tunnels from eight to fourteen inches into the trunks, and occurs in countless numbers in logs of Douglas fir, western hemlock, lowland balsm and Sitka spruce. It attacks only weakened or dying trees and logs.

## Defoliating Insects.

Among the best known of our forest insects are the defoliating or leaf-eating species; of these the larch saw-fiy, the spruce bud-worm, and the tent caterpillars must be familiar to all, and illustrate the nature of the injury caused by insects of this sort. A few of these defoliating insects are very seriously destructive in our forests, and unfortunately we have no direct means of combating them on large areas. Nature controls them, in a longer or shorter time, by means of their parasitic enemies and weather conditions. We hope some day to be able to assist materially in this control, by the distribution of the parasites, smaller insects which prey upon the pests; and the Entomological Branch is studying these problems from that standpoint.

The Larch Sawfey, the most destructive of the group, has killed immense quantities of larch within the last generation, from Nova Scotia as far west as Northern Saskatchewan, and will evidently extend its ravages throughout the range of the eastern larch. The larvae feed upon the leaves, and when numerous entirely defoliate the trees, and eventually kill them. It does not yet occur on the western larch in British Columbia, although it feeds readily enough upon cultivated specimens of the western species in the Arboretum at Ottawa. The wide gap (nearly 600 miles) between the ranges of the eastern and western larches will be a safeguard to the latter species.

The Spruce Bud-worm, in its caterpillar stage, attacks the buds and later the leaves of spruce, balsam, Douglas fir, hemlock and larch. It is most noticed in spruce forests.

While it has been known to kill large numbers of trees, particularly balsam, its parasites usually effect control before very serious damage is done. This has been the history of the recent outbreak in the Quebec and Ontario woods. It is always to be feared that spruce weakened by the bud-worm will be attacked by destructive bark-beetles. For this reason, bud-worm weakened spruce should be watched during the seasons following a bud-worm attack, and if any considerable numbers of spruce are found dying in clumps or groups an investigation should be made at once.

Fire is, of course, our most serious enemy to forest reproduction. Squirrels eat each season countless numbers of seeds, and immense numbers of young trees are girdled and killed by rabbits and porcupines. A large amount of young black pine was killed in this way, apparently by rabbits, in the Jasper Park region during the winter of 1914-1915. In addition to these and other enemies, reproduction is seriously affected in many rgeions by injurious insects. Certain species of caterpillars, beetles and chalcids feed within the cones or seeds of pines, spruces, hemlock, balsams, larch and Douglas fir, and more or less completely destroy the seeds. Still other species feed upon the seeds of certain deciduous trees. The extent of this seed destruction sometimes assumes serious proportions, and its effect upon reproduction must at times be most important. Certain species of boring caterpillars are particularly injurious to young growth of pines by girdling and killing the branches and tops an ddestroying or killing the trees. The white pine weevil, Pissodes strobi, is a serious enemy to white pine reproduction in the east. The grubs of this species destroy the top or leader of young trees; the result is a "double-top" or at least a distorted trunk of little use for lumber.

(To be continued in July issue.)