and 1953, the foliage of most of the attacked trees turned a slightly greenish-yellow shade and fell from the trees in this condition. However, in 1954, the foliage of a number of attacked trees turned reddish before falling. Periodic examinations of attacked trees have revealed that when the foliage did not turn red, it usually remained on the trees for a longer period, dropping in the spring and early summer of the year following the initial attack. The foliage of red-topped trees usually began to fall the same year in which the attack occurred.—J. B. Thomas.

PRAIRIE PROVINCES

Tamarack Killed by the Larch Sawfly.—In the spring of 1954, dead tamarack, *Larix laricina* K. Koch, were noted in several plots near Prince Albert, Saskatchewan. Associated black spruce were not affected, so that site and climatic factors do not appear to be the primary cause of mortality. Table I gives the tally of trees in each plot and a description of the site. Plots in the Railroad Bog are each 1/10 acre; plots in the Airport Bog are 1/5.

TABLE I.—Description of plots

Plot designation	Stems per acre			Mean DBH.		Site type
	Lt	Sb	Total	Lt	Sb	
Railroad Bog B............	1,180	420	1,600	3·7	2·5	Moist
Railroad Bog D............	840	810	1,650	3·1	2·9	Moist
Airport Bog A.............	735	1,780	2,515	2·4	2·4	Dry
Airport Bog B.............	1,440	—	1,440	2·6	—	Wet

Table II shows the amount of larch sawfly defoliation observed in the plots since the first defoliation was noted in **1947**.

TABLE II.—Defoliation History of plots*

Plot	Years						
	1947	1948	1949	1950	1951	1952	1953
Railroad B, Railroad D	L	H	H	H	H	H	H
Airport A............	—	L	M	H	H	H	M
Airport B............	—	L	M	H	H	M	L

* L = Light, M = medium, H = heavy.

The amount of tamarack found dead in 1954 varied between plots. Table III shows the number of dead tamarack on a per acre basis, and their mean diameter breast height.

TABLE III.—Dead Tamarack in plots

Plot	Stems per acre	Percentage of tamarack	Percentage of stand	MeanDBH
Railroad B........	350	29·7	21·9	2·9
Railroad D.......	150	17·9	9·1	2·6
Airport A.........	85	11·6	3·4	1·8
Airport B.........	35	2·4	2·4	2·0

Continued defoliation appears to affect the tree in the following sequence: (1) lower branches and scattered branch tips die, shoot production and needle length reduced; (2) upper branches die back to trunk, foliage produced on adventitious shoots from trunk and base of branches; (3) tree dies, either failing to produce foliage in the spring or producing sparse foliage on scattered shoots that wither in early summer.—W. J. Turnock.

ROCKY MOUNTAIN REGION

"Dry Rot" of White Spruce Flooring.—Following seven years in service, a white spruce floor structure in the premises of a hardware store in Alberta has collapsed because of "dry rot". At a cost of several thousand dollars loss in potential business and in building materials, the entire floor has had to be replaced.

The structural failure of this floor is attributed directly to improper methods of construction which provided conditions ideal for the initiation and establishment of decay fungi. The main errors in construction which lead to decay were as follows:

i. The 2″ x 8″ untreated spruce floor joists were frequently in contact with the soil. Decay centred from these points of contact with the soil.
ii. Following the completion of the cement foundation for the building, the supporting "cribbing" was not removed. When examined in 1954, this "cribbing" was badly decayed, as were the contiguous floor joists and sub-flooring.

Proper construction—in this instance, removal of cribbing immediately following the pouring of cement and proper aeration—would have prevented dry rot in this particular building.

The decay was of the brown cubical type and attributed, from sporophores and cultural isolations from rotted wood, primarily to *Trametes serialis* Fries. One isolate, however, yielded a typical culture of *Poria monticola* Murr.*—Vidar J. Nordin, Willma Blyth, and Betty Carmichael.

Some Notes on the Larch Mistletoe in British Columbia.—The larch mistletoe (*Arceuthobium campylopodum* Engelm. f. *laricis* (Piper) Gill), which in British Columbia is common on western larch (*Larix occidentalis* Nutt.), is by no means restricted to this host. In the summer of 1953 this mistletoe was reported on *Pinus monticola* Dougl. in one, and on *Pinus contorta* Dougl., in several localities (see Bi-monthly Progress Rept. *9*(5):3). From field observations this summer it seems that the latter host is infected wherever it is associated with infected larch. On both species of pine the host response is quite different from that of the larch. On larch, both swellings and witches' brooms are initiated soon after infection. On the two pines, a fusiform swelling was present at every individual infection, but no trace of broom formation was observed, not even at old infections.

Apparently the susceptibility of individual trees of *Pinus contorta* is not restricted to any one species of dwarf mistletoe. This was illustrated by a specimen of this host near Kimberley which was infected by two different dwarf mistletoes. Several infections of the larch mistletoe and the lodgepole pine mistletoe (*A. americanum* Nutt.) were present on this one tree, even to the extent of growing on the same branch.

In 1918, Weir found the larch mistletoe naturally on *Abies lasiocarpa* (Hook.) Nutt. and *Picea engelmannii* Parry. These reports were the only ones of their kind until this summer, when the writer found the larch mistletoe on the former host near Rossland and on the latter host near Kimberley. Unlike the case of the two pines mentioned above, the symptoms on fir and spruce were similar to those on larch. Mistletoe plants were present on both trees, those on spruce fairly small, but those on fir quite vigorous.

Some recent comments by Dr. L. S. Gill*, Chief, Division of Forest Disease Research, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, relating to these two finds bring up an interesting taxonomic question (private correspondence). Although conceding that under the circumstances the seed-producing infections on these species of *Abies* and *Picea* probably come from plants of f. *laricis,* Dr. Gill points out that the mistletoes resulting then resemble the so-called natural host-forms, *abietinum* and *microcarpum,* respectively. It may therefore be that at least the forms here mentioned (f. *abietinum,* f. *laricis,* and f. *microcarpum*) are more apparent than real, any superficial differences being attributable to their different hosts.—Job Kuijt.

BRITISH COLUMBIA

Pole Blight and Climate.—Recently, a climatological survey of parts of British Columbia, Washington, Idaho, and Montana was carried out in connection with studies of pole blight of western white pine in those regions. The period 1930-1953 was selected for the survey, because few data exist prior to 1930 in some of the localities where pole blight has been studied.

Weather stations were chosen for their proximity to areas that had contained pole blight for a number of years or that were free from it as late as the summer of 1954. When a list of such stations had been compiled, those with the shortest gaps in their records between 1930 and 1953 were retained, and the remainder were discarded. Some-

*Cultures kindly verified by Dr. M. K. Nobles.

*The writer is grateful to Dr. L. S. Gill for his interest and valued comments on this work.

times, however, even the better stations available had lengthy gaps. For example, Pierce Ranger Station, Idaho, had some records missing in eight of the 24 years. Nevertheless, it had to be retained, since it was the only available station in the pole-blight free Clearwater area. The final list of stations is given below:

Near Pole Blight Areas	*Near Pole-Blight free Areas*
Central and Southern B.C.	Cascade Region, Washington
Nelson	Stehekin
Revelstoke	Snoqualmie Pass
	Bumping Lake
Northern Idaho	Northeastern Washington
Priest River Expt. Station	Chewelah
Kellogg	
Western Montana	Northern Idaho
Heron	Pierce Ranger Station*
Trout Creek	

The months May through August were selected for examination, since they either contain or overlap the growth period of white pine through much of the portion of its range under consideration. Monthly mean temperatures and monthly precipitation totals for each station were abstracted from the official meteorological records and arranged to reveal any trends that might exist. For example, the precipitation totals for June of each year were plotted consecutively to reveal any regular fluctuations in June precipitation at a station. This was done for each of the four months at each station so that trends could be compared among all stations. Temperature records were plotted in a similar fashion, and curves obtained for both variables were subjected to minimal three-point smoothing to show the regular fluctuations without unduly distorting the original data.

Before either the original or the smoothed curves could be interpreted, it was necessary to select station normals to provide a basis for comparison. Since both temperature and precipitation vary considerably throughout the range of white pine, it was necessary to compare the collected records of each station with their own official normals instead of comparing the different station means with one another. Official normals are recalculated occasionally and therefore are subject to change, so that unavoidable bias occurs whenever normals are selected for use in studies such as this. Since such bias must occur, it is better to direct it so that it will decrease, not increase, the chances of success in testing any hypothesis adopted.

In this instance, it was known that droughts and high temperatures were common over much of the continent during at least the first half of the 1930's, and it seemed possible that this and perhaps later similar adverse periods might have predisposed trees to pole blight. Consequently, this was the working hypothesis adopted, and its support required that stations near pole blight should show frequent precipitation deficiencies and temperature excesses in terms of their own normals, whereas those near pole-blight free areas should not. On this basis, any official normals calculated before or during 1930 could be expected to reinforce the hypothesis, since they would be higher than many precipitation totals and lower than many temperatures experienced since 1930. Therefore, official normals for all comparisons were selected from the period 1949-1951, since normals in that period already contained the effects of the changed climate of the 1930's and consequently would weaken, rather than reinforce the hypothesis.

Fig. 1 shows some of the smoothed temperature data for July and August for five stations, each referred to its own normal for the two-month period. Stehekin and Pierce are both near areas free from pole blight, and both had temperatures that were generally below normal. Pierce is particularly significant, since it is in the Clearwater area of Idaho, where pole blight has not occurred, despite the fact that it is prevalent a short distance to the north (e.g., near Priest River and Kellogg). The latter two stations and Nelson, all near pole blight, all had temperatures frequently above normal during July and August.

The associations indicated in Fig. 1 appeared again in temperature records for May and June for most stations, and also in precipitation data for the four months. This can be shown best in the limited space by the 2 x 2 tables below. To construct these tables, the stations were divided into two types: pole blight and pole-blight free, and the data from all stations of each type were grouped together. The other divisions of the tables were obtained by treating the four-month period as a unit for each year. Thus, a year was not considered to have below-normal precipitation or above-

*I wish to thank Mr. C. A. Wellner, U.S. Forest Service, for providing data for Pierce Ranger Station.

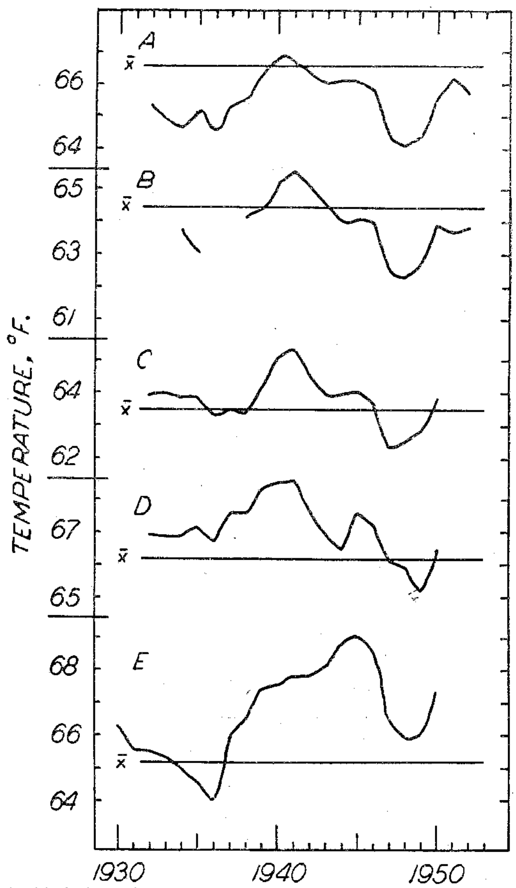

Figure. 1. Variations in July plus August mean temperature at pole blight-free stations ((a) Stehekin, Wash.; (b) Pierce Ranger Station, Idaho) and pole blight stations ((c) Priest River Experiment Station and (d) Kellogg, Idaho; (e) Nelson, B.C.). Curves subjected to three-point smoothing: $\bar{x}$ lines indicate levels of July plus August normals for the stations.

normal temperature, or the combination of these, unless the four-month total or mean bore the correct relation to the four-month normal. By this means, the initial hypothesis was subjected to an especially rigorous test, since even years with two or three very dry or very hot months fell into another category.

TABLE I.—Comparisons of May Through August Precipitation and Temperature at Weather Stations near Pole Blight and Pole Blight-free Areas, 1930–1953.

	Pole Blight	No Pole Blight	
A. Years with normal or above-normal precipitation	*71(78·5)	73(65·5)	144
Years with below-normal precipitation	49(41·5)	27(34·5)	76
	120	100	220
$X^2_A = 3·974$, $df = 1$, $P < 0·05$, border significance			
B. Years with normal or above-normal temperature	48(39·5)	23(31·5)	71
Years with below-normal temperature	66(74·5)	68(59·5)	134
	114	91	205
$X^2_B = 5·5871$. $df = 1$, $P < 0·02 > 0·01$, significant.			
C. Years with *above*-normal temperature and *below*-normal precipitation	32(22·1)	8(17·9)	40
Years with other combinations	80(89·9)	83(73·1)	163
	112	91	203
$X^2_C = 11·1262$, $df = 1$, $P < 0·001$, highly significant.			

* Correction for continuity applied throughout.

The main points shown by the table are: (*a*) precipitation deficiencies have been more frequent in pole blight areas than in those free from pole blight; (*b*) an even stronger association is shown between high temperatures and pole blight, and (*c*) the strongest association occurs between decreased precipitation coupled with increased temperature and pole blight. The border significance of precipitation alone (Table IA) confirms a point noticed during earlier inspection of station trends; namely, that occasional precipitation excesses in pole blight areas confused an otherwise relatively straightforward relationship. Such anomalies must be expected when monthly precipitation totals are used, because one or two brief but heavy showers in an otherwise dry month may change the records to indicate an apparently wet month.

Results of the types illustrated in Fig. 1 and Table I indicate the climatological background for pole blight. The trends in Fig. 1 show that the larger climatic variations over the Northwest have been more or less synchronized, but that their effects have been less marked in some localities. Summer in much of the white pine country east of the Cascades apparently has been relatively warm and dry for centuries, and the further warming and drying during recent decades might have affected areas that were already nearly marginal for white pine. In this connection, it is important to remember that trees now exhibiting symptoms of pole blight were established during periods when the climate was different than it has been during recent decades.

The comments above imply that pole blight may be simply an expression of the tree's reaction to adverse physical conditions. Since the complex of symptoms is somewhat diffuse, it is possible that clearer understanding of various symptoms may reveal that some affected trees may indeed fall into this category. It is equally conceivable, however, that adverse conditions have made trees more susceptible to a few organisms that produce most of the symptoms now grouped together as pole blight. Consequently, the climatological background outlined here will be more valuable if it is viewed as a broad framework within which other information becomes more amendable to critical assessment. Several points concerning field work arise when the climatic background is considered, and some of these are outlined below.

During the last few years, several summers have been wetter and cooler than previously. It is worth while to keep in mind that a change to wetter, cooler conditions for a few years might be associated with two conflicting trends in the occurrence of pole blight. In stands that have not been severely affected, there might be decreased progress of pole blight, or even apparent recovery from it. On the other hand, in severely affected stands, there might be a sudden upsurge of pathogens favoured not only by the changed climate but also by trees still too weak to benefit immediately from the changed climate. (I am indebted to Mr. A. C. Molnar for some aspects of the ideas above, since his current plot analyses suggest possible differences between stand responses.)

Wetter, cooler climate also may enter into present attempts to classify stands according to their physical environments. When existing conditions are determined in these stands, it might be even more profitable for the investigator to consider the different sites in terms of what they might be like with less rainfall and more sunshine. Similarly, the surrounding topography should be considered, not only from the standpoints of aspect, exposure and drainage, but also from the standpoint of storm paths and possible rain-shadow areas.—W. G. Wellington.

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