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BARK-BEETLE INJURIES AND THE MEANS OF CONTROL.

BARK-BEETLE INJURIES.

The majority of our bark-beetle species breed commonly in dying and slash, but many of these attack trees which have become weakened or unthrifty, or even at times healthy trees, and they are therefore distinctly injurious. Other species attack healthy trees readily when the beetles are present in sufficiently large numbers, and have killed an enormous quantity of timber in Canadian forests.

The injury to living trees is caused by the adult beetles cutting their egg-tunnels through the inner bark or upon the surface of the sap wood, and by the larvae excavating the larval-mines in the same location.

The multitude of tunnels and mines checks the flow of sap and rapidly kills the tree, or the part of it attacked. Direct injury to the timber is caused by the Ambrosia-beetles, since their small black tunnels penetrate the wood for several inches or, in some cases, for more than a foot.

PRIMARY ENEMIES.

Certain of our bark-beetle species are commonly found attacking and killing healthy timber. They attack perfectly sound trees and cause the chief or primary injury, and they are therefore known as "primary" enemies. Among our best known examples are: *Dendroctonus brevicornis* Lec., *D. monticolæ* Hopk., *D. piceaperda* Hopk., *D. borealis* Hopk., and *Dryocates confusus* Sw. These are also found breeding in slash, and in timber dying from various causes, but they are commonly and abundantly found attacking healthy timber in quantity.

A considerable number of our species breed everywhere in slash and dying trees and are usually secondary enemies, but upon occasion, the frequency varying with the species and the conditions for rapid breeding, they increase to immense numbers so that they successfully attack healthy trees and become important primary enemies. *Polygraphus rufipennis* Ky., the Four-eyed Spruce Bark-beetle, is abundant throughout Canadian forests in spruce bark of slash and dying trees; but it attacks and kills large numbers of over-mature trees, and those weakened by other causes, and at times becomes epidemic, killing large quantities of spruce, particularly black spruce. *Pityokteines sparsus* Lec., (*Ips balsameus* Lec.), the Balsam Fir Bark-beetle, is an important primary enemy of the balsam fir in Eastern Canada. It is an important factor in the present extensive injury to our eastern balsam, and is always active in killing the over-mature and weakened trees. It is everywhere abundant in dying fir bark. *Dendroctonus pseudotsugæ* Hopk., the Douglas Fir Bark-beetle, is everywhere abundant in slashings of Douglas fir and western larch, but is at times an important primary enemy in restricted localities. *D. obesus* Mannh., the Sitka Spruce Bark-beetle, is rather more commonly found as an important primary enemy of Sitka spruce on the British Columbia coast, but it usually confines itself to dying bark if this is available. Several of our species of *Ips*, and many other species, while usually important secondary enemies, are at times of considerable primary importance in sporadic outbreaks. All these primary enemies, in order to overcome the resistance of the healthy trees, must attack in very large numbers, so that their numerous and rapidly excavated tunnels may check the sap flow in a short time. In an epidemic outbreak of