

majority of species attack only dying or dead trees.* Stumps, diseased or dead branches, brush piles and recently-felled logs are their favourite breeding places. Most species will not, as a rule, molest living trees at all if rapidly-dying and recently-felled food-plants are available, but if trees in this condition are not to be had in sufficient quantity, many of these species will attack perfectly healthy trees and prove very destructive. Between 1882 and 1889 *Polygraphus rufipennis*, which does not ordinarily feed upon living trees, destroyed, according to Dr. Hopkins, approximately 10% of the 500,000 acres of growing spruce in West Virginia.

The injury done by the species which attack healthy and diseased trees is, in certain regions and at recurring intervals, very considerable. The work of *Dendroctonus frontalis* in the spruce and pine of West Virginia and the adjoining States, of *D. piceaperda* in the spruce of the Northeast, and of *D. ponderosa* in the spruce and pine of the Black Hills of South Dakota, may be cited in illustration. *D. frontalis* and *D. ponderosa* attack the living, healthy spruce and pine, and in spite of the resin are able successfully to rear their young within the bark. The tunnels and mines thus formed interfere seriously with the flow of sap, and either kill the tree outright or induce an unhealthy condition favourable to the attacks of other borers and fungous diseases. It seems very probable that many destructive forest fires have been fed by trees dying or dead from the attacks of Scolytids. In 1903 Dr. Hopkins estimated that the destruction, in the previous three or four years, of 10% of the white pine and 75% of all other species of pine, throughout an area of over 10,000 square miles in the States of Virginia and West Virginia, was to be attributed to the ravages of *D. frontalis*. In 1904 the same writer pointed out that *D. ponderosa* had been the primary cause of the destruction of 1,000,000,000 feet of Bull Pine in the Black Hills of South Dakota and the Rocky Mountain region.

The Timber-beetles, by driving their tunnels through the wood in many directions, often render timber unfit for use.

Hylastinus obscurus breeds in the roots of clover in many parts of the Northeastern States and in Canada, and in some localities proves a serious pest.

Corthylus punctatissimus occasionally does considerable damage in young sugar-maple plantations.

Scolytus rugulosus, the fruit bark-beetle, attacks unhealthy fruit trees of all sorts, and occasionally bores in apparently perfectly healthy trees.

Phlaeotribus liminaris frequently attacks diseased peach and cherry.

Xyleborus dispar sometimes occurs in diseased apple trees.

* (A few breed in dead wood only.)