

insure the timber needs of the future. The total forest area of Canada is estimated at over 1,250,000 square miles, of which about 400,000 square miles may be considered to be covered with merchantable timber.

Two of the three factors which are chiefly responsible for the destruction of our forests depend for their solution upon the results of biological investigation. The three chief forest destroying agencies are fire, insects and plant diseases, and all are interdependent. Naturally the first appears to be the most important on account of the extremely apparent and ravaging devastation. Nevertheless the destruction caused by insects and plant diseases, though usually working for a long time, insidiously and unseen, is enormous. It is estimated by Hopkins that for a ten-year period, during which investigations were made, the average amount of timber in the forests of the United States killed and reduced in value by insects would represent a loss of \$62,500,000 annually. It is impossible to estimate in the absence of the necessary statistics the extent of the annual loss in Canada to the growing forests, but on a conservative estimate the loss on the annual cut of timber due to insects in Canada would be more than \$2,000,000. The injury to forests by fire receives the serious consideration which it merits on account of its very noticeable character, but insects and fungi carrying on their destruction in apparent secrecy are unobserved until their depredations assume a magnitude such as to render their control almost impossible.

Forest insects are injurious in a number of ways: they may attack and kill the mature growing trees; they destroy the second growth and thus hinder or prevent natural regeneration; they attack the cut timber and the finished products to a serious extent; in a word, from the seed to the finished product they exact no inconsiderable toll of this important and valuable resource. There are two classes of insects injurious to forests: those which defoliate the trees, and the boring insects which attack both living trees and the cut products. Of the former class we have two examples in Canada to which I may briefly refer. The Larch Sawfly (*Nematus erichsonii*), which destroyed all the mature larch or tamarack in eastern Canada in the outbreak of 1881-1885, is now repeating its depredations. The second is the Spruce Budworm (*Tortrix fumiferana*), which is distributed throughout Quebec, and in many localities has effected serious defoliation of the spruce and balsam during the last two years. In British Columbia it is also attacking the Douglas Fir and has already shown its ability to kill the young second growth. The seriousness of this outbreak of the Spruce Budworm is not only due to the probable effect on the trees of the repeated