

balance of nature. Such being the case, it is the duty of scientific societies, such as this one, to protest to the Government against permission being granted to introduce any exotic birds into this country, either from aesthetic or economic considerations.

Mr. Tom Wilson: On the North Thompson the grouse is a destructive bird in orchards, as it attacks growing buds of trees. Pheasants are also a curse, and this is accentuated by the fact that they are not allowed to be shot except in season. I am a little opposed to the introduction of birds into the Province, and partly also to game birds.

Mr. Cunningham: In confirmation of Mr. Wilson's remarks, I wish to evidence the importance of destroying wild crab-apple on the Island and around Vancouver. These trees breed the oyster-shell scale. A few years ago I advocated this, but a great protest arose, accompanied by press writing. The extermination of wild crabs would materially affect the grouse, which feed on these trees. The fruit-grower was not considered.

Mr. McCubbin: There is also, I believe, a bounty on horned owls. These birds prey on mice and rats. They also destroy these game birds.

Mr. Tom Wilson: I recollect an instance when 75 per cent. of an orchard was girdled by mice and the man obtained good money for owls.

Mr. Taylor: This bounty on owls has since been removed. In regard to the mice question, in 120 acres a man had to replant 60 acres. This was not, however, the fault of the owls; the orchard was in poor shape. The starling in England is a fairly harmless bird. When introduced into Australia and New Zealand it began to feed on grapes, the natural food being absent. Cecil Rhodes in South Africa introduced the same bird. In six years it spread enormously and fed again on the grape. There is now a bounty on starlings in that country.

Mr. Creese: I must say a word to support the blue-tit. In England this bird feeds on woolly aphid and the currant bud-mite. It will also attack eggs of insects in winter.

Mr. Taylor: Quite true. Possibly 95 per cent. good and 5 per cent. harm; but to me there appears to be no object obtained in this country. The native chickadee belongs to the same genus and has the same habits; why not patronize them? Besides, the blue-tit may become dangerous.

Mr. Day: I quite agree with the folly of upsetting nature.

Mr. Winslow: Our Department in Victoria when asked for an opinion replied that, while we admitted the sentimental gain, we took the stand that the possible harm outweighed the possible good.

A member: Why not protest against the granting of permits?

Mr. Day: It is now too late to make any protest. We might draw up a resolution to present later.

It was moved and seconded, "That this Society, in view of recent researches into the economic value of introduced birds in other countries, disapproves of the practice of granting permits for the introduction of any exotic birds in this Province." Carried unanimously.

THE ECONOMIC IMPORTANCE OF CANADIAN IPIDAE.

BY J. M. SWAINE, DOMINION DIVISION OF ENTOMOLOGY, ASSISTANT ENTOMOLOGIST FOR FOREST INSECTS.

Among the Canadian species of the family Ipidæ (bark-beetle and ambrosia-beetle) are many of greater or less economic importance. Their destructive activities are along several lines in accord with their varied habits.

The bark-beetles breed in the inner bark or between the bark and the wood of healthy or dying trees. A few species prefer living trees; others prefer dying bark, but attack and kill green timber when in immense numbers; and still others are found almost solely in rapidly dying bark, or with a few species in bark that is dead and fairly dry; both coniferous and deciduous trees are attacked, but the former

are more subject to serious injury in Canadian forests. Those species which are able to kill healthy trees prove among the most destructive of forest insects. The genus *Dendroctonus* contains a number of species most injurious to coniferous trees. *D. piceaperda*, Hopk., in successful outbreaks, has killed an immense amount of the finest spruce timber in Maine and New Brunswick. This species is a constant menace to the spruce forests of eastern Canada, but does not appear to be concentrated at present in destructive outbreaks. *D. valens*, Lec., is commonly found in dying bark of spruce and pine stumps and logs, and, not rarely, is the primary cause of the death of trees. It is assisting *D. brevicomis* in killing bull-pine in the south-western part of this Province. In the timber attacked this season, and still green, *valens* is working in large numbers. It may be considered a destructive species in bull-pine in British Columbia.

An undescribed species of *Dendroctonus* breeds in immense numbers in the fire-injured timber of northern Manitoba, and has killed a small amount of jack-pine timber, mostly in the neighbourhood of the burns. *D. simplex* breeds abundantly in dying larch-bark from Manitoba eastward, and apparently kills many trees weakened by the larch sawfly.

An undescribed species of *Dendroctonus*, assisted by species of the genus *Ips* (*Tomicus*), is apparently killing much fine white-spruce timber along the Athabaska River, above and below Athabaska Landing. This infestation has not yet been carefully investigated. *D. pseudotsugæ*, Hopk., breeds abundantly in logs of Douglas fir and western larch in British Columbia. It everywhere attacks and kills injured and weakened trees, and frequently kills considerable green timber.

D. monticolæ, Hopk., has killed much western white-pine (*Pinus monticolæ*) in the Sugar-Lake region of British Columbia, and the outbreak is still spreading. This species also attacks and kills the black-pine in that district. *D. brevicomis* is destructive to bull-pine in British Columbia.

In the Princeton section an outbreak by this species has been running for three years and much valuable timber has been killed. The clumps of "red-tops" may be distinguished upon the mountain-side and in the valleys for many miles. The infestation is spreading rapidly and threatens the entire bull-pine stand of that region. The same trouble is appearing in other sections. *D. monticolæ* and *D. valens* are working in the same trees, and the former appears to be as destructive as *brevicomis*. *D. engelmanni*, *D. borealis*, *D. murrayana*, and *D. obesius* are variably destructive to spruce and pine in different parts of the Province. The habits of these and other ipid beetles of British Columbia are being carefully investigated.

Many species of the genus *Ips* (*Tomicus*) are abundant in dying bark of pine, spruce, and larch. Most species of this genus found in Canadian forests are important secondary enemies of trees, but are seldom found attacking green timber. There are, however, several important exceptions. *Ips balsameus*, Lec., is a serious enemy to balsam fir throughout Ontario, Quebec, and New Brunswick, and to a lesser extent is injurious to larch. Several species of the genus are injurious to pine and spruce in British Columbia and Alberta.

Polygraphus rufipennis, Kuby, and allied undescribed forms are everywhere important secondary enemies to pine, spruce, and larch. They are usually found in dying bark, but are apparently able to attack and kill healthy trees. Several species of *Phloeosinus* are locally injurious to cedars. A large number of species belonging to various genera are important secondary enemies, breeding in the bark of injured, weakened, and dying trees.

Certain twig-beetles of the genus *Pityophthorus* excavate and kill the twigs of various pines, and at times become sufficiently numerous to check seriously or even, rarely, to kill the infested trees. Such injury was common two years ago in southern Quebec to white and red pine; and in this season abundant on jack-pine in northern Ontario, and bull-pine in British Columbia.

Two species of this group are injurious to fruit-trees. The peach-tree bark-beetle (*Phloeotribus liminaris*) and the fruit-tree bark-beetle (*Eccoptogaster rugulosus*) are important pests in southern Ontario. The former breeds also in wild cherry in Quebec Province; but *E. rugulosus* does not apparently occur elsewhere in Canada.

The clover bark-beetle (*Hylastinus obscurus*, Marsh) cuts tunnels similar to those of true bark-beetles in roots of red mammoth alsike and crimson clovers, and is injurious in parts of Quebec and Ontario.

The deciduous trees of Canadian forests are less subject to injury by members of this family. Several destructive species found in the northern half of the United States have apparently not yet ventured to cross the boundary. We have many species, but, in the experience of the writer, few attack green bark.

Ambrosia-beetles, although belonging to the same family, have quite different habits. The adults bore round tunnels through the bark and into the wood. These tunnels are invariably stained dark brown or black by fungi which grow upon the walls. The eggs are deposited free in the tunnels (*Anisandrus* and *Xyleborus*) or in niches similar to those of the bark-beetles, cut along the tunnel-sides (*Gnathotrichus*, *Trypodendron*, *Pterocyclon*). The larvæ of these species enlarge the niches to elongate cavities, larval cradles, slightly more than their own length. Each species has invariably associated with it, growing in a dense layer upon the walls of the tunnel and larval cradles, a particular species of fungus. Several species of these ambrosia-fungi have been carefully studied by the writer. Under the proper conditions the conidia germinate readily and pass through the conidial cycle in about sixty hours.

Both beetles and larvæ feed upon the fungus. The larvæ of *Anisandrus* and most species of *Xyleborus* feed upon the fungus exclusively; and with the larvæ of all ambrosia-beetles, of this country at least, the fungus is a necessary diet. All our coniferous trees are subject to attack by species of *Trypodendron* and *Gnathotrichus*. Poplar, oak, birch, beech, maple, and alder are attacked by species of *Trypodendron*, *Anisandrus*, *Xyleborus*, and *Pterocyclon*.

The ambrosia-beetles do not, as a rule, attack sound trees in Canadian forests. They enter dying trees, or their parts, and recently felled logs and stumps, in which chemical changes have apparently rendered the sap more suitable to the growth of their fungi. With us their injury is only noticed in felled timber left out of water or in fire-injured stuff.

RESOLUTION RE QUARANTINE MEASURE.

"Whereas this Association at the annual meeting in Victoria last January did pass *unanimously* a resolution introduced by the Inspector of Fruit Pests, requesting the Dominion Government to enact such legislation as would prevent the importation of fruit and other vegetables from countries and Provinces infected with insect pests, bacterial and fungous diseases, not widely prevalent in this Province:

"And whereas the Dominion Government has admitted that the legislation requested may properly be enacted by the Provincial Legislature, and has graciously signified its desire that a Quarantine Act, with such provisoes as may be necessary to meet the peculiar conditions of this Province and the wishes of the people, as voiced by the Boards of Trade, Fruit-growers' Associations, Farmers' Institutes, this Association, and other public bodies throughout the Province, may be speedily enacted:

"Be it therefore *Resolved*, That this Entomological Society, in convention assembled at Vernon, B.C., in the month of July, 1913, hereby reaffirms its opinion that the legislation requested is necessary and expedient, and renews its appeal to the Provincial Government to bring down such legislation at the first meeting of the Provincial Legislature as will adequately protect the agricultural and horticultural industries of this Province from pests and diseases not widely prevalent in British Columbia."

Moved by G. O. Day, seconded by Lionel E. Taylor.