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MICHIGAN TERMITES

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MICHIGAN STATE COLLEGE
EXTENSION DIVISION

FOREWORD

Many types of insect attack are cyclic. Such an explanation is perhaps correct in the greater number of termite infestations brought to the attention of this institution in the last few years, although publicity upon the subject of termite damage is also contributory.

In any case it is a fact that termites are capable of and do inflict a sizable toll to improperly built structures, especially in certain parts of the state. However, the habits of termites are known and preventative as well as remedial measures have been devised which are effective. The better methods of combating termites are presented in this bulletin in an effort to bring to the attention of interested persons a true picture of the termite problem.

MICHIGAN TERMITES

E. I. McDANIEL

Termites, or "white ants" as they are sometimes known, have recently assumed a new economic status. In Michigan several factors have influenced this change. Of these perhaps the most important has been the gradual destruction of the termites' natural food supply; for originally, termites were considered a forest insect of secondary importance, since their activities were restricted largely to fallen trees, rotten stumps or decaying wood. Today, with farm buildings, bridges, towns and cities replacing the forest, termites have succeeded in adapting themselves to an entirely new set of conditions and in many instances are established in untreated timbers where wooden structures have been erected on infested soil.

Fig. 1. Workers and soldiers of common termite, enlarged.

Damage from termites in Michigan is restricted to one subterranean species, **Reticulitermes flavipes.**

To all practical purposes the termite infestation in Michigan is limited to the two lower tiers of counties along the southern line of the state and up along the west coast about two tiers of counties inland to Antrim. This area is commonly known as the Upper Austral life zone, though an occasional outbreak may occur in the central part of the state or the area known as the transitional life zone.

LIFE HISTORY

The organization of a termite colony is complex and the life history is involved. Each colony is made up of workers, soldiers, primary and secondary reproductive males and females, in addition to the royal pair which are the true parents of the colony.

The eggs are cared for by the workers in an underground chamber. The young develop slowly, usually requiring from six to eight months to complete their development. They live several years and are active throughout their existence. In the organization of a colony the workers predominate. Their duties are varied and on them rests the maintenance of the colony. They excavate new galleries in the timber, tunnel through the soil, construct covered passages over obstacles, care for the young and wait on the queen. The primary function for the soldiers is to protect the colony. They are always to be found

Fig. 2. Winged form of common termite, enlarged.

scattered about among the workers building their exploratory tunnels through the soil or at any place where an accident reveals the inner activities of the colony. Where the mother colony containing a queen becomes over-crowded, winged true sex forms are developed and in the spring several swarms depart from the home nest. Swarming takes place during the day, usually in the forenoon, and the first swarm is always the largest. Swarms may appear as early as the first of March from heated buildings following an open winter, though in the open they usually appear along in April or May. The flight is short and erratic. Comparatively few individuals succeed in finding a suitable place to establish a colony. Those which are successful remove their wings and the new queen the first season lays a few eggs. From these eggs develop workers which are cared for by the queen until they are capable of fending for themselves. The second season, if the colony survives, the rate of reproduction is increased and a number of soldiers are also developed. From three to five years are usually required to produce a thriving colony from which swarms may be thrown off.

HABITS

The food supply of subterranean termites is largely cellulose and is obtained from various sources. In fact, no untreated material manufactured from plants or plant products, or for that matter any organic material, is rejected by termites if there is sufficient moisture present. Moisture is essential since termites depend on certain accompanying organisms to digest their food and these organisms are inactive ex-

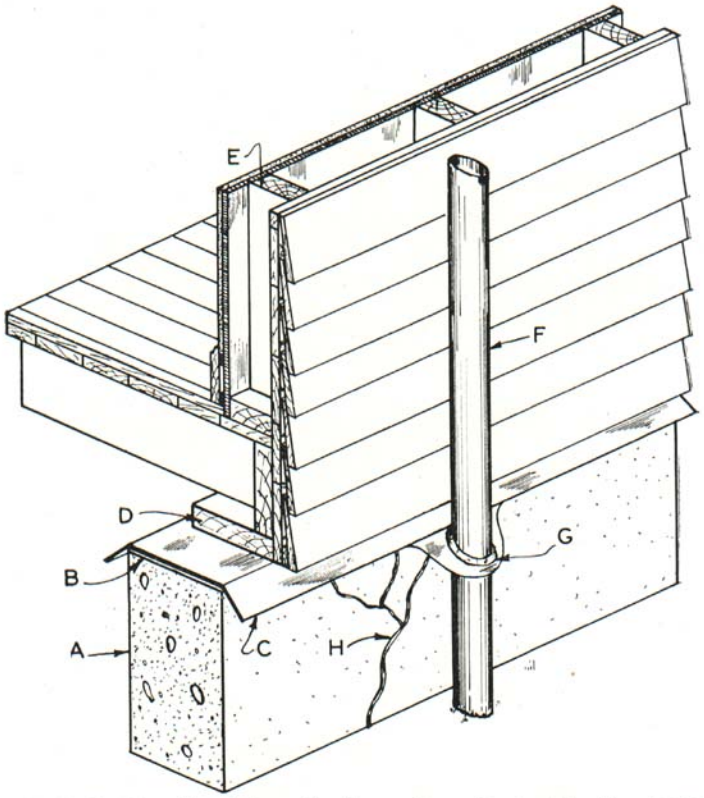

Fig. 3. Flashing of foundation wall with corrosion-resistant metal with protected drain pipe in place. a, foundation wall; b, layer of dense concrete sealing foundation wall; c, flashing of corrosion-resistant metal plate; d, sill; e, stud; f, pipe; g, protecting flange which must be fitted to the pipe and to the flashing; h, covered passageway built by termites but checked by flashing.

cept in the presence of moisture. This is an important fact since it furnishes the key to the control of termites, for **where the contact between the nest in the ground and the work in the wood is broken, the termites die.** This can be effected either by building termite proof structures following the suggestions in figure 3, page 5, by using treated timber, page 9, or by chemical barriers, page 12.

While termites appear to prefer dead wood they may attack living plants and trees. They thrive in sandy soil, especially where barnyard manure is utilized as a fertilizer, or where the soil is filled with an abundance of decayed vegetation such as rotted wood or corn stubble. Under these conditions termites may extend their exploratory tunnels out over acres of ground. In fields like corn fields where the crop refuse is turned under season after season it is possible for the termite

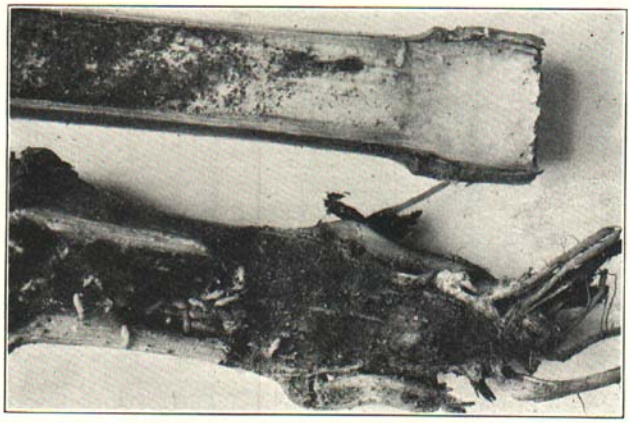

Fig. 4. Living cornstalks tunneled by common termite.

population to become established to the place where they will attack growing corn and it is possible for them to destroy an entire field. They enter the stalk through the roots and work inside the pith. In greenhouses they have been known to destroy entire benches of plants before their presence was even suspected and it is not unusual for them to attack trees and vines growing in infested soil.

HOW TERMITES GET INTO BUILDINGS

At least 95 per cent of the termite infestations in buildings takes place through the soil, resulting from exploratory expeditions sent out from the subterranean nest. The entrance may be effected in several places at the same time, or the entrance may be restricted to a certain area. Wherever untreated wood comes in contact with

infested soil it is always likely to be attacked. Where buildings are constructed on low foundations immediately over infested soil, termites are capable of building earthen tubes from the ground to the floor above, through which they establish themselves in the flooring and the timber throughout the ground floor and from which the pests may even work up the side walls to the second and third floors. There are authentic records of second story entrances through covered passage-ways built along vines to the second floor. These covered highways are largely constructed at night. They are common avenues of approach extending from the ground to the work in the wood and may be constructed on either the outside or the inside of foundation walls or they may even extend up the inside of foundations following

Fig. 5. Foundation destroyed by termites.

cracks or crevices in the mortar, or they may follow along the inside of hollow tile. Infestations of this sort can be checked by using non-corrosive resistant metal plates according to suggestions on page 5; a high grade of concrete, page 11; or by the use of chemical barriers, page 12.

INJURY TO BUILDINGS

Once established in timbers, termites may continue to breed and feed in obscurity over a period of years, constantly opening up new tunnels in the timbers, working with such secrecy that they are unnoticed. The work is obscure because in their efforts to conserve moisture they leave the outside of the timbers intact even though the

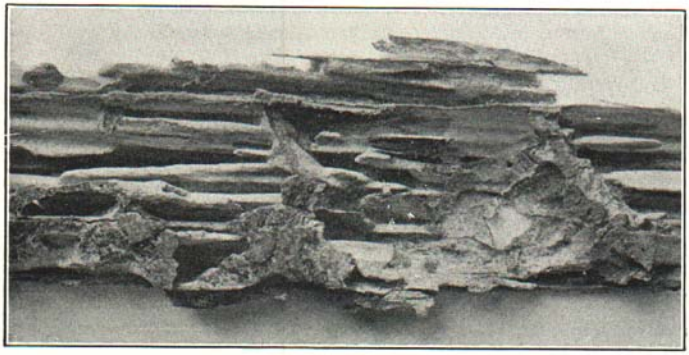

Fig. 6. Work of termites or "white ants".

inside may be hollowed out leaving a mere paper-like shell. Wainscoting may be hollowed out from behind leaving only sufficient backing to support the paint and varnish, yet to the casual observer everything will appear to be in good condition. Floors may be so weakened that they suddenly give way under pressure. Timbers hollowed out may allow the building to settle or the floors to become uneven. The damage may occur suddenly, certain parts of the building being practically in a state of collapse before the infestation is discovered. Then again where the infestation is light the attack may be of years' duration with little or no apparent loss. The lower floors are usually attacked first since they are nearest the soil, though the injury is not restricted to the first floor.

Other insects are sometimes mistaken for termites. To distinguish work of termites from that of other wood-boring insects is important since the control recommended for termites is not satisfactory when used to control other wood borers.

Fig. 7. Log tunneled by large carpenter ant, reduced.

Termites excavate wood for food. They prefer damp wood in shaded areas and their tunnels through wood contain more or less refuse in the shape of wood paste.

Timber ants excavate wood for a home. They prefer dry wood and their tunnels are void of all refuse. They usually leave the outer wall of their habitat uninjured or with only an occasional opening.

Powder post beetles attack sapwood of the various hard woods, such as oak, ash and hickory. Their tunnels are filled with fine powder-like dust which is crowded through numerous openings. See figures 8, 11, 12 and 13.

CONTROL

Build Termite-proof Structures

The most satisfactory method of controlling termites is to build termite-proof structures. The following suggestions are enumerated with that in mind:

1. Clear the ground for the proposed building by removing all stumps, wood and refuse or debris, before starting to lay concrete. As an extra precautionary measure where the soil is infested, treat the soil with coal-tar creosote, calcium chloride, borax or some of the other soil treatments, page 12.
2. Lay basement floors of dense, high-grade concrete and use a construction that will not crack.
3. Set all foundations and footings in high-grade concrete. Where a wooden column rests on a basement concrete floor reinforce the floor with special footing of sufficient width and depth to prevent settling.
4. Where wood comes in contact with the ground, use only treated wood. This applies to foundation timbers, sleepers, joists, basement floors, porches, etc. Where possible the substitution of either steel or concrete for wood is advised. In building the steps allow the lower step to rest on a concrete platform high enough to form the first step and insulate the wood of the step from the building proper with a metal termite shield. Timber treated with coal tar creosote[1] according to the standard practice (under pressure in a closed chamber) is termite-proof so long as no opening through the treated shield is made. Where it is necessary to cut a treated timber put a quantity of coal tar creosote into the fresh cut surface either by pressure treatment or by repeated applications of coal tar creosote with a brush.

[1]The American Wood Preservers Association specifies that the coal-tar creosote treatment take place under pressure in a closed container to obtain proper penetration of the wood. Where lumber is dipped in boiling vats of coal-tar creosote and allowed to boil for several hours, leaving the wood in the vats until the liquid cools, some protection will be obtained, although nothing in comparison to that attained where the treatment takes place under pressure. The application of coal-tar creosote with a paint brush is of little value.

5. Have all foundation walls capped with a termite-proof metal shield.[2] Allow the shield to extend over the edges of the foundation inside and outside for ¾" at least and then down at an angle of about 45 degrees. The shield should be of heavy gauge metal and continuous. It should be laid flat on a bed of Portland cement mortar 1 inch thick (Fig. 9, page 11).
6. Where buildings are to be erected without making excavation, allow for an air space of from 18 to 24 inches between the ground and the floor above. Use screened windows in the foundation wall to provide for ventilation and an adequate amount of light, making it possible to inspect the foundation for termite tunnels at any time.

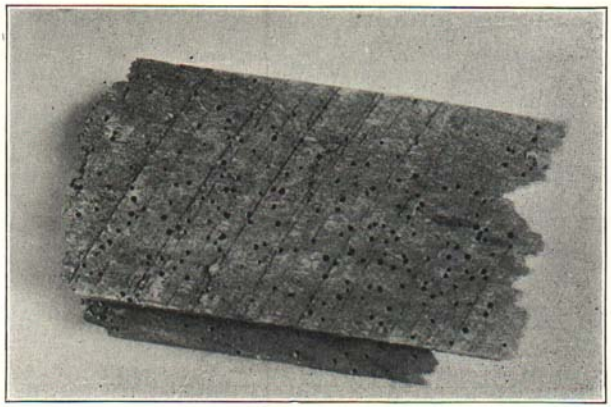

Fig. 8. Surface of piece of wood showing exit holes of powder-post beetles.

7. Cement tiles, drain pipes, and sewers should be cemented tightly into the foundation or through the foundation floor using high-grade cement that will not crack. Also any pipes used to supply gas, water or electric light wires should be cemented into the foundation in such a way that termites will not be able to get by at these openings. Pipes on the level with the foundation should be protected with tight fitting non-corrosive metal flanges as shown in Fig. 3, page 5.
8. Expansion joints between concrete floor and wall may be made termite-proof by filling with asphalt mastic, Figure 9.

[2]Hard copper plate .04 inch thick is to be preferred. Soft copper will be effective where hard copper cannot be obtained. Brass is suitable if it is an alloy of from 80 to 85 per cent copper and the remainder zinc.

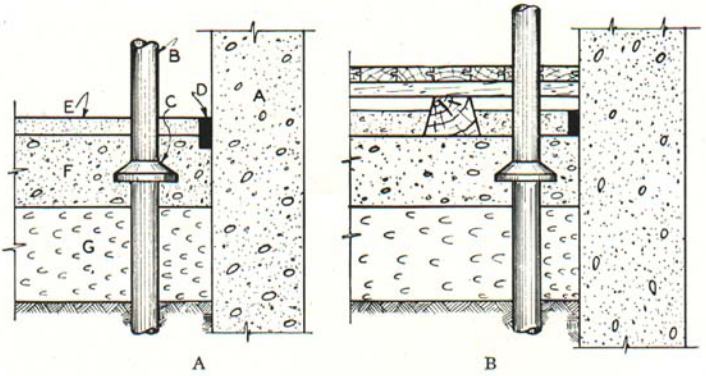

Fig. 9. Showing two types of construction. Ordinary type of construction, in which the floor is sealed to the foundation wall by means of a channel containing an asphalt mastic expansion joint, showing the proper way to break the possible ascent of termites by a metal flange around the pipe. a, foundation wall; b, pipe; c, flange of corrosion-resistant metal; d, asphalt mastic expansion joint; e, high grade cement; f, ordinary concrete; g, gravel and concrete.

A represents a less usual type of construction, somewhat similar to that shown in B, with the exception that the proper way to lay a wooden floor over concrete is shown.

To Eliminate Termites from Infested Buildings

Termites can be eliminated from infested buildings by capping all foundation walls with corrosion-resistant metal shields according to the specifications in Fig. 3. It will be necessary to replace all

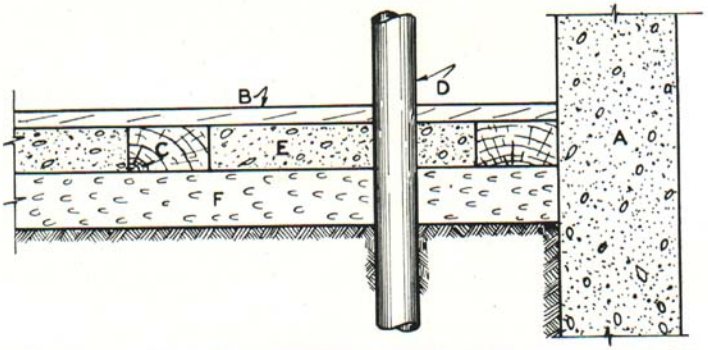

Fig. 10. Dangerous type of construction. Pipe unprotected; union between floor and foundation wall not sealed; sleepers exposed to possible termite infestation from the ground through the coarse gravel. a, foundation wall; b, floor; c, untreated sleeper; d, pipe; e, dense concrete; f, coarse gravel or cinders.

weakened timbers, and these should be replaced with treated timbers properly insulated from contact with the soil, using either the corrosion-resistant metal plate or treated timber.

It will be necessary to excavate under buildings and to secure proper ventilation, following the suggestions made in Article 5, page 10.

Termites may build their covered runways up to the metal plate overhanging the foundation but unless the tubes are neglected for an extended period of time they will not succeed in bridging over the metal shield. Where the shield is inserted in infested buildings and termites are trapped in the timbers above the metal plate they will drop down covered runways from the work above to establish contact with the soil. If these passages are not removed they will again serve as connecting links with the work in the wood and the colony in the soil, re-establishing the moisture supply for the termites above. It is seldom necessary to break these tubes more than once or twice. Where precautions stressed in Article 5, page 10, are not observed termites may build up from the ground beneath and re-establish themselves in the timbers or they may drop passageways down from the floor above to the ground beneath unless precautions are taken to excavate the area under the building and to obtain good ventilation which prevents the termites from making either of these contacts.

Chemical Barriers

Recently certain chemical barriers have been developed which appear to be satisfactory under Michigan conditions provided they are properly installed. Such barriers may be either toxic or repellent, and in either case they should be injected into the wood under from 300 to 400 pounds pressure. The important thing with chemical barriers is to obtain good penetration and to inject enough material to saturate the timbers, literally building a chemical wall around the structure and making it impossible for the termites to maintain their contact with the ground. Chemical barriers are comparatively new and it is impossible to say just how long they will remain effective, but it is evident they will furnish protection over a period of years. Several commercial preparations have proved satisfactory, particularly where the barriers have been placed by firms making a business of such treatment. It is practically impossible for the layman to apply these barriers properly, since special machinery and a quantity of high-grade chemicals are necessary to effect an efficient barrier.

To Eradicate Termites in the Soil

No satisfactory chemical treatment for the eradication of termites in the soil has been developed for use on lawns or in gardens. Under buildings a layer of crude coal tar creosote poured over the soil before the concrete is laid will form a fairly permanent barrier. The chemicals for placing chemical barriers used at the rate of 2½ gallons per square foot should also prove effective. Soil treated with borax (40 pounds per 100 gallons of water) applied at the rate of 10 gallons per 100 square feet will check termites so long as the ground is dry. Where water circulates through the soil, however, the borax will eventually leach out. A layer of powdered borax worked into dry soil is an effective barrier.

Dr. T. E. Snyder of the United States Department of Agriculture recommends the use of both orthodichlorobenzene and paradichlorobenzene for use as home-made barriers. The orthodichlorobenzene is applied by the trench method. Excavate a trench 30 inches deep (never lower than the footing of the foundation) and apply orthodichlorobenzene at the rate of one gallon per 10 linear feet. Replace the soil and repeat the treatment within 3 inches of the surface. The paradichlorobenzene is used as crystals at the rate of 5 pounds per linear feet.

Kerosene and coal tar creosote, three parts of the former to one of the latter, applied by the trench method (outlined in the preceding paragraph) at the rate of 1 gallon of this mixture per 10 linear feet has been recommended. The coal tar creosote fortifies the kerosene and makes it more effective. This mixture can be used only where there is no vegetation.

The kerosene and pyrethrum combination made by adding one-half pound of pyrethrum powder, flora grade, to each gallon of kerosene and allowing them to stand for 48 hours is a good killing agent but since it is not permanent in any sense the application must be repeated frequently. This mixture is likewise to be used in the absence of vegetation.

Where termites are attacking living trees, the injection of carbon disulphide will kill the insects trapped in the tree but will not prevent reinfestation.

For further information on termites it is suggested that the following text books be consulted:

"Termites and Termite Control," Kofoid, et al., University of California Press, Berkeley, Calif., and "Our Enemy the Termites," Snyder, Comstock Publishing Company, Ithaca, N. Y.

In addition to the two texts listed, there are numerous station bulletins on the subject of Termites and Termite Control. However, it must be borne in mind that practices which are effective in one section of the country may not always prove so satisfactory in another.

Work of Powder-post Beetles Often Confused with that of Termites

Fig. 11. Piece of wood split open to show inner part reduced to powder.

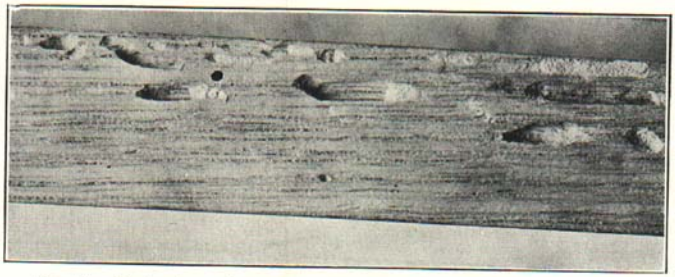

Fig. 12. Work of powder-post beetles in flooring cut to show tunnels, enlarged about 2 x.

Fig. 13. Powder-post beetle, **Lyctus planicollis,** enlarged 3 x. For work see Fig. 8.

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