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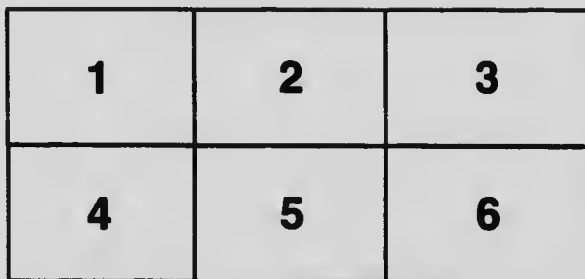
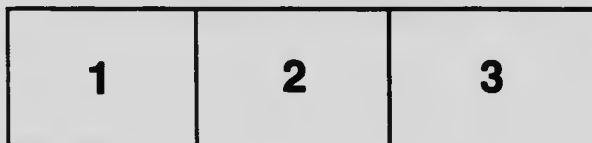
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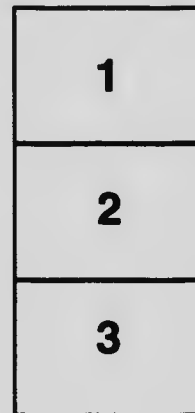
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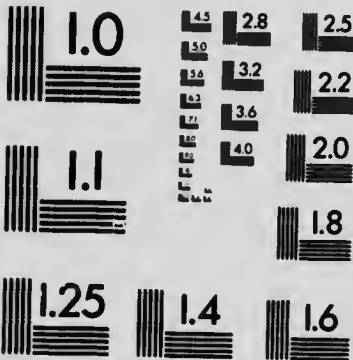
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# CANADA'S WHITE PINE POSSESSIONS THREATENED WITH EXTERMINATION

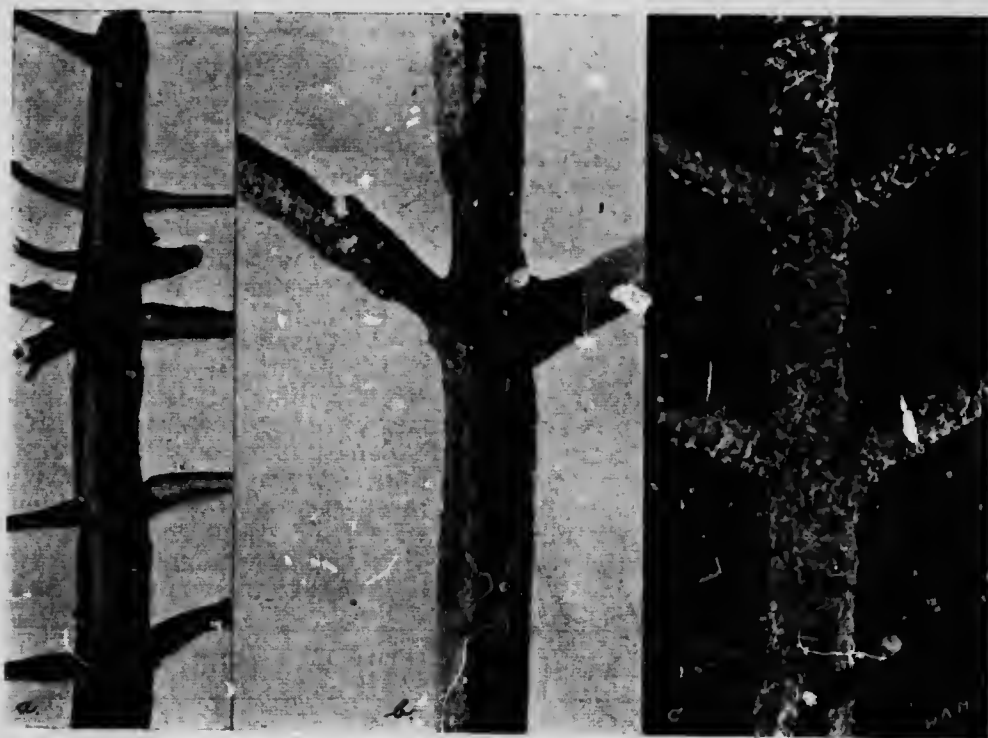
## An Authoritative Discussion of White Pine Blister Rust

Written by *H. T. Gussow, Dominion Botanist, Ottawa.*

*Published and distributed by the Canadian Forestry Association, Ottawa.*

The Forest resources of the Dominion of Canada, it has been said, are inexhaustible. This statement, on careful inquiry, may need some modification. The forest wealth of Canada undoubtedly is inexhaustible as far as the present generation is concerned; it will be found ample yet

for many more generations. We must however, bear in mind the wonderful opportunities Canada offers for settlement. With an increased population such as Canada requires to develop its natural resources to the fullest degree the demands on the Dominion forest resources will in-



*White Pine Blister Rust*

Photos by W. A. McCubbin

- (a) Early stage of white pine blister rust showing typical swelling.
- (b) Branch of white pine completely girdled by disease.
- (c) Appearance of infected white pine during May and June.

crease simultaneously, very probably in an increasing ratio.

We are, as a nation, so convinced of this great forest wealth that little thought is given by the general public that things may be different some day; and unless we carefully husband our resources, the time may come, when it will be realized that Canada's forest wealth is giving out.

A word of warning is intended to be sounded in this article,—a word of very earnest and serious warning. At the present moment, if one be asked which forest trees are the most important in Canada, one would unhesitatingly reply, the Pines—the White Pine proper and Western White Pine.

Are you aware that a white pine forest in Northern Europe is a thing of the past? The White Pine, from its original home in America was quickly introduced into Europe, be-

cause of its great commercial usefulness. But now there is no White Pine to speak of; it has been replaced by an inferior pine. Why? A fungous disease is to blame. It appeared, worked for years in silence, nobody suspected anything wrong, and then trees began dying here and there—slowly at first, rapidly later on. Then the eyes of the people were opened too late, far too late, the disease was so firmly established. Then the governments realized the position, and planted trees not subject to this disease. They fought the disease; but like a vast fire the epidemic was beyond control. They could do naught but look on. Steps were taken to study the disease; but it took years before the cause became known; and, before it could be fought, the white pines had succumbed. The Disease referred to was the *White Pine Blister Rust*.

#### A DESTRUCTIVE PINE DISEASE IMPORTED FROM EUROPE

This disease was unknown in the continent of America; at any rate, if it did exist in early times, it cannot have been a virulent or destructive disease. When the white pine was introduced into Europe, the Blister Rust, which, before this time, must have been present somewhere,—some say in Eastern Europe or Serbia—found a very suitable host, and repaid hospitality by killing its host. There existed in European countries great tracts of land suitable for the raising of pine seedlings. Millions and millions were raised in Europe, few for their own use, but mainly for export, for export, curious as it may seem, to their native haunt the continent of America. Had one but

lived years ago, and put a stop to this importation! Sure enough the disease came to America's shores with these seedlings. It doubtless arrived much earlier than its actual discovery, for it probably took years to become acclimatized—or, perhaps, it died out with the first pines it killed before spreading further. Who knows? Before the year 1914 the disease was, to all intents and purposes, unknown here. But in 1914, it appeared in one or two localities at first, was immediately recognized, and is since being persistently fought. Europe has returned America's generosity in the meanest way; the disease found its way from that continent into America, and now threatens our own White Pine forests.

#### THE PINE BLISTER RUST REPRESENTS A SERIOUS FOE

Are we going to profit from the experiences of Europe? *We must!* This is the only answer possible. We must protect this most important lumber tree in our country. It is not those alone will suffer, whose interests are

in the lumber trade. Think of the thousands of homes depending directly upon the returns from such industry. True there are other trees; but the White Pine, is commercially, the most important tree, and, I shall



*White Pine Blister Rust*

1. Young pine seedling showing spore deposit at X of pine blister rust.
2. Branch of pine showing roughness of bark after girdling branch.
3. Currant leaf showing rust stage on lower side of surface of leaf.



say a word or two about its value. Think of the many industries indirectly dependent upon the pine lumber trade. Think of yourself, when one of the most important sources of revenue is lost,—what that would mean to you, to your children, to the coming generations.

Our forest resources are not inexhaustible. When that was said, nobody gave a thought to such a destructive enemy! The enemy is now within our borders—it has spread during a few years from Ontario, where it was first found in Canada, to Quebec. Its spread is alarming, but not beyond control, it is hoped. It has spread also in the United States widely, far more widely than in Canada, so far as is known.

We know the enemy, we know what it has done in other countries. We must do all we can to prevent the destruction of our white pine resources. Most of all, those who are holding white pine sections, should co-operate with the government in its battle against this dangerous foe. Combined effort alone may yet save the situation. Let there be slackness, slowness even, and the disease will defeat our efforts. Twenty years, perhaps fifty, perhaps ten,—who can tell how long it will take this plague to repeat what it accomplished before. Now is our day to do what must be done, and, if we succeed, coming generations, our own children and children's children will thank us for the deed.

#### DESCRIPTION OF WHITE PINE BLISTER RUST

The first and most essential point is to know the disease. If everybody made it his business, when in the woods, every camper, every hunter, every Boy Scout, every lover of our beautiful forests, and, most of all, every forester and wood man, from lumber-jack to owner—to know, recognize, and immediately report, where the disease was observed, and, if in doubt he send a specimen to those who know it, then we may hope to cope with it before it is too late.

The disease is most of all dangerous to the young pine. When it attacks the main stem,—and as many as one hundred separate infections and more have been observed on one tree—and girdles it, which it is sure to do eventually, the tree dies. *During May and June each year*, this disease can be recognized by any one looking for the following symptoms even if he have no training; later on, only experts can determine it. All know the appearance of the fine smooth dark green bark of stem and branches of this white pine. But does everybody know the white pines from other pines? Of course he knows that the white pines have five needles or leaves in a cluster, while others have but two or three. To make sure of this, he need only cut or pull off a cluster

of leaves where they are attached to the branch, and count that little cluster held together at the base by a small sheath—if there are five needles it is almost sure to be a white pine—and even if not, (this disease only attacks five-leaved pines) it should be reported nevertheless.

During May and June, only after the middle of June, the disease is most conspicuous on the pine. The formerly smooth dark green bark will be found swollen, puffed up, "blistered," and breaking through the bark will be seen small whitish-orange scale-like bodies of a dusty floury appearance, composed of the spores or seeds of the disease. There may be a few or many at each point of infection. Often times one can see these from a short distance. They may be on any young branch or on the older wood, but they disappear after June, and only the blister remains, though far less pronounced to the casual observer.

Where the scales had been are often small drops of resin, or gum in the popular phrase, though these are not always present,—(or may be present from other causes,)—since even mechanical injuries to the bark, such as squirrel bites, etc., will cause gumming. In time, this bark be-



comes rough and cracked, the disease slowly makes progress up and down, or around the limb or stem, and kills the branch, or the tree if it has girdled the stem; or the wounded area may give rise to another series of spores, but at no other time of the year except May or June, will the spores be seen. In old pines the disease may live for

years; young pines will succumb as soon as the main stem has been girdled.

Thus far, the disease on the pines. The symptoms should be carefully borne in mind, and always looked for, when one is in the woods in May and June.

### ANOTHER STAGE OCCURS ON CURRANTS OR GOOSEBERRIES

The fungus, as was said, produced orange white dust—like a coloured flour. This dust, when viewed under a powerful microscope, is composed of thousands of minute grains, spores or, popularly, seeds of the fungus. These spores, like seeds of wheat or other plants, germinate in a similar way. But not in soil like the latter. They require living plant tissues to develop. These little organisms or plants, for they belong to the vegetable kingdom, are parasitic and live exclusively on living plant tissue, somewhat as the mistletoe in Europe grows upon and with its roots within the living apple tree or other tree. The spores produced by the white pine blister rust cannot germinate on the pine direct, but pass the next stage of their life history on another host plant. When they fall upon the leaves of wild or cultivated currants or gooseberries, particularly the cultivated black currant, they germinate and produce on the lower surface of these leaves minute little spore blisters, from one to a few hundred on one leaf. These blisters are filled with bright orange-red spores, as small as those on the pine; to the naked eye they appear to be merely a reddish dust, which is the early summer stage.

This stage may appear on currants in the neighborhood of the pines from which the spores originally came, at any time from June throughout the rest of the season; though, later they produce a second kind of spores. The early summer spores spread the disease known in this stage as currant rust; from currant leaf to leaf, shrub to shrub, plantation to plantation, and thus infection may travel for miles in districts where either wild or cultivated host plants occur. These plants are not killed; premature defoliation may result, with consequences injurious to the cultivated plants, but the parasite does not kill the plant so essential to the continuation of its life cycle. Towards the end of the season the so-called late summer spores are produced. These occur on very short peg-like protuberances growing from the lower side of the leaves; and these later spores only germinate on white pines anywhere in the neighborhood. This occurs in fall, and it may take several seasons before a blister is produced on the pine, which will give rise to the pine rust stage and the spores already described. This is the life cycle, rounded off: From pine to currant—and back from currant to pine.

### LESSONS FROM THE LIFE HISTORY OF THE DISEASE

This mode of life has acquainted us with two very important features. Without currant or gooseberry bushes there can be no pine disease, that is absolutely certain. If there be no pines—then the currants cannot be affected. Please note this point very

carefully! If we wish to keep the currants or gooseberries, the pine should be destroyed: if we prefer the pine—the former should be destroyed. When one or other is done, this disease has lost its sting. Can this be done? Would we recommend, for

instance, the destruction of pines to save the currants, or, vice versa, of the currants to save the pines? These would certainly be the most efficient means to arrest this disease. The next important lesson to be learned from the life history is the modes of spreading of the disease. It spreads of its own accord on currants or gooseberries, for miles in one season, in all directions; and eventually reaches a pine, a pine plantation, or a forest, and these then, in turn, may start new outbreaks. Hence the next lesson to be learned is this:—no currants or gooseberries near pines; no pines near gooseberries or currants.

How far apart should these different host plants grow from each other? This point is still an open question—“the farther apart the better. Can this be carried out? Sometimes a single pine, or a few pines menace the cultivated currants; sometimes a few shrubs of the latter, the former. Therefore, whichever, in a given locality, is the more im-

portant must remain, and the other be destroyed—certainly if affected, but better at any rate. Most important of all, all wild currants and gooseberries should be destroyed: they are most serious offenders. This should be done everywhere in or near valuable pine woods.

There is yet another danger, that currant rust spores may adhere on baskets of currants or other fruit, when shipped from an infected area, and spread the trouble very widely—that the disease will eventually find its way to a pine. So far as now believed, currant bushes in themselves and sold as such, do not appear to carry the disease, once the leaves are gone. Doubt still exists on this point, which we are now endeavouring to settle. Should the disease be conveyed by infected currant bushes, this would constitute a new menace, and the question become more difficult. However, it is generally held that infection of currants occurs every year afresh from nearby pines, strange as this may seem.

#### THE DISEASE IS CARRIED ON PINE NURSERY STOCK

We know for certain that the pine carries the disease—it was by pine seedlings from Europe that the disease was introduced; hence importing pines into Canada should be

stopped. This was done shortly after taking up my work in Canada. No pines (five-leaved) can enter Canada from anywhere abroad, reads an order-in-council.

#### QUARANTINE AND CONTROL MEASURES NECESSARY

A federal quarantine against white pine seedlings or other five leaved pines, and, if possible, against currants, etc., from infected provinces or areas, or individual nurseries, is desirable. The first work to do is the accurate location of every infected locality—this requires men and time, the more men the shorter time. The shorter the time it takes to know accurately the distribution, the better the chance to fight this disease. Therefore, let all concerned come to the fore! The

question is of greatest moment; and the experiences of other countries are on record. Shall we too fail, where others have also failed? It may become necessary, but not until the distribution in Canada of the disease is fully ascertained, to establish a safety belt of considerable breadth in which currants and pines shall be wholly eradicated, isolating, if possible, the infected area from valuable timber limits. Wherever diseased pines are located they should be immediately destroyed.

### PRESENT DISTRIBUTION OF DISEASE

During the early season of 1909 large shipments of foreign seedling pines were received in the Continent of America, part of which went to New York, New Jersey, New Hampshire, Pennsylvania, Connecticut, Vermont, Massachusetts, Ohio and Indiana. But a portion of the same shipments was introduced into Canada. In all of these States, and also as far as Minnesota, the disease is now established, as well as in parts of Canada. It was first discovered in the year 1914, near Guelph, Ontario, and later in other parts of the Niagara Peninsula, mainly on currants, but, unfortunately, on native pines also. It is now distributed generally in Southern

Ontario, but may not yet have reached the important white pine section, although no systematic search has been possible there. Quite recently the currant rust stage was found in Ottawa; as it was also this season in certain localities of Quebec province. Very urgent need exists for systematical inspection of all pine areas. In the west no inspection has yet been possible.

It is gratifying to note also that both the Ontario and Quebec governments have become deeply interested, and much work promises to be done next year. It would be a matter for congratulation if the government inspectors should be aided by the employees of lumber companies and other concerns interested.

### VALUE OF WHITE PINE LUMBER CUT IN 1915

In Bulletin 58A, published by the Forestry Branch, Department of the Interior, the white pine lumber, including both species, White Pine (*Pinus Strobus*) and Western white pine (*Pinus monticola*), is valued at \$17,584,149 for 1915, or nearly three quarters of the value of the five commercial spruce species of Canada taken together.

It is to be hoped that the matter dealt with in this article will be fully discussed at a meeting in the near future, at which all interested parties may be represented. Co-operative effort alone will save the situation. Meanwhile, if, as a result of this article, attention and careful thought become focussed on its subject matter, something will have been accomplished.

In conclusion, I wish to anticipate the probable charge against me of

crying out "wolf" causelessly, and of taking too alarming a view of the situation. Let me most emphatically re-iterate, I am an alarmist, and am of set conviction in this matter. My attitude is based on the experience of other countries, with forest timber diseases, on the already rapid and insidious spread of this particular disease in America, and lastly, but not least, on the importance of rousing to action all concerned, while there is yet time. So surely as my warnings lie unheeded, will the ultimate loss of trade and revenue fall on all, whether or not interested financially now, in the White Pine Industry, one of the prime factors in our Dominion's vast resources.

H. T. GUSSOW,  
Dominion Botanist.

NOTE:—Extra copies of this bulletin may be had by addressing The Canadian Forestry Association, 119 Booth Building, Ottawa.

