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OHIO STATE UNIVERSITY AGRICULTURAL COLLEGE EXTENSION SERVICE

Termites in Buildings

and Insects Mistaken for Them

FIG. 1.—Typical termite damage to supporting timbers.

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Termites, "white ants," or *Reticulitermes flavipes*, are native insects that originally inhabited our forests, where they fed on dead and decaying wood. With the passing of the forests they turned their attention more and more to wood used in buildings, and do tremendous damage to timbers in houses in both city and country. This damage frequently requires expensive reconstruction. The insects feed on the cellulose of wood, usually following the grain, and construct tunnels through the timbers.

In some parts of the world, termites cause the collapse of floors and even furniture unless special precaution is taken to guard against their entrance. In Ohio, the insect is not that serious, but during the past few years has called for increased attention on the part of home owners. It is estimated that 10 per cent of the houses in some sections of our cities harbor termites. Most of this infestation is unknown to the owner, because of the insect's habit of working under cover. Their presence usually is discovered only after the termites have progressed into the supporting timbers, which may be so badly weakened as to need replacement, or after the winged migrants have swarmed into the open.

Habits of the Insect

While termites are called "white ants" and live in colonies, they are not closely related to ants and have entirely different habits. The young of *ants* are inactive, white, footless larvae that are fed and cared-for by worker ants. The young of *termites* are soft-bodied active nymphs somewhat resembling white ants. They travel within the honeycombed timbers on which they feed.

The termites found in Ohio are subterranean in habit, which means that they either live in the ground, or must have ground contact and moisture in order for the colony to survive. They build their nests in the underground portion of logs, stumps, posts, dead standing trees, buried blocks, or in underground passages connected with buried wood, or wood in contact with the ground. During the winter, termite colonies are found in the earth below frost line.

There are divisions of caste in the colony, as there are among bees and ants. We have the white workers and soldiers, which are blind and remain under cover in the subterranean passageways

and honeycombed timbers (Fig. 2). Some of the young develop into mature males and females, which are provided with eyes and wings and leave the colony, emerging into the sunlight to swarm and establish new colonies. Those which appear in the open have black bodies with semi-transparent wings extending far beyond the body (Fig. 3). They do not fly far from the place of emergence, but soon shed their wings and seek a new place to become established. If they are successful in establishing a new colony, it may take two or three years before the insects become noticeable.

Termites do not increase as fast as true ants or bees, but old established colonies may have tens of thousands of individuals. The location of the queen and the colony source is almost invariably underground.

Buried timbers furnish ideal places for termite nests, but their runways may be found ramifying underground through gardens and lawns. It is a common occurrence to pull up a wooden tomato stake, fence post, or clothes pole and find that termites have taken possession of the underground portion and have honeycombed it. They are likely to be present anywhere in the soil and appear under boards lying upon the ground, or even under stones where moisture abounds.

Since they depend on moisture for their existence, they may go deep into the soil to secure it. We have observed termites coming through cracks in cement basement floors six feet below the level of the surrounding lawn. While dependent on moisture for their exist-

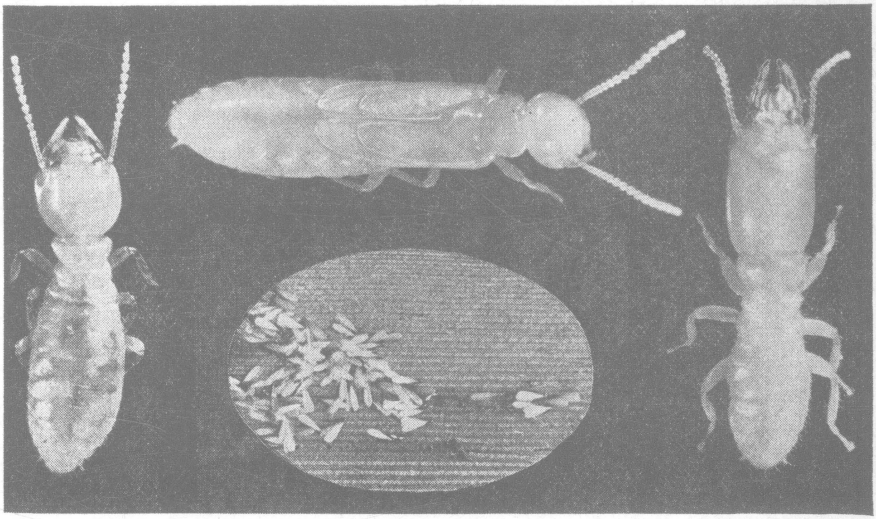


FIG. 2.—Three castes of termites are soldier (right), worker (left), and supplementary queen (upper center). Lower center shows some winged migrant termites.

ence, they will travel a considerable distance into a building to feed on dry wood in the floors or joists, or even eat into rugs and floor covers. Their runways always lead to moist timber or earth below, even though they must travel some distance to reach it.

The insects work under cover, and carefully leave a shell-like covering over their channels in the wood which excludes the light and all evidences of their work. Eventually, the owner of the building is greatly surprised to find that these timbers, which superficially appear sound, are in reality honeycombed by the insects.

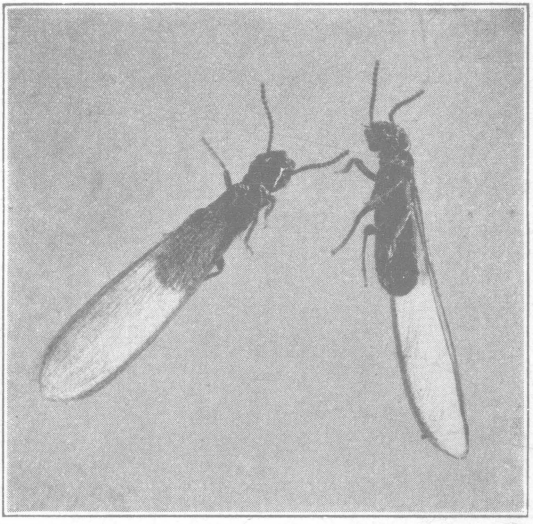


FIG. 3.—Winged migrants, greatly enlarged.

Swarming Leads to Their Detection

The presence of the insects in the timbers of a house or barn is frequently revealed to the owner through the appearance of the swarms of black, "ant-like" individuals with wings twice as long as the body. (Fig. 3.) In heated buildings, swarming commences during March and continues over a period of two or three months. Out-of-doors swarming occurs later, and may continue until midsummer. The black, winged forms emerge from a crevice and fly or run about in a clumsy manner in a huge colony of struggling individuals. The emergence continues for several hours and the insects become so abundant as to constitute a perplexing problem to the housewife.

In a day or two after emergence countless numbers of detached white wings may be found lying upon floors, the wingless migrants seeking new cracks and crevices to enter in an attempt to establish other colonies. They are successful only in case the moisture content is suitable. For this reason, few of the swarms that emerge in houses ever succeed in establishing new termite colonies.

The swarming of termites should serve to warn the house owner that a colony is established in nearby timbers and should be investigated immediately. The affected timbers usually are found

near the basement walls, such as foundation plates, sills, the ends of joists or studding, or even in the floors above. Porch steps, cellar posts, steps and window frames are most likely to become infested, because these frequently offer the needed ground contact. Through such timbers the insects travel upward, and at times may even be found in the upper stories of buildings.

Wherever timbers are kept moist through water leakage, as from refrigerators or leaky pipes, termites work very rapidly and are able to survive without the aid of ground contact.

How Termites Enter Buildings

Most termite infestations are due to faulty construction and occur principally at filled porches, terraces, and in basement structures wrongfully installed. Termites often gain entrance to a house through wooden forms left in place after building concrete walls, floors, or steps. These supporting forms should be removed after the concrete is set. The space between a porch floor and the soil beneath should be at least 18 inches deep, and be ventilated so that it is kept light and airy. The same is true of wooden floors where there are no basements. Termites thrive in dark, moist places and an effort should be made to avoid these conditions.

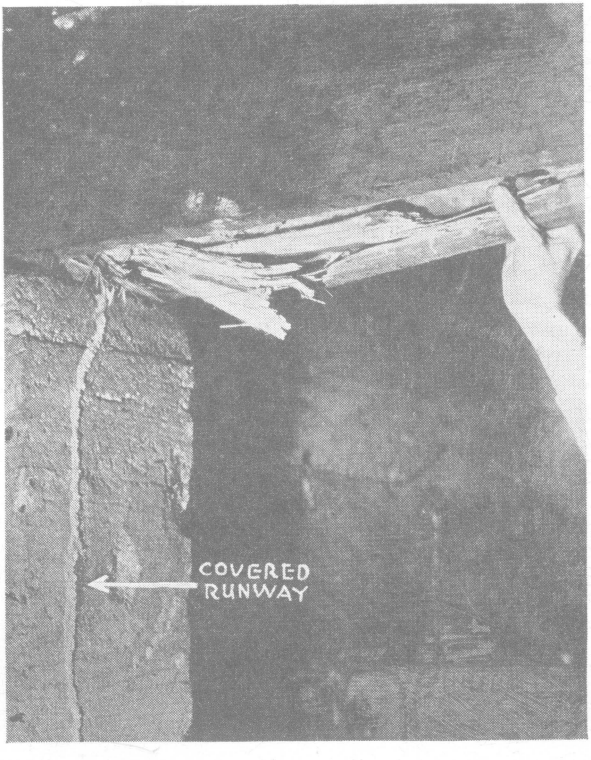


FIG. 4.—Note the covered runway or "tube" built by termites to connect the wood beam, their feeding ground, with the soil and moisture below.

The insects frequently enter houses through wooden support timbers improperly set in concrete basement floors, and through

sleepers embedded in moist concrete during the building construction. Modern building construction requires that no wood be in contact with earth at any point. Neither should untreated joists or sleepers be buried in raw concrete as a support for nailing floors. Such construction furnishes an ideal place for termites to enter, and makes it difficult to eradicate them.

On many occasions termites gain entrance to a building through cracks in the foundation wall, between walls and floors, or through porous mortar, and reach the timbers above through hollow tile or hollow cement blocks. When this happens, it is very difficult to detect the place of entrance. Often the termite will come through the basement wall from the outside, and, finding no timber, will build covered runways, or "tubes," leading up the basement wall to the nearest timber above (Fig. 4).

These runways or "tubes" are made of particles of wood fiber and earth. With this material they bridge over the barrier and use the runways to reach the timbers without exposing themselves to the light. They may bridge over a gap of several feet and when such runways are opened, one immediately sees how constantly they are used by the white termites in their migration back and forth between the ground and the infested timbers. The presence of such runways indicates that a colony is established, and careful inspection should be made to determine the seriousness of the infestation. These mud-covered runways should be removed as they are rebuilt.

Outside Conditions Favorable to Termites

Out-of-doors, termites are frequently found swarming from rotten wood, such as dead trees, logs, stumps, wooden posts, or board walks. These sources of trouble should be removed promptly from the vicinity of the home. We have known of several city blocks over which the ground became well populated with termites ever seeking to find suitable timbers to establish new colonies. Such a situation is most likely to arise where homes are built in the midst of standing timber, and where contractors have carelessly filled in with earth, covering stumps, logs, building blocks, and such wood debris.

Injury to hotbed frames and greenhouse benches and flats is a common occurrence where termites are abundant in the soil. Greenhouses offer favorable conditions for termite injury, due to the high humidity and the common use of wooden bench supports. Through these they sometimes reach and feed within the stems of potted plants.

How to Exclude Termites from Buildings

When termites are established in the timbers of a building, prompt measures should be taken to eradicate them. The appearance of termite swarms gives an immediate clue to the location of the trouble. Infested timbers usually occur in some part of the basement, where supporting timbers are kept moist from ground contact, or where the insects have built "tubes" to bridge over a barrier. Wooden support timbers resting on earth, or embedded in concrete cellar floors, should be removed and replaced with iron posts, or cut off and set on a finely finished cement base. Wooden sills and sleepers should be inspected carefully and, if weakened, should be replaced, or reinforced with sound timbers.

When the place of entrance is located, the owner should use every means possible to insulate against the insects. It may be necessary to face a poorly constructed foundation wall with fine, rich cement 1 inch thick in order to exclude the insects. Tearing down the mud-covered runways is desirable, but the termites are likely to enter at some other point. Painting the outside of a porous basement wall with a waterproof coating serves as a mechanical barrier. This may be done in conjunction with chemical treatment of the soil as described later.

Chemical Repellents and Barriers

Where masonry used in foundation walls cannot be rebuilt with cement to prevent the entrance of termites, one may treat infested timbers and also the soil near the foundation wall with chemical repellents. Coal tar creosote is the cheapest and probably the most available material serviceable for such use. The addition of kerosene to the creosote at the rate of 2 parts of kerosene to 1 of creosote improves penetration and facilitates its movement into clay soil. When this mixture is allowed to sink into the soil next to the basement wall the termites will be repelled, providing the chemical sinks deeply enough into the soil so termites cannot work beneath it. The treatment is made by excavating a narrow trench about 2½ feet deep and pouring the solution on the bottom at the rate of 1 gallon to each 8 to 10 lineal feet. The soil is then replaced and the treatment repeated within 3 inches of the surface, using 2 gallons of the mixture to each 5 cubic feet of soil.

Pentachlorophenol is also an excellent material for treating soil when used as a 5% solution in the manner as given above. Ground areatment should be made only when the soil is dry.

The mere spraying or painting of building timbers with chemical does not result in a sufficient amount of the chemical being

absorbed by the timbers to insure protection against the insects. Surfaces where timbers rest upon foundation walls cannot be reached by sprays and it is at these places that the termites are most like to enter.

Where sleepers, or other supporting timbers are known to be infested, but are not sufficiently injured to be replaced, the work of the insects within can often be stopped by forcing either the creosote-kerosene mixture, or orthodichlorobenzene under high pressure through holes drilled into the infested timbers. Either of the above chemicals is very penetrating and rapidly flows along the tunnels of the termite infested wood, rendering it unsuited for their habitation. Power pressure equipment is needed for applying this. *Be careful of open flame, such as hot water heater, when using materials containing kerosene.*

Replacement timbers that are inserted at or near points of entrance of termite colonies, as well as sleepers embedded in concrete, should be previously creosoted at a treating plant equipped to impregnate the wood with the preservative. After fitting the creosoted timbers, the cut ends should be painted with a heavy coating of creosote.

After every precaution is taken to eradicate termites from supporting timbers of a building, the question arises as to what should be done with the termites already working in the timbers above. If their contact with the ground has been removed, and the timbers are not kept moist by water leakage, the termites will die, or at least vacate.

Fumigation and Use of Poisoned Powders

Fumigation with toxic gas, such as is used successfully for some other household insects, is not effective for controlling termites. Such gas cannot penetrate the timbers and reach the channels occupied by the insects. Even should fumigation kill the termites in the timbers, reinfestation would soon occur by those insects coming up from the ground.

The use of poisoned baits or DDT powder, which is effective for some household insects, is *not* effective against termites, because they live entirely under cover and feed on the cellulose of wood.

Some Things to Remember

Termite injury to building timbers will cease if the contact with moisture and the earth below is permanently removed.

Do not allow wooden cement forms or stakes to remain in place, or scraps of wood to be buried under porch floors.

Replace injured wooden sills with concrete, and do not allow wooden cellar posts or steps to be embedded *in* concrete.

The intelligent use of the proper chemical repellent in the soil next to the foundation wall may solve the problem. The treatment of the soil must be complete. Caution should be used in handling these chemicals as they irritate the skin.

In replacing foundation timbers on top of hollow cement block, or hollow tile foundation wall, use creosote-treated material.

In the absence of a basement, see that there is plenty of air space between the floor and the ground, and see that this space is ventilated.

Remove stumps, rotten logs, and buried wood from the immediate vicinity of the house.

We now have commercial companies which contract to eradicate termites in buildings. These companies perform a worthy function if they are reliable and undertake to permanently solve the problem. This bulletin should sufficiently acquaint the home owner with the manner in which the problem should be attacked.

The fight against termites may take more than one year to eradicate them from a building. This should not discourage one in the attempt, for the longer the insects remain unmolested, the greater will be the repair bill.

Insects Mistaken for Termites

Ants.—Sometimes swarms of large black ants emerge from cracks or crevices in foundations or from the soft wood in window sills or facings. These flying ants can be told from adult termites by the shape of their body, which is always greatly constricted between the thorax and abdomen. The sides of a termite's body are not deeply constricted. The wings of *ants* are clear, except for a dusky area near the middle of the front marginal line. The wings of ants are *not* shed, as are the wings of termites.

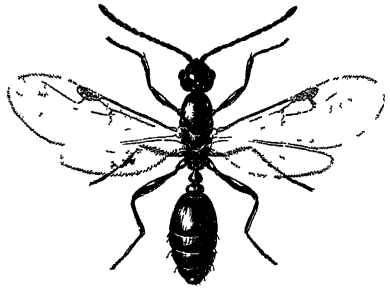
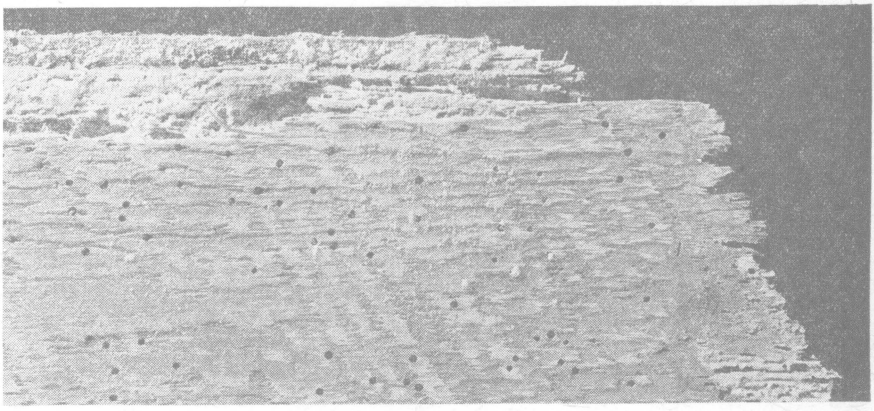


FIG 5 —A typical winged ant

DDT (10%) dusted into ant tunnels and on the swarming colony of ants will usually destroy them. Only the large black carpenter ants injure timbers. Smaller species which may swarm in basements usually live in the soil behind the foundation wall or under porches.

Powder Post Beetles.—Injury to timbers by powder post beetles is detected by the presence of numerous small round holes from which fine powder may protrude and fall to the floor below. Badly damaged timbers are soft and the sapwood is often converted into a fine powder-like mass by the insects. The adults, which are dark brown beetles, emerge from the timbers, mate and lay their



Courtesy Purdue University

FIG. 6.—Typical damage from powder post beetle.

eggs in the pores of the wood. The grub-like larvae are rarely seen unless the wood is dissected. They damage only the sapwood, but such injury may greatly weaken the timbers.

Control consists in applying an oil solution, or emulsion of 5 per cent DDT to the timbers to kill the beetles which emerge and rest on the treated surface. Where odors of the chemical are not objectionable, a thorough wetting of the timbers by spraying or painting with a 5 per cent solution of pentachlorophenol is effective. Likewise, a solution of 2 pounds of paradichlorobenzene dissolved in 1 gallon of previously warmed kerosene to make a concentrated solution of that chemical can be depended upon, if sprayed or painted on the infested timbers.

Regardless of which of the three methods is chosen it probably will take two applications to get control. This is due to the immature forms of the insect being out of reach of the chemical at the time of first application. Need for repeating the operation will be guided by the appearance of freshly expelled powder.