the Whiteshell Forest Reserve. The most severe defoliation will probably take place in the vicinity of Moose Lake and may extend northward to Shoal Lake, and south and west through Middlebro, Sprague and Vassar to Whitemouth Lake. Moderate to severe defoliation is also expected near the Big Whiteshell-Crow Duck Portage in the Whiteshell Forest Reserve and may extend south to Brereton and Falcon lakes and west to Telford.

In Saskatchewan, complete defoliation is again expected in areas that were severely attacked in 1951 and the egg pattern suggests that these infestations may emerge into a general outbreak in 1952. The degree of attack will probably range from light to severe throughout the entire area extending north from Glaslyn through Meadow Lake and Green Lake to Beaupre Lake, thence east to Montreal Lake. The southern limit should be near Big River and the south boundary of Prince Albert National Park. A heavy local infestation is expected south of Lac la Ronge in sec. 31, tp. 69, rge. 22, W. 2nd mer. In this area, trees 9 inches in diameter averaged 24 egg clusters per tree.—V. Hildahl.

(AGRICULTURAL AREA)

Artificial Control of the Spruce Spider Mite, Paratetranychus ununguis Jac.—The spruce spider mite is a serious problem in many plantings of white spruce in the prairie regions of Canada, particularly in towns and cities. Feeding by the mites causes browning and, in more severe cases, dropping of the needles; the webbing collects dust and ruins the appearance of ornamental trees. Dry lime sulphur at the rate of 1 pound in 12 gallons of water has given good results as a spray against mite infestations. However, increased costs and decreased supplies of dry lime sulphur together with its phytotoxicity and its damage to paint on buildings have made it desirable to find a substitute miticide.

During the summer of 1951 several newer insecticides and miticides were compared with dry lime sulphur in preliminary tests. At the concentrations used, Ovotran 50W, C. 1014 (Pestox 3), lindane, chlordane, and toxaphene were the most effective. Aldrin and Aramite were somewhat less effective, whereas parathion, enzene hexachloride, and EPN 300 yielded indifferent results.

The lindane spray was prepared by dissolving the crystalline material in xylol and emulsifying with Triton X-100; benzene hexachloride wettable powder was used at the rate which supplied an amount of gamma isomer equivalent to the quantity of lindane applied. Since tests revealed a considerable difference in the effect of these two sprays, the xylol and Triton X-100 emulsion without lindane was tried to determine whether it was responsible for the greater effectiveness of the lindane spray. The results indicated that xylol and Triton X-100 alone had little miticidal value, but rather contributed to the efficiency of the lindane as solvent and and emulsifier respectively. Apparently lindane in this state was more effective against the spruce spider mite than was the same material as a component of benzene hexachloride in a wettable powder form.—C. Y. Hovey.

ROCKY MOUNTAIN REGION

Parasitism of the Lodgepole Needle Miner.—Earlier investigations and detailed population sampling in Yoho Park did not show any large numbers of "precocious" larvae. On July 17, however, a restricted area was discovered that contained a high proportion of precocious larvae and pupae. In that particular area, sampling of two trees produced an average of two to three precocious needle miners per tip; approximately 825 precocious larvae and pupae were collected.

Incidence of parasitism was very high, 98·3 per cent of the larvae obtained (305) being parasitized. The pupae were used in a physiological experiment and approximately 30 per cent of the moths emerged. The pupal material has not yet been dissected to determine a more precise parasitism figure. From the material collected at least seven parasite species and one hyper-parasite were recovered.

Parasite 1.—A Braconid, presumably *Apanteles californicus* Mues. This is the most abundant of the species obtained and it is from this species that the hyper-parasite emerged.

The hyper-parasite is a Chalcid, brilliant blue-green, from 1·5 to 2·5 millimetres long. There is only one per cocoon and they emerge from the basal part of the cocoon by chewing a hole through the side and out through the needle. They evidently mature in the pupa of the host.

Parasite 2.—A Chalcid, metallic blue-green in colour and lacks a clouded area around the stigmal vein. There is some doubt as to whether there are two species in the group. There are some that form a tough white cocoon while others are found naked within the larval skin of the needle miner, and still others naked within the needle-miner pupa. The latter two have similar, naked, black pupae. Emergence of these parasites began August 5, but there were immature forms as well as adults in the field on August 13.

Parasite 3.—Another Chalcid similar in many respects to Parasite 2 but dissimilar enough to suggest another species. They are larger and there is a cloudy area around the stigmal vein. Also, the projection on the stigmal vein of this parasite appears more pronounced than that of Parasite 2.

Parasite 4.—Another Chalcid, *Copidosoma* sp. This is a Chalcid whose larvae form within the needle-miner larva in symmetrical groups of five to eleven, the average number per larva being eight. They emerge by cutting a round hole in their cell, formed of part of the needle-miner larval skin. Emergence of these parasites began about August 5th, although adults were found in the field July 26th and immature forms have been found as late as August 13th.

Parasite 5.—Another Chalcid, probably of the sub-family *Chalcinae*. The hind femur of this species is greatly swollen and dentate. Only three specimens were recovered from needle-miner pupae.

Parasite 6.—Family Ichneumonidae, probably *Phaeogenes*. Only one of this species was recovered this year and it emerged July 25th from a needle-miner pupa. Others have been recovered in flight years of the needle-miner.

Parasite 7.—Only cocoons of this parasite were found this year. The cocoon is brown, translucent, and four to five millimetres long. Two adults recovered in 1950 are dissimilar from Parasite 6.

The period of activity of these parasites suggests that the life-histories, of some at least, conform to that of the needle-miner. If this is true, a carry-over of this portion of the parasite complex cannot be expected as the needle miners available for parasitization are in their second or third instar. All the parasites described above have been recovered from mature larvae or pupae that are out of phase with the main body of the infestation.

Histological examination of second and third instar larvae has disclosed the presence of immature parasites which supports the theory that the life-histories of some of the parasites conform to that of the needle miner. The perplexing problem of the occurrence of these mature larvae in the odd year with their high incidence of parasitism remains to be solved.—R. W. Stark.

BRITISH COLUMBIA

Forest Insect Survey (Interior).—The spruce budworm, *Choristoneura fumiferana* (Clem.), infestations expanded slightly during the period 1950-51. The degree of expansion was difficult to assess this year since feeding damage is rather obscure during the first year of the 2-year cycle. The mountain pine beetle, *Dendroctonus monticolae* Hopk., continued its destruction of the seemingly doomed western white pine timber. An increasing number of logging operations in areas infested by this bark-beetle has resulted in the salvage of numerous beetle-killed and dying trees. Severe defoliation by the forest tent caterpillar, *Malacosoma disstria* Hbn., occurred in portions of the Fort George and the eastern half of the Nelson Forest Districts; heavy infestations are forecasted for these areas in 1952.

Outbreaks of the two following species which heretofore have not been reported in infestation proportions in British Columbia, occurred in the Kamloops Forest District during 1951. Medium to heavy infestations of *Zelleria haimbachi* Busck were observed at two points in the Okanagan Valley; infested ponderosa pine up to 15 feet in height lost most of their new needles. A sawfly, *Neodiprion* sp., *abietis* group, was abundant on a 100-acre area of pole-sized Douglas fir near Squilax; the population will probably be light in 1952 as no eggs were found and cocoons were scarce.—D. A. Ross.

Studies in Damping-off in Forest Nurseries in British Columbia.—Plots were laid out, using Douglas fir seed, at the Duncan Forest Nursery to compare the effect of fungicides applied to the nursery soil and, as a slurry, to the seed. A standard sulphuric acid treatment was also tested. The only appreciable variation observed was in emergence of seedlings. Although overhead irrigation was practiced, drought-caused dry streaks occurred in which emergence was low, whether or not fungicides had been applied to the seed or soil. For this reason, no conclusions are drawn as to the effect of the fungicides in controlling damping-off or in lessening germination and emergence.

Stand obtained, expressed as percentage of seeds used.

Control	63·9
Soil Treatments	
Sulphuric acid	42·2
Arasan	60·5
Fermate	64·0
Seed Treatments	
Tricop	52·4
Arasan	65·6
Fermate	47·0

Greenhouse tests on control of damping-off are in progress. Three different fungi are being used as test organisms. Five different fungicides, each applied to seed at four different rates, are being tested.—P. J. Salisbury.

Pole Blight of Western White Pine.—The final series of permanent sample plots arising from the pole blight survey have been established in the Nelson Forest District. This work was initiated in 1950 and has the following main objectives:—

1. To study the progress of pole blight symptoms within individual trees.
2. To determine the nature and rate of spread of the disease.
3. To determine the feasibility of control through sanitation thinning.

Detailed records have been completed on 6,274 trees including 2,061 white pine. All trees have been tagged, their locations mapped, and measurements recorded with respect to diameter, age, and height. In addition, the pine have been classified according to a pole blight severity rating similar to that employed by the workers in adjacent regions in the United States.

Fifty-four plots, 0·2 acres in size, have been established. In co-operation with the B.C. Forest Service all pine on 34 plots, and on an additional 9·1 acres of isolation strip known or presumed to be affected by pole blight, have been felled and removed from the experimental areas. The remaining 20 plots will provide controls for the sanitation thinning experiments and provide information on the progress of the disease under natural conditions of stand density. Continuing records will be maintained to provide a basis of the management of affected stands similar to those under reserve.

Inoculation experiments initiated in September, 1950, are currently being re-examined. The natural spread of pole blight to this latter area in recent months has required the replication of inoculation experiments at widely scattered points distant from any presently known location of the disease. Work of this latter nature is currently in progress.

It is of interest to note the first authentic record of pole blight in living white pine in the coastal region of Western North America. Diseased trees have been located near Duncan and analyses have indicated its presence there for at least eight years. Additional scouting has subsequently confirmed its presence near Bowser and Qualicum Bay on Vancouver Island and near Hope on the adjacent mainland.

Cultural studies are being undertaken on a species of *Scopularia*, a fungus commonly associated with the disease and known to be capable of producing lesions similar to those found on pole-blighted trees. These studies are being made to determine biological requirements of the organism and the possible existence of strains. In addition, studies are being undertaken to determine the perfect stage of the organism and the extent of the host range.—A. K. Parker and A. C. Molnar.

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