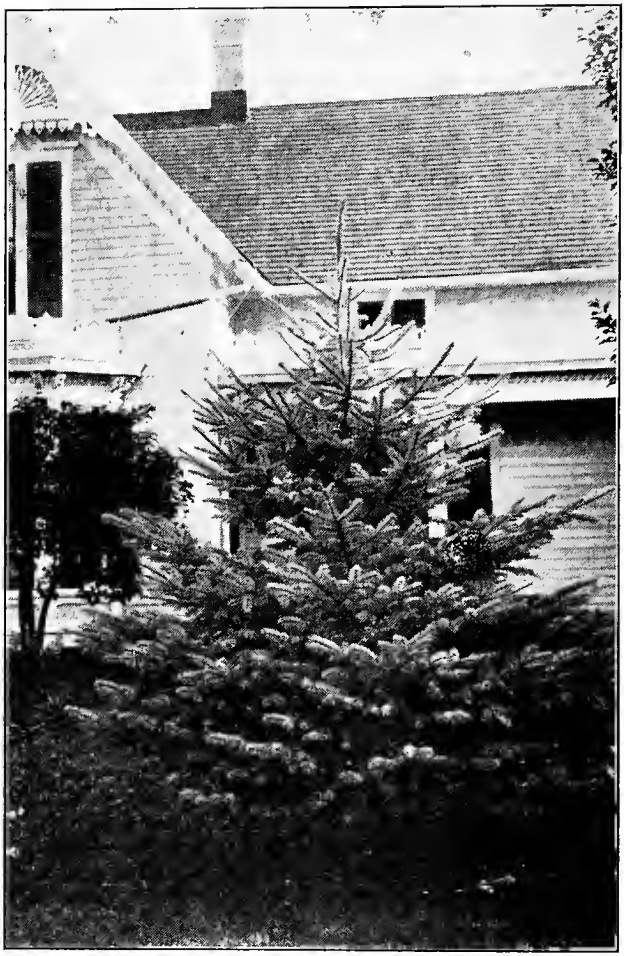
Go higher up, where the snowflakes fly in summer, and the sleet comes in August, and you find the Pungens and Engelmani children of the clouds, whose fleecy whiteness seems to linger in their foliage, and even in the glare of the sun those branches

seem flooded with the softness of the moonlight. These trees of such attractive and unique coloring, are sports or variations of their respective species, found only in our Western mountains.

Gathering The Seeds. Well, let us take a trip to the mountains and gather some seeds. One year we followed in the wake of a sawmill. The men took the logs and let us have the tops, so we could gather rapidly. But generally we let the squirrels do the work. They can climb so much better than we. I have been in those high altitudes when the trees would be burdened with cones, and in three weeks there would not be one to be seen. It is a busy time both for squirrels and seed gatherers. It would be cruel to the squirrels were it not for the fact that they cut off ten times as much as they can possibly consume. But their idea is to leave nothing. They will take a large tree, say of the Concolor, the cones of which are as large as an ear of small sweet corn, and in a short time the stems will be gnawed off and the cones come thumping to the ground. Sometimes the cones are bad; the seeds did not mature. These the squirrels never touched. We did, but found them worthless. At first we used to climb and gather at great expense and trouble, but now our collectors almost entirely depend on the squirrels. If a man wants the hardest scolding he ever had let him fill a bag with cones while the little fellow is at work up a tree. He tells him in plain language he is a thief and a robber, and if he wasn't so large he would come down and give him the biggest thrashing he ever had, and sometimes he would start to do it anyhow, but the nearer he got to his enemy the bigger he looked, and then he would go back and work a while and scold a while.

The most singular thing about the little fellow is the way he keeps the seeds. They must be kept fresh or he cannot use them. If they should spoil he would starve. He has places where he stores them among old well-rotted cones. He stands them on end in clusters of about a double handful and sprinkles some old cone dust between them; then covers them lightly and sometimes under a single tree the men will get two or three bushels. The cones are put in sacks and bound on burros or horses and taken to camp, where they are spread out on large sheets to dry. They are then threshed out and put through a fanning mill and are ready for market. The industry has grown immensely. Our collectors in Beulah, Col., gather nearly a ton a year; many of these go to Europe. One year we sent a lot to plant Prince Bismarck's estate, a few years before he died.

The Picea Pungens. The Picea Pungens is the king of the Spruces, clothed in royal robes of silver and sapphire, a very kohinoor among the gems of the Rockies. It is a child of the storm king, growing at an altitude of from 8,000 to 10,000 feet



Picea Pungens.
(Colorado Blue Spruce.)

above the level of the sea. It is generally found even there in deep gorges or on the north of the ranges. We would naturally suppose that it could not endure a sudden change, or thrive in a hot climate. But the fact is, there is no tree which can endure a greater variety of soil and climate. There are fine specimens growing in Washington, also in North Carolina.

Until it is twenty-five years of age it will probably be by far the most attractive Conifer on earth. That marvelous sheen seems of the deep blue and the fleecy clouds poured out on the oranches like a flood of beauty.

This tree has been extensively grafted, but as only laterals could be used, it was hard to make the tree rise in the world. The upright leader of course could not be used for the scion, and so the tree, partaking of the nature of the graft, did not know which way to go, and so would go every way but upward.

The rare color of these trees is somewhat tricky. You may put the brightest tree you can find on the windswept plains and it will become green except while growing, when it will brighten again. You may make the most careful selection and send East, and they will lose their gala dress on the way. The collector is often severely censured for not sending bright trees, when the finest have been sent, but sweat out the color on the way. But it is restored again as soon as the tree begins to grow. Two Pungens grafted from the same tree will show different color, according to different situations. For some cause trees raised from seed in nurseries do not develop as bright color as those growing in some sections of the mountains. Some of the ranges will show a much larger per cent of richly colored trees than others. The best way is to take those with established colors and give them good cultivation. The brightest tree, if stunted or neglected or placed in an unfavorable location, will take the sulks and turn green. It also changes as old age comes on.

The cone of the Pungens is about one-half the size of the Norway. The needles are short and sharp—pungent—hence the name. They are like polished glass. In Denver you will often see them covered with dust and smoke, but on shaking them they will be as bright as ever. This peculiarity makes them especially adapted for city planting, and from its construction we would judge it was invented for this purpose. Dust is poison to Conifers of soft foliage. This distinctive feature of the tree must not be forgotten, for it will doubtless grace a thousand city homes where there would be no success in planting any other kind.

These trees vary much in form. Those on the grounds of Robert Douglas of Waukegan, Ill., are remarkable for their pyramidal form and symmetry, while others will be pendulous. The tree has a regal grace, stern and unyielding in outline, like an oak among the Conifers. It throws out stiff, shelf-like

branches, each year giving a new shelf. Sometimes the snows lodge heavily on it, and you would think it would be pendulous like the White or Norway spruce, but as soon as the snow is off it springs back again.

Taken all in all, this is a remarkable tree. There is probably no state in the Union where it will not thrive. It might be monotonous to have the entire grounds planted with them, but every lawn or yard should have at least one to give with its unique coloring such a pleasing contrast to the deep green of other trees. Hardy, healthy and wonderfully beautiful, it should be welcomed to every home.

Picea Engelmani—Engelmani Spruce. Named from Dr. Engelman, the Botanist.

About fifty miles west of Boulder, Col., in the centennial year, a company of travelers were caught in a fearful storm and probably would have perished had they not found a most remarkable tree. It was tall and shapely, of beautiful drooping form, the outer branches bending to the ground. There was an opening as if some animals had entered. Cutting away some of the limbs, they found a spacious room reaching out in every way from the trunk about fifteen feet, giving ample space for themselves and horses. On their entrance some bears rushed out to the terror of their horses. Looking about, they found the great limbs shingled with green foliage, dropping to the ground, shutting out snow and storm, while beneath was a floor of cone and leaves. They were nicely fixed and named their protector the "Centennial Tree." It was often used by travelers in that far off place—away from human habitation.

Some one put up a match box and under it wrote: "If you haven't any take some; if you have a surplus, leave some," and the box was kept filled for years. The room was impervious to the storms and the matches kept in good condition. The bears were loth to give up their comfortable neat, and coming back one day to see if their room was vacant, they frightened the horses so badly that they ran away, and it took days to find them. This famous tree was Picea Engelmani—the giant of the high altitudes—and this was a weeping form of the species. They seem at their best at an altitude of 8,000 to 10,000 feet above the sea level. A few miles from Beulah, Col., in the high altitudes there are magnificent groves of them.

They have a softer and more symmetrical appearance than the Picea Pungens, which they much resemble, and it takes an expert to tell the difference. These are sometimes called the Colorado Blue Spruce, though that name really belongs to the Picea Pungens. The seed is often gathered and sold for Pungens.

There is no doubt but what this would be one of the very best trees for Northern Minnesota, North Dakota and Mani-

Picea Engelmani.

toba. It is among the hardiest. It seeds enormously. A pound will raise a good many trees. Being from the high altitude, it will stand any degree of cold, and we wish it might be tried on a large scale.

Juniperus Scopulorum, or Silver Cedar. After twenty years' acquaintance with this tree, I think it is by all odds the most beautiful of all our evergreens for the plains. It is fully as hardy as the famous Platte Cedar in its resistance to heat and drouth and cold. It does not blight like that in a damp season.

An Error Corrected. Many have supposed, and myself among them, that the Scopulorum was the mother of the Platte Cedar—that the seed drifted down our streams and that the present variation was the result of long years of different conditions. This is all a mistake. The two kinds are entirely distinct. Their meeting place is some distance to the west of us. The Platte Cedar came up to us from the East, while the other came down from the mountains. You find it in many parts of the Black Hills. How do we know? One kind has several seeds in a berry, and these seeds have a much softer shell. The Silver Cedar has but one seed to the berry, and it has a very hard and horny shell. One ripens the seed the same year, while the Silver Cedar requires two years for maturity. The birds work on them in the meantime, and it is hard to get those that are matured. Many bushels have been collected the first year and planted, and not a seed grew.

They are radiant in their robes of silver and emerald and most of them have drooping foliage which looks as if they were shingled by some magical process with the most beautiful covering that ever adorned a tree. The first few years they turn brown like the Platte Cedar, but as they grow older they keep their exquisite coloring in winter, and when the snow is on the ground, contrasting with its whiteness, you see these glorious trees, queenly in their beauty, with garments scintiliating like flashing jewels in the sun. I have gathered poor stunted little trees from stony ledges in the Rockies and planted them on our rich prairies, and in a year or two, when well rooted, they were like prisoners released from bondage, and would expand and grow from one to two feet a year.

The Firs of the Rockies. Remember trees with upright cones are Firs, and are called Abies. Those with drooping cones are Spruces and are called Piceas. Even today and among intelligent writers and nursery-men the matter is badly mixed up, and some write Abies Picea Pungens. Of course, the Cedar and Pine families go into their respective families.

The Sub Alpina. When you go up the Rockies to an elevation of about 8,000 feet you find a beautiful tree, very symmetrical in form, trunk straight as an arrow, the bark nearly

es white as Canoe Birch, the needles streaked with emerald and silver, and when the winds move the branches there is a fascination of beauty in these mingled colors. This tree is called by some Abies Lasiocarpa, sometimes White Fir, White Balsam and Mountain Balsam. It is a Balsam. In form it is much like the northern species with which we are familiar, only the needles have a more intense color and the bark is different. In its own habitat it is a beauty. This is Abies Subalpina.

It took me some time to get acquainted with its peculiarities. One day I saw a fine group of beautiful slender trees, very thrifty and symmetrical, huddled closely together. A few feet away there was a dead Subalpina and from it a dead limb extended under the group. Looking closely I saw the limb had dropped down into the leaf mould and taken root, and these young and beautiful trees were the result. Looking further, I found many other trees doing the same thing. I have seen the Norway Spruce and American Arborvitae do this in the moist climate of the East, though very rarely, but this was the only tree I have met in the West with this habit. To see them in their beauty one needs to visit them where they grow. In the East, where they want the best of everything regardless of cost, they are growing in favor. These trees grow in the Yellowstone National Park where they have the same characteristics of reproducing themselves from the lower limbs which fall into the leaf mould and take root. Showing this tendency to fellow passengers awakened much interest.

The Concolor. After 25 years of close observation I am convinced that this is the queen of the Firs for the East. Of course, we must acknowledge the superiority of the noble Firs of the Western slope, but as they do not succeed in the East we must count them out and leave the Concolor supreme. The name signifies even color, bright both summer and winter. These have been tested under cultivation for forty years and they are growing in favor. Riding with a friend in Massachusetts years ago in a group of evergreens, I detected one which I said was from the Rockies. We were quite a distance away. There were several kinds in the group, but I knew my eye could not deceive me, and there was that lovely tree, thrifty and beautiful, outvying all the rest.

The Picea Pungens ranks as the most beautiful of all in its younger years. It is indeed a marvel, but after it is thirty years old the silver and sapphire gradually turn to green and in many instances they have been cut away. Not so with the Concolor. Planted by itself with room to spread it will grow to be four feet through and seventy-five feet tall and the lower limbs are retained so as to give a fine pyramidal form. As with the Pungens and Engelmani there are sports or

Concolor Fir, Growing wild on the Ranch of T. C. Thurlow, West Newbury, Mass.

striking variations. Many have the most exquisite and fascinating beauty—ermine and emerald blended.

While visiting the princely estate of H. H. Hunnewell at Wellesley, Mass., I noticed some of these trees of striking beauty and symmetry, very rich in their foliage. I looked at the labels—what ponderous and high sounding names they had—well, pile them on, they could stand it. They were nothing but our own glorious Concolor after all, and that was enough. I was glad to see them. They were old friends doing better in their new home than in their mountain fastnesses.

A singular thing about them is, though their native home is far inland and they thrive at a high altitude, they make one of the finest coast trees that can be secured. Many Conifers cannot endure the salt air, but these seem to thrive on the very shore, defying old ocean to do his worst. While the sheen of other trees will fade with passing years, these retain their glory, keeping their attractiveness as the Christian does his joy, to the very last. In order to see these trees in all their glory you need to visit them while bearing their cones. Here is a grove of them. All have on their gala dress. Some are light green, some have a darker color. The last year's foliage is of one tint, and the new growth has a lighter tinge. There are many different shades and what is strange is, that on one tree there will be cones of light green, and on the next they will be deep purple. They grow erect on the top of the tree. They are about the size of the ears of early sweet corn. As they mature the color seems to deepen, and from the cones there exudes a gum as clear as crystal. Now stand back while the gentle breeze and the sun put all that beauty on exhibition—there the emerald, the sapphire and the silver, the older and newer growth with varying tints, the cones in contrast with the rich colored needles—the sparkling gum flashing like diamonds. Take it all in all, there is loveliness enough in that grove to woo a man half across the continent. From specimens here and there in the East one has no conception of the coming glory. T. C. Thurlow of West Newbury, Mass., has some splendid specimens, very rich in color, from collected trees I sent him years ago. On the Tenney estate of Methuen, Mass., are some grand types of this variety.

Well, you ask, what is the use of this tree? Can we raise it on the plains? Will it grow in our parks and private grounds? Can we depend upon it? Yes, on a hill in prairie sod, near the town of Friend, Neb., in the cemetery, I saw some of these trees growing vigorously after three consecutive years of terrible drouth and heat, in the full blaze of the sun and full sweep of the hot winds.

The winter of '03 and '04 played sad havoc with these trees at the Minnesota experiment grounds. The trouble, doubtless, was the seeds were from the foothills instead of the high alti-

tudes. Trees from the hills will stand better on the plains. Those from the highest limit best resist the cold.

The Douglas Spruce. The Douglas Spruce (Pseudotsuga Douglassi)—Tsuga is hemlock. Resembling hemlock is the signification. This is the tree for the million. It is now planted largely in Europe. In visiting the nurseries of the interior and also of the East I found it the most thrifty of all the evergreens, making by far the most rapid growth. Some complain that it grows too rapidly for a lawn tree, that it soon obstructs the view in a yard, but it has its place in a grove. Mr. Pollard of Nehawka, Neb., has a fine grove of them and they are making a rapid growth. The foliage is too soft for a windbreak. When exposed to the full sweep of the sirocco it sun scalds. You need to hide it behind other trees or put it in a grove.

In the western part of Nebraska I noticed that if planted on low grounds, as it starts to grow very early, it is sometimes nipped by late frosts, which give it a ragged appearance. This is the most famous tree of the Pacific coast. B. E. Fernow, former chief of forestry, tells us that nowhere on earth is there such a burden of lumber to the acre as this tree produces. It was named from David Douglas, an early explorer of the western forests. You will find it distributed from the eastern slope of the Rockies to the Pacific coast.

John Muir says: "It is this grand tree that forms the famous forests of western Oregon, Washington, and the adjacent coast regions of British Columbia, where it attains its greatest size and is most abundant, making almost pure forests over thousands of square miles, dark, close and almost inaccessible, many of the trees towering with straight and almost imperceptible tapering shafts to a height of 300 feet, their heads together shutting out the light—one of the largest, most widely distributed and most important of all our western giants."

I call attention to one feature of this tree, and that is its almost infinite forms and features. Some are light green and some a dark blue mingled with silver, some have short needles and some have longer ones, some have rigid branches and others those that are gracefully pendulous. Time and again mountaineers have said: "I will show you an entirely distinct tree," when it would prove to be a type of the Douglas.

In eastern Nebraska and Kansas this tree will have a future, and in the central portions it will do well if sheltered by a row of Cedars on the South. As far West as Franklin, Neb., there are some fine specimens, but its best field will be to the East of the 100th meridian. If one is planting a forest by all means use this tree. It will bear close planting. Surround a piece of land with other evergreens or deciduous trees, and plant these in the center, and you will soon have a forest of straight, beautiful trees, which in a few years will make saw-

logs. I think in eastern Nebraska you can raise these trees as rapidly as they can a forest of Pines in Michigan.

Doubtless in reforesting the waste lands of Minnesota this tree would be eminently satisfactory. Its hearty, healthy and rapid growth must make it a favorite. Often in the mountains you see those of glauca or silver type making them look much like the Silver Pungens. If you plant a thousand of these trees you would be delighted at the various forms and color.

Pinus Ponderosa. The Pinus Ponderosa has several names—Pinus Engelmani, Pinus Parryana, Pinus Jeffreryi. It is also called Yellow Pine, Bull Pine, Long-Leaved Pine, Heavy Wooded Pine and Montana Black Pine.

It is one of the most rugged, robust and hardy of all the Pine family. Under cultivation it is very thrifty. It will not do as well in eastern Nebraska as in the western portions and in the Atlantic states it is a failure.

This tree belongs to Nebraska. It grows on the bare hills in the northwestern parts of the state. You will find it perched like the cliff dwellers on high, barren bluffs where nothing else will grow, to get out of the way of the prairie fires. Had it not been for these fires it would ere this have taken possession of the sand hills. Some years ago the government did some experimental planting in the hills and got some Ponderosa seedlings which I raised in the western part of the state, and they were found well adapted to the sands. This tree must be our main reliance for the sand hills and plains. It is a native. It will resist the extremes of heat and cold.

The last time I went to the Black Hills, out on the plains in a gorge, on a shelf of disintegrated rock, with no vegetation around it, I saw a lone Ponderosa. There it stood like an emblem of hope on the desolate plains. It had survived because no grass could grow near it to invite the fires. It plainly said: "See what can be done. A bird dropped me here and here I have stood for years with hardly anything to live on. I have defied drouth, heat and cold, all alone and unprotected. Now turn up the soil, prepare the ground, give us a chance and we will show you what can be done."

I have been much impressed with the almost human intelligence of these trees. You go into the mountains when the ground is very dry and you will see a grove of them turning yellow and you say, "I think they have caught it now, and even these hardy trees must succumb to the drouth."

But, no! Look a little more closely and they are dropping half their needles for there is not moisture enough to carry the whole. Had there been plenty of rain no such economy would have been needed. One fall when it had been very dry and all the groves were turning yellow and adjusting themselves to the conditions, I noticed some trees very green and vigorous. There was no water within 200 feet. Having occasion to dig

Pinus Ponderosa.

near the ditch, I found the roots of these same trees had gone down to drink, like a herd of cattle, and there they were pumping moisture into those fresh looking trees 200 feet away.

Owing to the rapid growth the grain is very coarse, so that it makes fine finishing lumber. Many good houses in Colorado are finished with this Pine and when nicely dressed with hard oil it is one of the most attractive woods we have. It has a tendency to warp and twist if left to itself. So it is necessary to have it snugly piled. Immense forests of it have been cut away in the West and in the Black Hills, but they are in haste to restore the waste and almost invariably when the old trees are cut new ones spring up to take their places.

The Pinon Pines. There seem to be two kinds of Pinus Pinon, pronounced Pinyon or Nut Pine, one growing on the eastern slope in Colorado and another in Arizona and New Mexico. They are remarkable from the fact that they seem able to bear almost any amount of drouth and heat. You find them growing well down on the foothills with the Brown Cedar. They are propagated by a remarkable provision of nature. Birds have much to do in the distribution of trees. In the winter large flocks of Cedar pigeons will swoop down on a Platte Cedar and clean it out, and scatter the seeds all over the country. In the mountains there is a species of bird called the Pinon blue jay, whose special business seems to be to take care of the seeds. Now, these Pines do not seed every year, and the seeds are large, and the squirrels and birds love them, and yet this blue jay seems to think he is the warden, and as soon as they are ripe he digs holes in the ground and deposits them for his own use. In the meantime he may be shot or his memory will be poor, so he cannot remember all his hiding places, and so some are overlooked. They are planted rather deep. That is all right, for it is a dry country, and if too near the surface they could not germinate.

Now, the rule is the larger the seeds the deeper you plant them. You can plant a Black Walnut from four to six inches deep and it will be all right. If you should plant Black Hills Spruce as deep you would never hear from it. The seed of the Pinon is about as large as honey locust seed. It is sturdy and vigorous and will hold its vitality a long time. If it is too dry to come up one spring it can wait for another and when the ground does get a soaking it springs up a strong plant and forthwith throws down a long tap root to reach any moisture that may be stored, and thus it hangs on and lives and grows under most adverse conditions. The wood of this tree is very heavy and full of resin, making excellent firewood.

It not only grows low down on the foot hills, but also up near timber line. Years ago, in attempting to climb Pike's Peak, I was seized with the rheumatism up in those high altitudes so I could go no further. Off in the distance, I saw a

wood chopper's tent, and stayed with the men all night. They were taking Pinon wood to the Pike's Peak station. The timber had been killed by fires. The wood was carried on burros. The grove had fair trees growing at an elevation of 11,000 or 12,000 feet, where it is always very cold nights. I remember I had had a severe chill, while covered with six army blankets in August, and I wondered how any tree could possibly grow at that altitude and in such extreme cold. So you see from the hot foothills up to timber line, there is a marvelous reach of adaptation. But here we must note one thing. If you want to get Pinon seed for Manitoba, better get from the highest altitude, and if you want trees for the plains, better get them from the foothills.

Under the head of Evergreens of the Pacific slope you will note other varieties of this nut-bearing Pine.

Pinus Flexilis. Sometimes called—Timber Twig Pine, and also Rocky Mountain White Pine.

This tree is found growing at an altitude of from 6,000 to 12,000 feet. In form and general appearance it much resembles the Cembra Pine, so popular in the East. Growing in the mountains, it is a fine symmetrical tree. It bears a large cone and has large seeds. I have raised a good many from seed and also transplanted many from the mountains. They always do well and transplant as easily as any. They often assume a glauca or silver coloring like many other mountain trees. I am well pleased with them. They are especially adapted to Kansas and Nebraska and they may take the place of the Eastern White Pine, though I think they will not grow quite as large. A grove of these hardy and beautiful trees would be very attractive.

Of the twelve kinds of evergreens of the Eastern slope all can be made to live. The Engelmani and Sub Alpina need to be planted so the sun cannot strike them in full force. By a judicious arrangement so that the Pines and Cedars can be placed on the south side to bear the full brunt of the hot winds and scorching suns, and the tender ones on the north side, there would be no trouble. We must study how to plant trees and plants to meet their requirements.

The York park is putting in a Rocky mountain section on the north side of a steep hill. It is now partly planted and additions will be made year after year, so that the people can have the Rockies in miniature without the journey. Besides the twelve evergreens, there is a large family of shrubs and flowers.

Pinus Aristata. Pinus Aristata is sometimes called Bristle Cone Pine, Hickory Pine and also Foxtail Pine, because the branches have needles going all around them and they much resemble the tail of a fox in form.

The tree is very unique in appearance, and on account of its oddity should be in every collection.

They are found at an altitude of about 8,000 or 9,000 feet above sea level. Sometimes they grow to a fair size. Though they belong naturally to high elevations, I think there will be no trouble in raising them in Nebraska. I have tested a few and they seem to do well.

Mr. Pollard of Nehawka, has a fine specimen growing on his grounds. I saw it a very hot and dry summer, and it seemed to resist the heat and drouth like most of the Rocky mountain Conifers.

I have not had much experience with the timber, but judge from the name Hickory Pine that it must be the toughest of all the Pines. At least, it will give us variety, and I think it will reinforce the number of our useful and hardy evergreens. These trees grow on the Pacific slope. Mr. Muir has found them 90 feet tall and five feet in diameter. He says "The needles have a glossy polish and the sunshine sifting through them makes them burn with silvery luster. Whether old or young, sheltered or exposed to the wildest gales this tree is found irrepressively and extravagantly picturesque, and offers a richer and more varied series of forms to the artist than any other Conifer I know of."

I cannot forget the first one I saw. I had been climbing a high mountain in a locality I had never visited before, and was lying down in utter exhaustion when my friend asked "What kind of a tree is that?" I was rested in a moment and went down to examine it. I thought I knew evergreens but surely that was a stranger. The tree was a pyramid in form, and all the way from the limbs trailing on the ground to the topmost branches, it was completely covered with fox tails that had all turned green, and were turned outward as though hundreds of foxes were all rushing to some common center, and had each gotten so far, and could go no further. We had to lie down and laugh at that tree. It just seemed alive. "What is it" asked my friend, "Didn't you ever hear of the Fox Tail Pine? We never saw it before, but that is it, you can't mistake it." Further up we found quite a grove with different forms, but the same fashion. Some little, some big—grandmothers, children and grandchildren, all adorned alike with those green Foxtails. For variety a man should have one of those trees in his collection. It would enhance the effect of the winter foliage garden of which we have spoken.

Pinus Contorta. This is sometimes called Twisted Pine, and Tamarack Pine, because in a forest it much resembles the closely packed Tamarack swamps of the North. It is called Lodge Pole Pine, for the Indians will go long distances to secure the long, light, straight poles for their tepees.

The body and the branches of this tree seem to belong to two entirely distinct systems. The trunk is straight as an arrow, and the limbs are the crookedest things that grow on a tree. The first time I saw a grove of them I stopped and studied them a long time. The foliage is of yellowish green, in fine contrast to the neighboring Concolor. No straighter tree grows in any forest, but as the lower limbs die and are dried up, they turn and knot and twist like so many writhing serpents, forming one of the most striking contrasts in tree life.

Native Forest of Pinus Contorta Growing in Idaho.
By permission of Forestry Department. From Gifford Pinchots, Primer of Forestry

The cones of this tree are very remarkable in that they hold the seeds in a vise-like grip instead of opening them to the sun and letting the seeds fall like other Conifers, and herein is a most remarkable provision or compensation of nature. The trees are full of pitch and the dry limbs easily catch fire and the whole tree is wrapped in flame, and the entire grove is a charred and ruined mass. But the fires open the cones and the seeds spill out into the ashes. They sprout and take root and come up by the million. They spread out further and further. Thus by their destruction they push their conquests.

In this respect the tree much resembles the Pinus Tuberculata of the Pacific slope. In a visit to the Yellowstone Nation-

al Park. I was much impressed with these trees, for they pack an immense amount of lumber on an acre. It is fascinating to read the history of a forest. It is all plainly written. About 150 years ago there was a beautiful grove packed thick with the straightest trees. The lightning struck one of them. Someway, the flames crept up a tree and the resinous foliage was set on fire, and great billows of flame went roaring over the tree tops, and lo, the whole mass was charred, blackened and killed. But the intense heat had opened the cones, and out popped the seeds into the leaf mould below. The parent trees were standing, but a forest of young trees immediately sprang up so dense and vigorous you could hardly go through them. Then commenced the struggle for existence. Of course, there was not room for all. Nine-tenths of them must die. But the effort to live seems almost human. Finally a chosen few have the advantage. Perhaps the leaf mould where they fell was deeper. Perhaps a rotten log was feeding them. Little by little a few overtop the rest. And now begins a race for life. The over-shadowed trees cannot carry bulk, but they must get up into the air and light. They drop all needless baggage for the race, no matter about the size. Up must go the slender stem holding the tuft of green, or the tree must die. The struggle goes on for years, and then that tree with 90 others must succumb to the more vigorous 10 who assert their supremacy, and reach out their roots and consume the food which belongs to the weaker. They have formed a trust, and power and vigor prevail. And there are those dead trees, sacrificed to the greed of their fellows. How much human nature there is in trees anyway. Seventy-five years pass by and one of those same arrogant trees is struck by lightning, and the same process is repeated, and now you see a forest of fallen timber so thick you can walk over the ground on the trees. There is another forest standing upright, and dead, and there is another of thrifty young trees, all on the same piece of ground.

It makes the heart of a dweller of the prairie ache to see such a waste of timber. There is enough to fence all the prairie farms, to build all the railroads and furnish telegraph posts for a great prairie state, and there they must lie and rot for it will not pay to move them. These trees have a wide range. Our picture of them represents a forest in Idaho. They grow in Montana, and all through the Sierras. They are trees that will not be downed. They are not large. Three feet through and 90 feet tall is a good size, but there are so many of them, and they grow with such vigor and fight death so vallantly, we can but admire them. They grow on good land or poor, among stones or in the sand, on mountain crests or so near the geysers their limbs are coated with the spray. Defiant, heroic, and victorious. We would recommend them for our Northern states. The seed is somewhat difficult to gather, but there

are little ones growing by the million which might be collected and planted. They grow rapidly. The National Park is well to the North, with an altitude of 8,000 feet and there is not a month entirely free from frosty nights, and yet those trees, under those uncongenial conditions, will often grow two feet a year. At a lower altitude, and under good conditions I am sure they would be a success. I would earnestly urge the Experiment Stations of all our northern states to give them a fair trial; for I believe they will have a future in Minnesota and the Dakotas. It would be an easy matter to try them in some of our northern forests.

CHAPTER XII.

FOREIGN EVERGREENS.

Of course we cannot give the names of all the earth's Evergreens. This is not necessary. We mention those that have been widely introduced and that succeed in many localities. The Japanese Retinispora are beautiful dwarfs. You see large quantities of them in New England. These are very effective in lawns and parks, where you do not wish for large trees. But from all that I have seen of them they are worthless in the West.

The Irish Juniper.

This is a fine compact tree, the branches growing close to the main stem giving the tree a conical symmetrical form. This does well in the East and has been planted by the thousand in the West. But I do not know of one that has succeeded. They cannot endure our dry winters.

The Swedish Juniper.

This has much the same form and is a very fine tree. I have had them several years. Some winters the tops of some of them will be a little injured but they soon recover. In the same row you will note that some are hardy and others tender. It is an easy matter to multiply those of known hardiness. The tree throws out numerous branches at the base and these seem inclined to take root. Dig up a good hardy tree with the dirt attached; plant it six inches deeper than it was before and in a year or so you will have half a dozen well rooted branches which can be separated and planted and they will all make nice trees. I think in the northern states these would succeed well, for it is not the cold but the dry air of winter that kills many trees.

In planting we need variety in form and this is a variation from the usual types of Evergreens and is right for the lawn where you do not want the view obstructed.

Siberian Arborvitae.

This succeeds much better in the West than the American. There are fine large specimens in many places and they will help to give diversity to our plantations.

Chinese Arborvitae.

Chinese Arborvitae.

Some twenty years ago Robert Douglas advised me to raise these trees for Southern Nebraska, Kansas and the Southern states for they endured the hot, dry weather remarkably well.

I found them very easy to grow from seed. It did not seem to make any difference how old they were. I have planted seed obtained from many different sources and never knew them to fail. And they do not damp off like other Evergreens. So you can raise them very easily. I had been growing them with success for twenty years and wrote quite a commendatory article for one of our leading papers. But the ink was scarcely dry when there came one of those mysterious Northwest death waves which took the foliage off the Scotch Pines, killed some of the Red Cedars and demoralized the nursery generally and they hit the Chinese Arborvitaes hard and killed the tips. They sprang up again and with fresh branches covered up the dead ones, but after all they got a staggering blow. I had one that was a record breaker. I left it where it grew in the seed bed. Only six years from seed it was over nine feet tall and shapely as a Juniper. A cold snap of 35 below injured it.

These death waves are mysterious things. One winter such a wave four or five miles wide swept through the Rockies like a fire and turned the evergreens brown. Many were killed. Even the Ponderosas, the hardiest of all were badly scorched. One wing of the blast hit our nursery there. It scraped the sheen from the Pungens and browned some of them badly so it took years for them to recover. These things show that the unexpected and the uncertain are always hovering over us.

The Norway Spruce—Picea Excelsa.

These have been planted on a larger scale than any of our foreign trees. I think they were introduced about sixty years ago. They are somewhat of the form of our native White Spruce but more rapid growers. They succeed fairly well East of the Mississippi river, and in favored localities beyond. There are hardy ones among them. That is you may plant one hundred under the one hundreth meridian and perhaps one among them will survive. In the counties bordering on the Missouri river they often succeed, but you cannot safely move them out on to the open of unsheltered prairies. We often plant them in nurseries at York and they may do well for a year or two, then they will be nearly all wiped out in some unfavorable winter. In Illinois at one time I saw a cattle yard surrounded by these trees. It was one of the finest artificial plantations I ever saw. The trees were uniform in size and of drooping habit. They certainly added much to the charm of a prairie landscape.

There is a weeping form of this tree much used in the East. It is a sad looking tree and gives its whole strength to mourning. It would be a failure in most parts of the West.

Alcock's Spruce.

This is a beautiful, symmetrical tree and quite hardy. One sent out by accident grew well for years on the grounds of E. F. Stephens of Crete, Nebraska. It was sold by mistake with other evergreens and we lost sight of it. I think it is well worth trial and I am sure it would succeed.

Nordmann's Fir.

Is a success in Pennsylvania and in the Southern portions of New York state, but is not regarded hardy in Massachusetts and would be of no use in the West.

Scotch Pine—Pinus Sylvestris.

When first introduced this Pine was very popular and was planted on a large scale. The seeds are cheap and they do not damp off as readily as other Conifers, so that at little expense they can be produced in immense quantities. They grow rapidly while young but soon mature. I think both East and West they are being discarded. They have a fair appearance at first. They cannot endure the heat of the semi-arid regions and are utterly useless West of the one-hundreth meridian. I do not know why they are called Scotch Pine. I suppose they were planted on a large scale on the mountains and were introduced from there. Their real home is in Northern Europe and Asia. They are found in immense forests in Russia. On account of their Northern birth and soft foliage they cannot endure the climate of Western Kansas and Nebraska. While they are a success in the Northern states, yet even there it is probable other Conifers will do as well.

Austrian Pine—Black Pine.

This tree is largely used in Europe, especially in Germany. The foliage is deep green and seen at a distance in masses it appears very dark. And so plantations of this tree are called the Black Forests.

Of the imported trees, this is by all odds the best all around evergreen for the middle West. It much resembles the Pinus Ponderosa only the needles are not as long. It endures the heat remarkably well. I have seen it thriving on the hot plains of Oklahoma and it is a success beyond the one hundreth meridian. It is a compact,, symmetrical and sturdy tree. I see one from my window which was planted in poor soil twenty-five years ago. It is a beautiful pyramid about thirty feet tall. The lower branches almost touch the ground. It is about five times as large as the famous Platte Cedars planted near it. Some Scotch Pines in the neighborhood grew faster and for

Austrian Pine.

a time seemed to look down on the slower rival but gradually they grew more and more feeble and when a series of dry years came on they went out altogether while the sturdy Austrians grew more vigorous. This makes a fine tree for forest planting. Some which I planted in York twenty-six years ago would now make considerable lumber. While not quite as strong a grower as the Ponderosa it should be planted on a large scale. But you cannot move it as far north as you can the Scotch. One serious trouble with it is the seedlings are inclined to damp off badly, and they never can be raised as cheaply as either the Scotch or the Ponderosa.

European Larch.

This is a deciduous Conifer from the mountains of Tyrol. It was planted largely in the Highlands of Scotland where it succeeded admirably. About sixty years ago there was much interest taken in this tree in our Northern states. In Illinois there were beautiful plantations forty years ago. Standing by itself it is a charming tree. The main stem is straight as an arrow and it will often have graceful pendulous branches which droop symmetrically on every side like green fountain sprays. In a forest it allows close planting and bears a great burden of

European Larch in Western Minnesota.
(By Permission of Forestry Department)

poles to the acre. They make a rapid growth and the timber is quite durable, being excellent for posts, railway ties and telegraph poles. The vitality of the seed is short lived. It is only good for a year. Incidentally a good many years ago I heard seedsmen tell how they fixed it. They did not wish to lose all the two year old seed so they mixed it with some that was fresh and sold it all as good seed.

Along in the seventies I secured the visit of three prominent Horticulturists to Nebraska. They were passed by the Railroad company to Kearney and back. They noticed quite a stretch of sandy land and thought it would be just the place for Larch. But they did not know the country and could not bring the climate of Illinois to Nebraska. I had seen so much of it in Illinois I was determined to show the people what could be done in the West. So in the spring of '73 I planted half a mile on the North side of my farm. They did look beautiful. But the hot winds seemed to cook the turpentine in them and they were all burned up. It would have been much worse at Kearney. However, there are now fine groves in the Eastern part of the state, where they can have the shelter of other trees and we present here through the kindness of the Forestry Department a picture of a thrifty grove in Western Minnesota. Keep out of the belt of our Western Siroccos and there are many places where these beautiful and valuable trees will succeed.

Japanese Evergreens, Retinisporas.

These are charming little dwarfs very pretty indeed where you do not wish large trees. They are hardy in many portions of the East, but they cannot endure the trying climate of the West.

CONCLUSION.

We have thus described the silent partners the farmer may have in securing comfort and building up prosperity. You can see them patiently waiting all around the horizon—these sturdy sentinels from our own and other lands are ready to stand guard around your home, sheltering you from summer's heat and the cruel blasts of winter. They have been waiting long and are ready to come to you arrayed in their charming robes, bringing the freshness and greenness of summer into the desolations of winter. Contrast a home defended by these guardians, cosily sheltered by their protecting branches, with one storm-swept, defenseless, and desolate, and then see how soon a change can be wrought. To work such changes, to give beauty and charm to the homes of the great West, this book is written, may it not fail of its mission.

ADDENDA.

The proprietor of the nursery at Devils Lake, North Dakota, gives this account. He wanted to start a nursery on the bleak wind-swept prairies of North Dakota. He bought a lot of seeds and hired a German expert; but he did not like his work and let him go. Then said he, "I followed the book" and as the result he raised millions of evergreens, and now this nursery in the bleak Northwest has forged to the front, showing what can be done under adverse circumstances. He is proclaiming the gospel of hope to those vast treeless regions and showing how those fertile lands can be adorned and embellished by sheltering forests.

Following the directions of the book, scores of farmers in the sand hills in Minnesota, Dakota and Manitoba, are raising their own evergreens.

The tree planting at Halsey yet goes on. Many experiments have been tried to prevent damping off, and this formula is given. Directly after planting the seeds dilute 3-16 of an ounce of fluid sulphuric acid with a pint of water for every square foot, and sprinkle your beds. Then water your beds every day till the plants come up.

Send to U. S. Department of Agriculture for Bulletin No. 453 regarding damping off of evergreens.

Since the first edition was written I became connected with a nursery in central Minnesota. I had the men go into a patch of hazel brush, cut off and burn the brush, dig up the ground, rake out the roots, level down and rake the earth fine, then sow, and spread half an inch well rotted leaf mould, and when directions were followed we got a splendid stand without watering and had no damping off.

I wish to recommend the cultivation of the Bull Pine.

I recently visited a plantation which I put out some 25 years ago in Franklin in the Republican Valley in Nebraska. It had been a fearful summer and while other evergreens showed the effects of the terrible drouth the Bull Pine never winched. They were brilliant green. Those out in the open had developed symmetrical heads and from what experience I have had with these trees I am confident that with the right treatment they could be made to grow anywhere between the Missouri river and the Rockies. Once established I never knew one to fail.

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