

United States Department of Agriculture,

DIVISION OF ENTOMOLOGY.

L. O. HOWARD, Entomologist.

POWDER-POST INJURY TO SEASONED WOOD PRODUCTS.

By A. D. HOPKINS,

In Charge of Forest Insect Investigations.

INTRODUCTION.

The so-called powder-post injury to seasoned wood has attracted much attention in America, and especially in Europe for centuries, and has been the subject of published articles in many languages.

This peculiar injury seems to be on the increase in the United States and numerous requests from a number of the principal manufacturers of vehicles and wooden articles have recently been addressed to this office for information. The subject has received considerable attention through Mr. F. H. Chittenden and the writer in the past, and investigations are now being made with a view to publishing a special bulletin giving detailed information. It is deemed advisable, however, to issue this circular in advance, as it is addressed especially to our correspondents who are in need of immediate information.

CHARACTER OF POWDER-POST INJURY.

Fine, flour-like powder is found on or beneath piled or stored hickory, ash, oak, and other seasoned hardwood products. Upon closer examination small holes will usually be found in the surface of the wood from which the powder will fall when moved or jarred. By cutting into the wood, or splitting it, the interior is often found converted into a mass of closely packed material which readily crumbles into powder. This is held together by an outer thin shell and intervening fibers of sound wood. It will also be found that the injury is confined to the white or sapwood, and that the darker-colored heartwood is seldom, if ever, thus affected.

CHARACTER AND EXTENT OF LOSSES.

This form of injury is widely distributed over the world, and unless remedies are instituted the resulting loss will be great. This is especially so in a country like the United States, which is rich in hardwood forest resources, and where there are extensive interests in the manufacture of commercial products from such wood. It is a character of loss which falls directly on the dealer, the manufacturer, or owner of

finished products, rather than on the producer of the crude product, since it is only after the wood is seasoned, and often some years after it is taken from the tree, that it is seriously affected. The principal losses result from injury to old hickory, ash, oak, and other dry hardwood lumber; handles, spokes, and other sapwood material used in vehicles of various kinds; ornamental woodwork, furniture, inside hardwood finishings, floors, joists, and frame timbers; inside rustic work, hoop-poles, bamboo, wood specimens in museums, old tanbark, and many other similar articles. In many cases the affected articles are not only rendered worthless for the purposes for which they are intended, and in the aggregate cause direct financial loss amounting to hundreds of thousands of dollars, but in certain cases may be a menace to human life, as in weakened construction timbers in floors, frames, bridges, and wood material of vehicles, etc. Indeed, we have evidence of a railroad wreck in which many lives were lost, due to powder-post injury to the principal construction timbers.

CAUSED BY INSECTS.

The injury with the consequent losses mentioned is the work of several kinds or species of insects which have the peculiar habit of burrowing into seasoned wood in quest of their natural food supply of nutritive substances in the wood, which is apparently rendered especially attractive by the loss of moisture and the chemical changes brought about by the seasoning process and the increased age of the dry material.

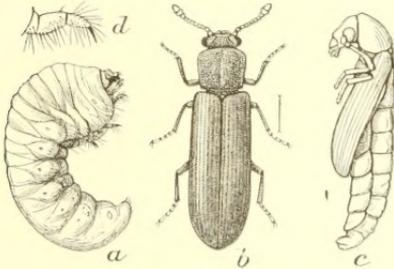


FIG. 1.—A powder-post beetle (*Lyctus planicollis*): a, larva; b, adult; c, pupa; d, leg of larva; line to right of adult represents natural length (Chittenden).

emerging from the wood where they breed and pass the winter, fly or crawl about in search of suitable wood material in which to deposit their eggs.¹

Habits and life history.—The different species vary in their habits and life history, from the egg to the adult, but in general that of the true powder-post beetles is as follows: The winter is passed in the wood. The eggs are deposited under normal conditions soon after activity commences in the spring, while in store-houses and buildings kept warm and dry they may continue their activity through the year

¹Technically the insects which have this peculiar habit belong to the order Coleoptera, and chiefly to the families Lyctidae, Ptinidae, and Bostrichidae. By far the larger part of the injury is caused by species of the genus *Lyctus*, of which there are several forms.

and deposit eggs much earlier. The minute white "worm" or grub (the second stage of the insect known as the larva), upon hatching from the egg, proceeds to burrow in and through the wood in all directions, feeding and growing as it proceeds, until it has attained its full growth. It then excavates a cell at the end of its burrow, in which it transforms to a semi-dormant stage (the pupa, or third stage in the insect's life), remaining thus until the legs and wings have fully developed, when it bores its way out and appears as the matured adult or beetle (the fourth stage), to mate and repeat the life process. Under normal conditions, so far as we positively know, there is probably only one generation annually.

Each female deposits many eggs, and many females oviposit on or in a single piece of wood, so that the combined work of their numerous progeny, burrowing through the wood in quest of food for their development, results in the complete destruction of the interior wood fiber and its conversion into a mass of fine powder. If the first attack and the first generation do not accomplish this destruction, subsequent generations will follow in the same wood until nothing of the solid fiber is left but a thin outer shell.

FAVORABLE CONDITIONS FOR ATTACK.

The conditions which appear to be most favorable for inducing attack are perfectly dry wood material, or sapwood which has been stored or piled in one place for two, three or more years, manufactured articles which have attained considerable age, floors and frame timbers in old houses, and other wooden structures. The insects prefer such material before it has been painted, varnished, or otherwise treated, but it appears that certain species will, in rare cases, even attack old wood which has been painted or varnished.

METHODS OF PREVENTING LOSS.

The methods of combating this class of insects, and of preventing losses from their ravages, come under two primary heads: *First*, destruction of the insects; *Second*, prevention of attack.

Destruction of the insects.—In the case of lumber and other manufacturers' and merchants' supplies which are found to be infested, the entire stock should be gone over carefully, and every piece showing the least indication of injury sorted out. Every piece found to be so injured that it is of no value should be removed and immediately burned, together with all waste pieces of wood, lumber, sticks, and other useless material which might serve as breeding places for the insects. Thus vast numbers of the insects will be destroyed. October to March is probably the best time in which to do the work, in order that none may escape. All partially damaged material, such as the sap edges of lumber, and parts of other material too valuable to destroy,

should, when practicable, have the damaged and infested parts removed, and likewise burned.

Where it is not practicable to remove the infested parts, the material may be subjected to one or more of the following methods for the destruction of the insects, and the prevention of further attack, provided in each case the treatment is not detrimental to the wood for subsequent uses:

1. A liberal application of pure kerosene, benzine, gasoline, formalin brine, or like substances, to the infested parts.
2. Thorough steaming of the wood in a tight room.
3. Subjecting the wood to the highest practicable dry heat in a dry kiln.

In the case of finished products such as furniture, museum specimens, and the like, which are portable, they may be subjected to the treatment mentioned under "1," "2," and "3," selecting the one which is least injurious to the articles. In the case of painted or varnished articles which would be injured by external treatment, the liquid may be injected into the holes made by the insects, or in small gimlet holes made for the purpose, to be afterwards filled with putty. With inside hardwood finishings, such as wainscoting, staircases, floors, doorposts, and the like, the injection of the liquid is perhaps the only practicable method of checking the progress of the injury.

When infested construction timbers are badly damaged, or important parts are weakened by the work of the insects, they should be removed and replaced by sound heartwood material, while all slightly damaged accessible wood should be treated with an external or internal application of a suitable liquid remedy.

Methods of preventing attack.—In the case of lumber and other manufacturers' and merchants' supplies, the following precautions should be taken to prevent the introduction and subsequent multiplication of the insects, as well as to prevent the development of favorable conditions for their attack.

To accomplish this end a general cleaning up and the immediate destruction of all useless and infested material, and the proper treatment of the slightly injured and infested wood, is of primary importance. Special precautions should also be taken as follows:

1. To prevent the introduction into the lumber-yards, store-houses, and factories, of infested material, remembering that the insects may be thus carried to or from all parts of the world in wooden articles.
2. The fact that the older material forms the most attractive conditions for the attack of the insect suggests the importance of preventing the accumulation of such material by converting it into the finished products within two or three years, or less time, after it is taken from the tree.

3. To make semiannual inspections of the lumber-yards and store-houses in order that any evidence of the presence of the insect may be promptly detected, and the infested pieces removed for treatment.

4. Nothing but heartwood lumber sticks should be used in piles of lumber liable to attack.

5. Quantities of naphthaline scattered about over the piles of lumber and other material, two or three times during the year, would serve to keep the insects away.

6. No wood showing the slightest indication of powder-post should ever be used for a finished article, or for parts of a building or other structure.

7. All important timbers used in wooden structures should be entirely free from sapwood.

Approved:

JAMES WILSON,

Secretary of Agriculture.

WASHINGTON, D. C., *November 20, 1903.*

NOTE.—If correspondents who try any of the methods recommended in this circular will notify the Division of Entomology of the results of their experience, and offer suggestions from their practical business for experiments or lines of investigations, it will aid materially in making our future publications of special practical value to the interests involved.



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