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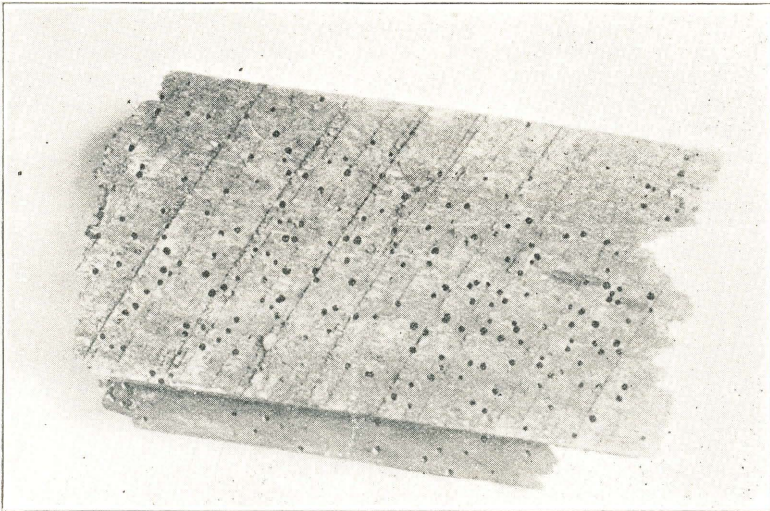
Wood-boring Insects Which Attack Furniture and Buildings
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Wood-boring Insects Which Attack Furniture and Buildings

By E. I. McDANIEL



Surface of piece of wood showing exit holes of powder-post beetles

AGRICULTURAL EXPERIMENT STATION

MICHIGAN STATE COLLEGE
Of Agriculture and Applied Science

ENTOMOLOGICAL SECTION

East Lansing, Michigan

FOREWORD

The number of complaints annually sent in to the Department of Entomology dealing with the destruction of wood-work in dwellings and in public buildings, is constantly increasing. In this bulletin the appearance and manner of life, the character of injury, and recommendations for the control of the three groups of insects principally responsible for such damage are described. The bulletin forms one of a series dealing with insects which are either annoying or destructive in dwellings.

R. H. PETTIT,
Entomologist of Experiment Station.

Wood-boring Insects Which Attack Furniture and Buildings

E. I. McDANIEL

TERMITES OR WHITE-ANTS

Leucotermes flavipes

Of all insects attacking wooden structures in Michigan, the termite or white-ant takes precedence, when judged by its potentialities for harm. Furthermore, year after year, its depredations seem to be on the increase. No untreated wooden building, bridge, or wooden sidewalk is safe from attack. Dead, standing trees and mine timbers are often partially devoured, and



Fig. 1.—Work of termites in timber, reduced

even dying parts of living trees have been known to be utilized as food by this voracious pest. Its only requirement seems to be a limited supply of moisture accessible to its workings. There are a number of species of termites known to occur in North America but, thus far, Michigan has had to deal with but one species, *Leucotermes flavipes*, a small, active "white-ant"

resembling a true ant in a general way. However, its "thick waist," its color, that of old ivory, and its habit of avoiding light are not at all ant-like characters. It lives in colonies and we often find these colonies established in galleries scooped out of wood. The tunnels made by these termites are always more or less cluttered up with rounded pellets of frass which are absent in the tunnels of true ants.

The work of termites differs from that of powder-post beetles in that the termites work both in the heartwood and the sapwood of soft and hard woods. Their tunnels are not filled with flour-like powder and they are very careful to keep the outside surface intact though the wood may be reduced to a paper thinness. *Leucotermes flavipes* is essentially a wood-destroying species. When working in solid wood, it follows the grain, otherwise it makes wide irregular galleries.



Fig. 2.—Living cornstalks tunneled by common termite

So obscure is the work of termites that a building may be doomed before their presence is discovered. Whenever they gain access to a building, coming from nests located outside, foundation timbers and basement floors are usually first attacked. If the infestation becomes severe before it is checked, furniture, books, and food may next be destroyed.

There are several ways in which termites may gain access to buildings. Probably, a number enter during the migration flight in the spring. Infested limb wood or cord wood is often carried into the house and stored in a damp basement. They are also capable of migrating into the house from rotten stumps or from the ground itself.

The normal home of *L. flavipes* is in rotting stumps, logs, railroad ties, or similar places. It may even live in soil which is rich enough in humus. There are a number of instances on record where fields in which corn

stubble has been plowed under year after year, have become infested to such an extent that finally it became impossible to grow a crop.

When infested cornstalks are brought into the barn or shed for feeding or shredding, the building invariably becomes infested.

Termites often destroy wooden posts in vineyards and it is not uncommon to find them feeding in the dead stock of the vine itself.

In November or December, members of colonies living in unheated quarters descend to their subterranean galleries below the frost line where they remain until spring. If the colony chances to be working in a heated building, its members retire to some protected place and may work practically the year round. Old termite colonies are made up of thousands of individuals. Old and young, queens, kings or males, workers, soldiers, and at certain seasons of the year, winged migrants are present in the colonies.

There is no resting stage in the development of the white ant but the tiny termite, after it emerges from the egg, develops gradually into an adult individual.

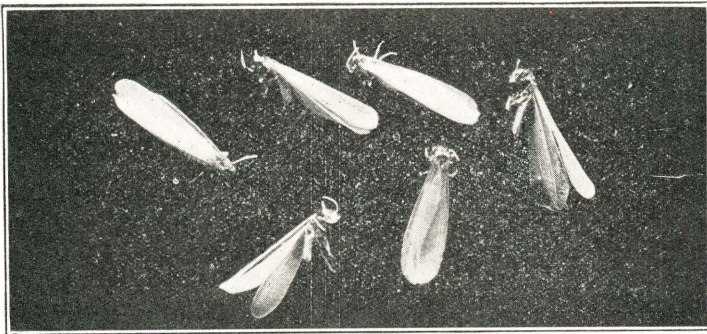


Fig. 3.—Winged form of common termite, enlarged

New colonies are established by winged individuals which leave the mother nest in the spring. In heated buildings, winged forms may appear as early as March, while, in the open, they usually appear in May and June. As many as four or five swarms may depart from the mother nest within a short period of time. The swarm usually makes its appearance in the morning and the first flight to leave is the largest. The individuals are awkward and not strong fliers. Usually their journey ends some 75 to 150 feet from the mother colony. Many pairs fail to find suitable quarters in which to establish a colony and consequently perish. Birds and other enemies also materially reduce their numbers during the short time they are in the open.

Such individuals as succeed in establishing themselves remove their wings and remain in the nest from that time on. Colonies of our Michigan species have no "royal chambers" with helpless stationary queens as is the case with some of the Southern species. On the contrary, the queens are active and may be found in any part of the nest. All forms except the winged migrants, have soft, delicate bodies and perish if long exposed to the light or to dry air.

When in order to reach woodwork of buildings it becomes necessary

for termites to crawl over masonry, they build covered runways or tunnels as a protection from light. These tunnels are obscure, winding tubes about the color of cement, which trail around like vines. They may be either outside or inside of the wall.

In regions where termites are known to be present, all buildings should be protected by "termite shields" on the foundation walls. These shields are metal troughs inverted over the top of the foundation masonry. White-ants may construct their covered bridges or tunnels up to these inverted troughs but do not build out across them. Unshielded concrete foundations are of course impenetrable, but the cracks which are to be expected even in the best of foundations, serve as termite highways through which the building may become infested. The metal shield placed between the concrete and the timbers, prevents termites from getting to the wood through such cracks. Any poles or posts to be placed in the ground, should be impregnated with coal tar creosote, which tends to lengthen the life of the

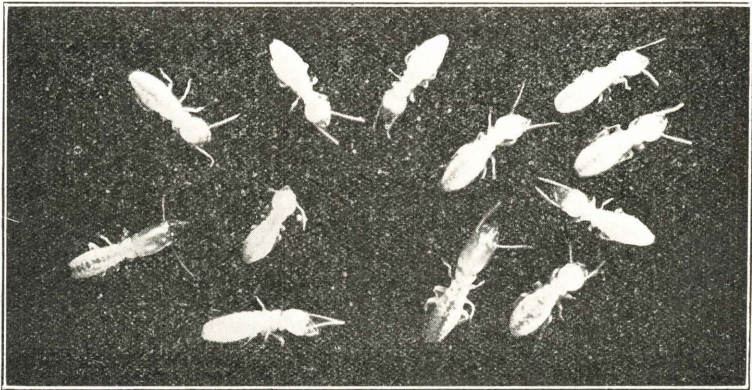


Fig. 4.—Workers and soldiers of common termite, enlarged

pole and to protect against termites for a period of years. Where it is imperative to use timbers in building foundations, such timbers should be treated with coal tar creosote or some other preservative, possibly one containing some soluble form of arsenic.

Control Methods

There are two methods of treating timbers with coal tar creosote. First, the pressure method which, while expensive, is better in that the preparation penetrates more deeply into the wood, and, second, the dipping or painting of the timbers with the coal tar creosote preparation.

Use as large a proportion of stone, brick, or concrete as possible in the building of the foundation. Make walls and floors in basements of concrete. Concrete floors should be laid on a gravel bed.

Do not allow woodwork to come in contact with the ground.

Do not sink untreated timbers in concrete. The concrete may crack and such timbers may serve as white-ant highways.

Termites require a certain amount of moisture. Therefore, buildings

with dry foundations are less liable to attack. Air space should be provided between the floors and the ground. Basements should be well drained and ventilated and be provided with as much light as possible.

Exterminate all white-ant colonies in rotting logs, stumps, or soil in the vicinity of buildings before the buildings themselves become infested.

By far the cheapest and one of the most effective methods of combating white-ants established in buildings is by means of liberal quantities of kerosene injected into their workings. The nest should not be opened up any more than necessary until after this has been done.

Each colony of white ants dwells in a nearly closed system of connecting galleries. The fumes from any volatile liquid therefore, injected at various points in this system of galleries, will tend to penetrate to all parts and thus reach all open spaces in the system. Kerosene is a volatile liquid which produces fumes deadly to insect life. In practice, it has been found entirely practical to drill small holes, perhaps a quarter of an inch in diameter, through timbers into the workings of the insects, and to inject by means of an oil gun or syringe a quantity of kerosene here and there wherever cavities are detected by rapping on the surface of the wood. If the workings are left intact except for these small holes, the fumes are closely confined and penetrate rapidly to various parts of the nest. The galleries of white-ants are usually partially filled with rounded white pellets of frass and excrement and in this spongy mass the liquid kerosene will creep somewhat after the manner of ink in a piece of blotting paper and distribute itself over quite a surface, which favors rapid evaporation and the consequent production of fumes. The addition of three ounces of pyrethrum powder of good grade to each gallon of kerosene has been found to render the treatment more effective, although it is not essential to success.

As soon as it seems that control has been secured, the nest should be opened up, and, if the timbers are too badly damaged, new ones should be substituted. If practical these new timbers should be treated with coal tar creosote or, better still, replaced with concrete.

When winged termites are departing from the mother nest in the spring they sometimes emerge from openings in the ground along the side of buildings. Such nests should be treated with kerosene. There should be several applications at intervals of a few days as long as any white-ants are believed to be present.

Kerosene is explosive and due care must be observed in its use.

Aside from kerosene, with or without pyrethrum, there are a number of effective commercial preparations of a similar character on the market.

Sodium arsenite, used in a five to ten per cent solution, has been recommended on the Pacific Coast* for eliminating white-ants. The solution is poured into the nests and galleries where the insects find and eat the poisoned timbers and, since termites are cannibals and eat their dead, the poisoning process may go on for some time.

Sodium arsenite is a violent poison. It kills vegetable as well as animal life.

*Light, S. F.—Calif. Agr. Exp. Sta., Cir. 314, 1929, p. 25.

THE CARPENTER-ANT

Camponotus herculeanus var. *pennsylvanicus*

The large black carpenter-ant is the largest of all the ants in Michigan. The workers vary from one-fourth to one-half inch in length and winged females may attain the length of one inch.

Their presence in houses is more or less accidental since they primarily infest timber. They seem to prefer unsound timber but will attack solid wood. In cut-over regions the ants sometimes migrate from rotting logs or stumps and take up their abodes in the woodwork of houses, hollowing out and weakening the timbers. The character of the tunnels depends on the density of the wood, differing however from those of the white-ant in that they are always free from pellets of frass.

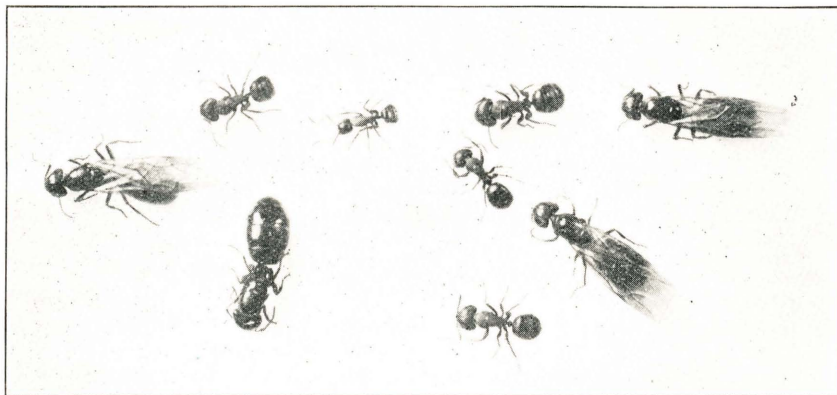


Fig. 5.—Females and workers of large carpenter ant, slightly enlarged

The presence of carpenter-ants in the house, however, does not necessarily mean that the timbers are infested. The colony may be established in a log or stump twenty-five or fifty feet away and the ants may be nesting in the stump and feeding in the house. Once the ants find something to their liking in the pantry, it takes considerable effort to exclude them.

Where colonies are found in the timbers of buildings or in stumps or rotting logs, they can be eradicated by generous applications of kerosene forced into the tunnels.

However, when the colony cannot be located, it is possible to poison the adults and in this way gradually to wear the colony down.

The carpenter ant is suspicious by nature but it likes sweets, especially when it has to steal them, so that any poison to be most effective should be placed in a secluded dark place.

Two baits with which we have had especially gratifying results, are tarter emetic in honey and Paris-green in brown sugar.

The tartar emetic and honey bait was developed years ago and has been quite satisfactory when used to control most of the sweet-loving ants infesting dwellings. The most effective formula is:

Tartar emetic 1 part by weight.
Honey and powdered sugar 20 parts by weight.

Stir enough powdered sugar into cold extracted honey to make a stiff dough and then add one part by weight of dry powdered tartar emetic to each twenty parts of honey and sugar. The dough must be kneaded or stirred thoroughly to insure an even mixture.

Tartar emetic is a deadly poison and must always be used with the greatest care.

If honey alone is used or if the honey is heated, it becomes too thin and part of the tartar emetic settles out.



Fig. 6.—Log tunneled by large carpenter ant, reduced

In order to permanently rid a building of ants, it is necessary to destroy the larvae as well as the adults. In order to bring about the destruction of the immature individuals, a slow poison such as the one just named must be used, one that will make the ants ill but will not incapacitate or kill for some little time.

When the ants are induced to eat a small amount of tartar emetic, they appear to feel ill. At any rate they seek the home nest and start removing their young to new quarters, usually succeeding in tearing up the old nests, but fail in an attempt to establish their young in a new home. Some of the poisoned bait is likewise fed to the larvae. The substitution of a quicker acting poison or the use of too strong a mixture to begin with defeats the purpose of the treatment.

The poisoned sugar bait is far less difficult to make and has been found fairly satisfactory. This bait is made as follows:

Brown sugar (cheap grade) 1 pound.
Paris-green 1 ounce.

Stir together thoroughly. Where the poison is made up fresh, it is very easy to handle. Where it stands for a time, it cakes and becomes lumpy.

The poisoned sugar bait has the advantage of being easier to make and is perhaps less dangerous to human beings, since green sugar is not inviting. The poisoned honey is messy though very attractive and great care must be observed to keep either bait properly labeled and out of reach of children, pets, and those who do not understand poisons.

Either bait must be kept in clean containers and served on clean boards, tins, or glass since ants are fastidious.

POWDER-POST BEETLES

Lyctus planicollis, *Lyctus linearis*, and *Lyctus opaculus*

Of all the beetles known as "powder-posts," those belonging to the genus *Lyctus* are of the most economic importance. They are capable of establishing themselves wherever seasoned sap-wood is available, rustic furniture, old furniture, floors, sills, and timbers may be attacked and the beetles may breed in such places for a number of years.

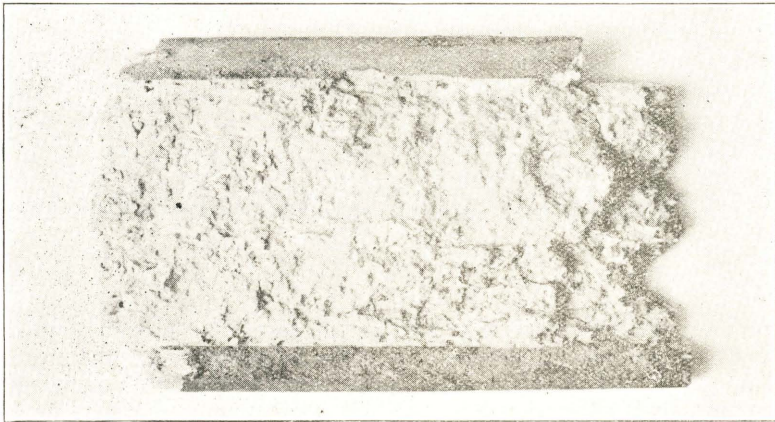


Fig. 7.—Piece of wood split open to show inner part reduced to powder

There are several species of powder-post* beetles, all of which are similar in appearance, habit, and life-history. The beetles are small, slender, somewhat flattened, elongate, and vary in length from one-tenth to one-fifth of an inch.

Three species have been recorded from Michigan. Of these, *Lyctus planicollis*, the Southern Lyctus, has been reported most frequently. *Lyctus linearis*, the European Lyctus, also occurs in Michigan. This species is widely distributed both in this country and in Europe. *Lyctus opaculus* is generally distributed throughout the United States.

The work of powder-post beetles differs from that of termites or white-

*Kraus, E. J.—A Revision of the Powder-post Beetles of the Family Lyctidae of the United States and Europe. U. S. D. A., Tech. Sr. No. 20, Pt. III, 1911.

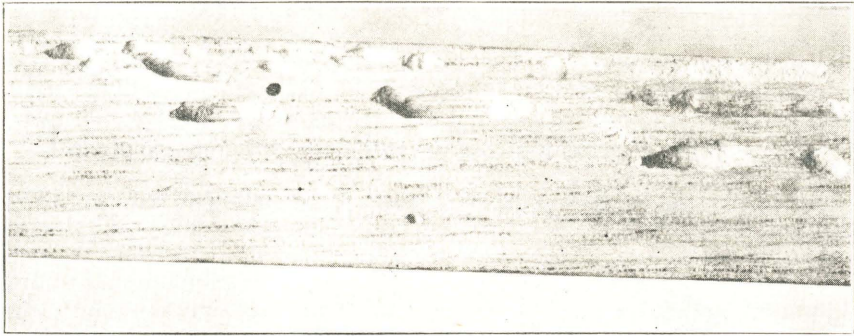


Fig. 8.—Work of powder-post beetles in flooring cut to show tunnels, enlarged about 2 x

ants in several particulars. The sapwood of hard woods only is attacked, second growth hickory, ash, basswood, and oak being preferred. Heartwood is never attacked.

Each beetle has its own individual tunnel from which numerous ventilating shafts and exit holes open to the surface, and the tunnel is filled with a fine, flour-like powder some of which is pushed out through surface openings at frequent intervals.

Usually, it is the presence of these tiny stacks or heaps of powder that first draws attention to the beetles and leads to the discovery of their work.

Each female lays a number of eggs, and a number of beetles may deposit eggs in the same piece of wood. After these eggs hatch and the young have tunneled back into the wood, an examination may show a number of beetles apparently working together. However, each larva is working independently even in a crowded community.

Wherever a number of beetles work in close proximity, the interior of the wood becomes completely honeycombed with tunnels and is eventually reduced to a mass of powder and splinters. The exterior may appear to be in perfect condition except for the numerous exit holes. Timbers infested to this extent are a menace to safety and should be replaced, if possible with heartwood.

In unheated buildings in the North, powder-post beetles pass the winter as grub-like larvae within their tunnels. Toward spring, the larvae change



Fig. 9.—Powder-post beetle, *Lyctus planicollis*, enlarged 3 x. For work see Fig. 8

to pupae, and adults usually appear about the last of May in heated houses or in June under out of door conditions. They are on the wing for a period of from four to six weeks, and it is during this time that the females search out seasoned porous sapwood of hardwoods on which to deposit their eggs. An infestation may start at the sawmill, in the lumberyard, in the factory, or in the timbers after a building has been constructed. The beetles are common enough anywhere.

Powder-post beetles do not lay their eggs on varnished or painted surfaces although, if they are in the wood before it has been "finished" they will continue to work.

The most practical method of control known to the writer is by the use of kerosene and pyrethrum, prepared by adding four ounces of pyrethrum to each gallon of kerosene and allowing it to stand for twenty-four hours. This is applied to the floor or woodwork by the aid of a mop or paint brush and the oil is allowed to soak into the tunnels through the natural openings made by the beetles. Reference has been made to these openings and the dust which is constantly being pushed out by the beetles. Kerosene will creep in this fine powder and, once inside, the fumes will penetrate for quite a distance and kill all stages of the beetles. If the powder comes from above, the oil may be applied to the timbers by means of a spray pump or soaked in by means of a paint brush. On many occasions where the infestation was very severe, the writer has made use of an ordinary oil can or squirt can by means of which kerosene has been forced into the openings in greater quantity than would be possible by use of a brush. Important timbers weakened to the point of danger, through the attacks of powder-post beetles, should be replaced with fresh ones preferably, and, if possible, the replacement should be made with heartwood. Flooring, if too badly infested, may become unsafe and in such cases should be replaced with fresh material.

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June —
! an building, thorough, for several days to reduce fire hazard.

Alum. spirit can be used in place of kerosene to reduce fire hazard.