

TERMITES IN BUILDINGS

Raimon Beard

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Foreword

The nuisance of flights of winged termites within houses and the damage done to structural wood by worker termites are sufficient to place these insects among the most serious economic pests of Connecticut.

Although a native insect, the termite appears to have become increasingly important since the early 1930's when observations were begun at this Station on termite attack behavior and methods of preventing damage.

The observations were reported in various publications especially in Station Bulletin 382, Circular 172, and Bulletin 695. Chiefly responsible for the information presented were W. T. Brigham, J. Peter Johnson, J. F. Townsend, Neely Turner and M. P. Zappe.

The earliest publications are out of print. This publication updates Bulletin 695 published in October, 1968. A more detailed account on current research on termite biology will be presented in another bulletin.

TERMITES IN BUILDINGS

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The only termite species established in Connecticut is the eastern subterranean termite (*Reticulitermes flavipes* (Kollar)). Other species, usually dry wood forms that nest in wood without access to soil, have been brought into the state from time to time in furniture or picture frames but there is no evidence that any of these has become established in Connecticut.

The eastern subterranean termite is native to North America, making its home in stumps and logs lying on the ground. It feeds on wood or wood products accessible to soil or other sources of moisture. As wooden structures were built on woodland sites, termites adapted to live in buildings and thus have become a major economic pest.

Although the station does not keep comprehensive records on the incidence of termites in buildings, infestations have been on the increase during the last 65 years. Despite a 1909 observation that termites were common in stumps, fence posts, and buildings, only three infested buildings were mentioned in Station reports prior to 1931. There were 34 infested buildings reported during 1932-1934, but over 200 reports of infestations now are received at the Experiment Station each year. Many more probably do not come to our attention because the homeowner ignores the infestation or he goes directly to a private exterminator.

Several factors may help explain the apparent increase in termite infestations. Because there are far more houses now and homeowners are more aware of termites and the damage they cause, more infestations are likely to come to the attention of the Experiment Station. Another reason could be that central heating permits year-round activity and favors rapid development of termite colonies in infested buildings.

Because more and more housing developments are being built in woodland areas where termite activity might be greater, termite infestations may be expected to be more numerous in these areas. However termite enemies are also more abundant so that infestations in woodland areas may be no more probable than in urban areas.

Few buildings are termite proof. Even steel and masonry buildings have been known to have annual flights of termites. These infestations probably result from discarded wood or tree roots being left around or under the building during construction.

Damage Caused by Termites

Considerable damage is often done before termites are discovered because the colony feeds, reproduces, and lives hidden beneath the surface of wood. Buildings are rarely so severely damaged as to be unsafe, but damage often requires structural repair. The value of the damaged wood is usually low but the expense of replacing it with sound wood is usually high.

Biology of Termites

Termites have castes or forms specialized for different activities of the colony. The fertilized female or queen lays the eggs. Workers, the most abundant members of the colony, are blind, white, and sexually undeveloped. They forage, build shelter tubes, and collect food and moisture which they distribute to dependent colony members. Workers may also be called larvae because they show no wing development. Some develop into nymphs—larger individuals with rudimentary eyes and wings. Nymphs can feed themselves but seem to be partially dependent in order to mature into winged males and females. A few members of the colony with large heads and jaws are called soldiers, although in this species they are ineffectual in defending the colony. Supplementary reproductives may also be present. These produce young termites at a faster rate than the original king and queen and so account for a more rapid build-up of the colony.

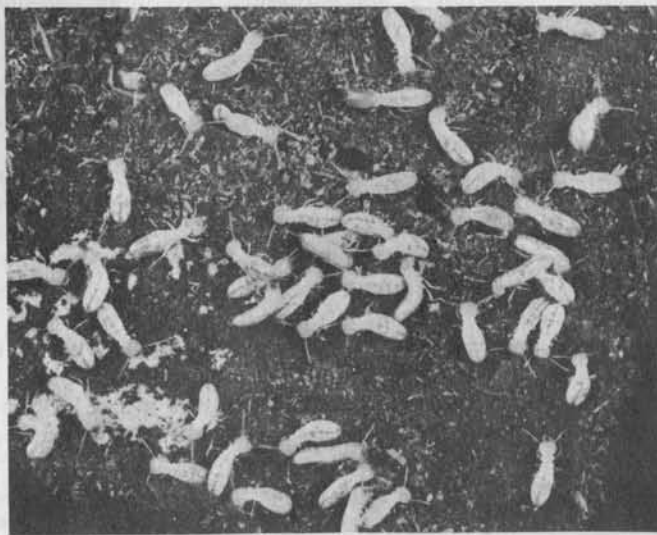


Figure 1. Termite workers and soldiers shown about one and one-half times life size.

A colony does not have a well-defined nest with recognizable permanent chambers and runways. Considerable movement occurs between soil and wood, but in Connecticut the soil is probably less important as a winter refuge than to supply moisture and through which foragers travel to new resources.

Primary termite colonies start in the spring. This is when swarms of flying, black forms with gauzy wings (cover photo) emerge from established colonies. These are the sexually mature adults that develop from nymphs. After a brief but aimless flight the wings are shed and the adults seek breeding sites. The adults soon die indoors and thus are of no significance other than to serve as an indication that the building is infested. If a pair finds a suitable site, egg laying begins promptly. A new colony develops slowly. After one year such a colony may number only 50 or 60 individuals. After the first year development is more rapid, especially after secondary reproductives appear.

New colonies may also form by fragmentation of an existing colony. A group of foraging workers may become isolated from the rest of the colony; in time a few will develop into reproductive forms. This method is doubtless more common than primary colony formation and can result in more rapid development.

Worker termites construct runways in all directions in search of resources. These runways are in the soil or are protected by shelter tubes above ground. The principal food of termites is the cellulose of wood or wood products, which is digested with the assistance of protozoa in the digestive tract. Termites prefer partially decayed wood and wood of lower density over wood of higher density. They may also attack dead roots of living trees. From time to time infestations have been found in living geraniums, strawberries, phlox, succulents, rhododendron, and in other plants with a large crown. Termites may also feed on paper, books and fabrics in infested buildings.

How Termites Enter Buildings

Termites may enter buildings (1) through wood in direct contact with the soil, (2) through cracks or hollows in masonry and concrete foundations, or (3) through covered shelter tubes which they build over the face of masonry foundations (Fig. 2).

Direct contact between wood and soil is by far the most common point of entry in Connecticut buildings. Sills in contact with the fill under concrete porches and terraces (Fig. 3); wooden supporting posts, partitions, and steps built in basements before concrete floors are poured; and wooden hatchways, steps, porches, and basement window frames offer such direct contact. In more than half of the infested modern dwellings in Connecticut, termites have entered through filled masonry porches and terraces.

Entry through cracks or holes in foundations or slab floors is not common although stone and masonry block foundations are more vulner-



Figure 2. Termites constructed this shelter tube from wood to the ground in a partly excavated area, formerly an exterior wall.

able than concrete. Channels around pipes or ducts through foundations or floors may provide access to wooden structures. Buried stumps or tree roots extending below a building may harbor termites that find their way inside.

Shelter tubes can bypass unfavorable sites and give the colony access to sources of wood or moisture. Some shelter tubes are exploratory, so if the termites find no resources, they abandon them.

Wood chips commonly used as mulch around foundation plantings are not "attractive" to termites in the sense that they draw termites from a distance. However, if termites find wood chips they may establish themselves just as they would if pieces of lumber or tree limbs were on the ground in the same location. It is very unlikely that a termite problem could originate from infested lumber or fireplace wood inside a building.

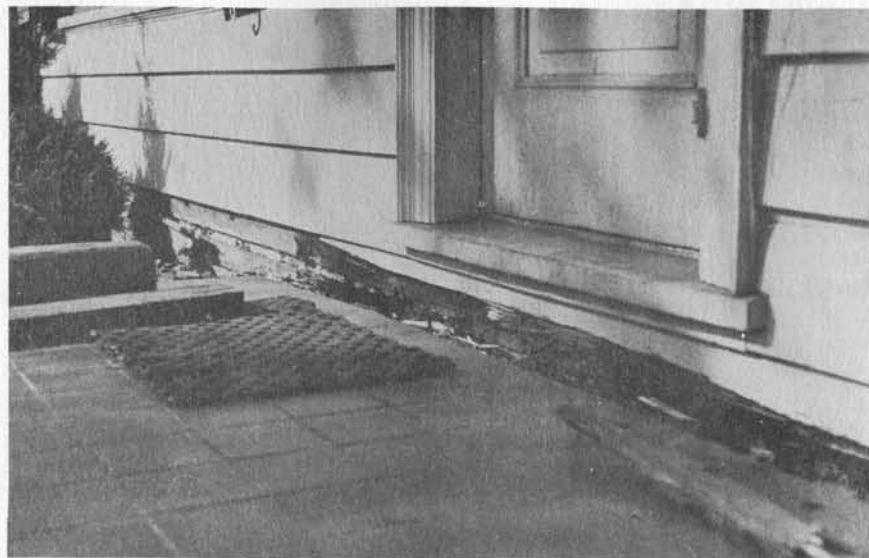


Figure 3. Direct contact between the sill and the earth fill under masonry porches or steps is an invitation to termite infestation. Part of the masonry floor has been removed to make repairs.

Finding Termites in Buildings

Swarms of winged termites may occur as early as January in heated houses, but are more common in February, March, and April. Swarms may occur indoors as late as July. Inside buildings, termites appear from cracks in the floor or woodwork. They emerge rapidly for several minutes, and then disperse. Out of doors, swarms usually occur between the middle of April and August first. If they occur in sufficient numbers to be a nuisance, winged adults may be killed easily with any household insecticide spray or aerosol.

Since winged ants are about the same size as termites and may also emerge in houses they may sometimes be confused with termites. Ants have narrowly constricted waists. Ants usually occur in small numbers; termites usually are more numerous. Ants fly freely, do not lose their wings quickly, and may be around for several days; termites are feeble fliers, shed their wings, and disappear within a short time.

The brown, earth-like shelter tubes (Fig. 2) are visible evidence of infestation. If a shelter tube is in use, the interior is moist and may have white workers inside. If a section is broken away, workers will repair it, but if a tube has been abandoned, it will be dry and crumble easily.

Without evidence of winged termites or shelter tubes, it is difficult to determine whether termites are present in a building. Examination of

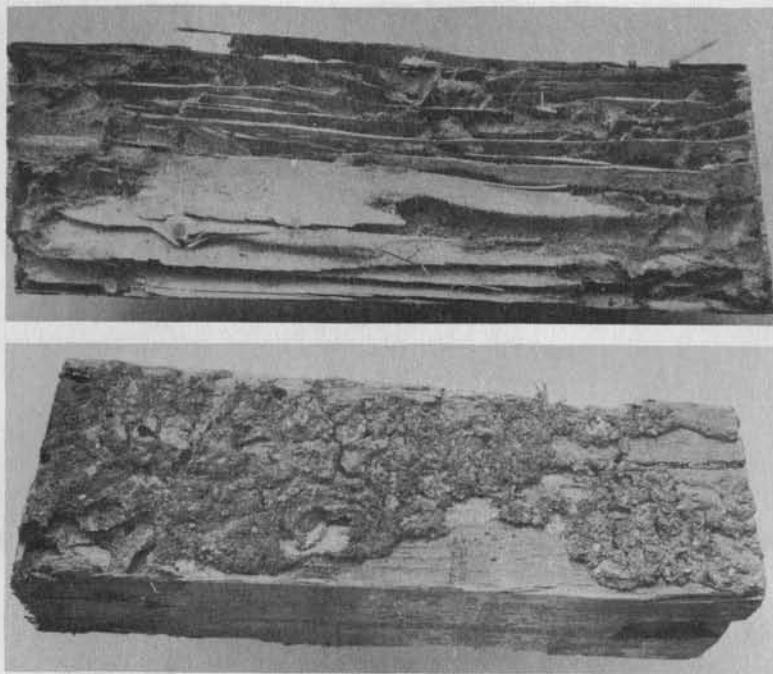


Figure 4. Lower photo shows external appearance of infested wood; top, a section of the same block opened to show termite burrows.

posts or other wood in the ground near the building may help. This can be done by punching the wood near the ground line with a screwdriver. If there is much of an infestation, the probe will open up some of the characteristic burrows (Fig. 4). The soft portions of the wood are eaten, leaving the hard sections. There may be accumulations of a sort of wood putty. There are also distinct spots of excrement. A similar examination can be made of wooden posts in the basement, and of the sill and and joists adjoining masonry porches.

Other Wood Damaging Organisms

Carpenter ants make nests by excavating wood softened by moisture or by rot and are often confused with termites. They discard the removed wood as a sort of sawdust, which accumulates in little piles below the infested wood. Their burrows will have no wood paste present, no spots of excrement, and usually contain legs and other hard portions of insects they use as food. These habits easily distinguish carpenter ants from termites. Powder post beetles which also eat wood leave pelleted deposits of excrement resembling wood flour in their burrows. When they

emerge from infested wood they do so through small round holes eaten through the surfaces. The powdered excrement sifts from these holes.

The old house borer (*Hylotrupes bajulus* L.) is very destructive in houses in northern Europe. The adult is a long-horned beetle, emerging late in the summer and laying eggs in cracks in lumber. The larvae feed for several years before maturing. The beetles probably cannot lay eggs in finished woodwork. However, those which come out within walls may find suitable sites for egg-laying. In some cases in Connecticut, the infested houses had been built only a year or two before the beetles were found. It is likely that infested lumber was used in construction of these houses.

The wharf borer (*Naccerdes melanura* L.) is another long-horned beetle occasionally found in buildings. It is usually found in wood that is wet for long periods of time. Since such wood will also rot, this pest is not considered serious.

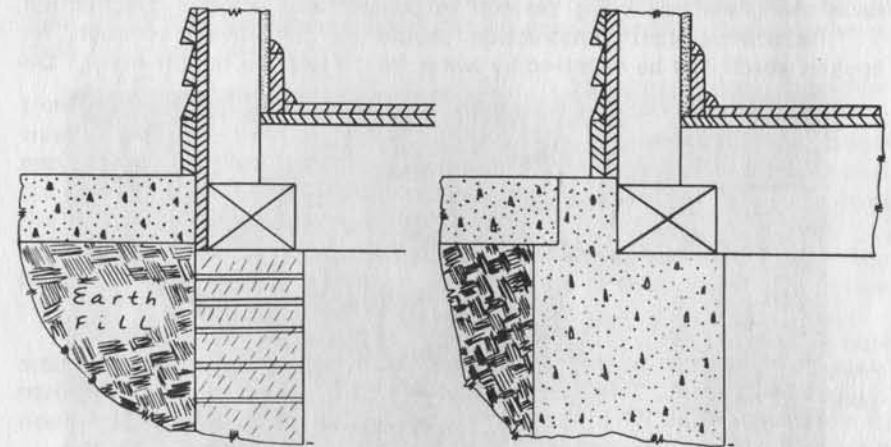


Figure 5. Cross-section of construction of masonry porch or terrace showing (1) easy access from fill (at left), and (2) construction with an extra thickness of foundation (at right).

Fungi also grow in wood, especially in damp surroundings. This causes the "dry-rot" so often found in buildings but despite this term, fungi cannot grow under dry conditions. Rotted wood may be checked on the surface, but unless it is also infested by insects, there are no burrows.

Prevention of Termite Damage

The easiest way to avoid termite damage is to take preventive measures when the building is under construction. Special care is needed in design and in construction of buildings near or below grade level so that

termites do not have an easy and convenient way to reach wood.

The most common means of termite entry in Connecticut has been through masonry porches and terraces. The simplest way to avoid this entry is to use an additional thickness of foundation which prevents contact between wood and fill (Fig. 5).

Another very common means of entry has been into wood extending through a concrete basement floor. This can be avoided by pouring the floor first, and then placing all wooden construction on it.

In houses built on concrete slabs, reinforcement of the foundation is required to prevent cracks, and there should be no joints underneath wooden partitions. Especially tight construction of floors and walls is required if the basement is to be finished with wood.

Care must be taken to avoid changes that allow termites to enter after a house is built. Wooden posts or trellises set in the ground and attached to the house furnish easy access to termites. Additional fill to raise the grade may bring the soil in contact with wooden construction.

Termite-resistant construction should be considered seriously for houses which will be supplied by water from a well on the premises. De-

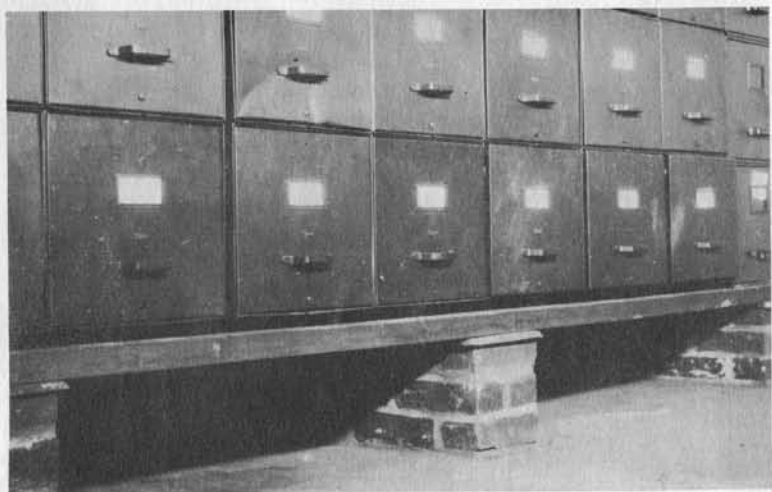


Figure 6. Records stored on a termite-proof rack in the basement of an infested building.

tails for such construction can be found in USDA Home and Garden Bulletin No. 64.

Susceptible materials, such as books, paper, clothing, and leather in infested buildings may be protected by storage on free-standing shelves, preferably metal, or even on wooden shelving constructed on short masonry piers (Fig. 6).

Preventive Chemical Treatment

Some termite control companies have developed systems of pretreating the soil under and around houses during construction. This allows thorough treatment in areas which are hard to reach after the building is completed. This is an excellent supplement to other precautions, especially if there is to be extensive wooden construction in the basement, or if the house is to be built on a concrete slab. This method must be used with care if the water supply of the building is from a well on the premises (See also Page 14).

Control of Termites in Buildings

Serious damage to the structure of infested buildings is more a matter of years than of weeks or months. For this reason, the decision as to how and when control measures need be taken can usually be reached deliberately. Even if there is evidence of structural weakness (as in older buildings) temporary support can be provided while plans are being made for repairs and control.

Changes in the structure to conform to termite-resistant specifications have usually prevented further damage. Such changes may be relatively expensive, thus many people prefer less expensive chemical treatment of soil. The insecticide is mixed in soil around and under potential points of entry to create a toxic barrier that separates the building from the surrounding soil.

Individual termites are very susceptible to many insecticides. The problem always has been reaching the termites. Several highly effective soil insecticides which persist for years are available (See Page 14).

These insecticides are usually applied in trenches dug on the outside of foundations, and through holes drilled in the floor of masonry porches or terraces and through basement floors (both along the foundation and along any infested partitions).

Houses on Concrete Slabs

The trench may be about 6 inches wide and not more than a foot deep. The diluted insecticide is applied at the rate of 1 gallon for each 5 linear feet of trench. The trench is filled and sprinkled with about 1 gallon for each 10 linear feet. For masonry porches, the same amount of material is poured through a series of holes drilled about a foot apart 6 inches outside the main slab. If termites are entering through expansion joints or cracks in the slab, a similar amount of material is applied through holes drilled along the line of the joint or crack.

Houses with Basements

The trenches may be 6 or 8 inches wide and should be at least a foot deep. A bar is used to make a series of holes about a foot apart and at

The first sentence on Page 14 which reads, "The insecticide is applied at the rate of 2 gallons for each linear foot of trench" should read, "The insecticide is applied at the rate of 2 gallons for 5 linear feet of trench."

least 2 feet deep at the bottom of the trench. The insecticide is applied at the rate of 2 gallons for each linear foot of trench. The trench is then filled and sprinkled with about 1 gallon of insecticide for each 10 linear feet. If the foundation has voids, holes can be made in the masonry joints and at least 1 gallon applied for each 5 linear feet of wall. Masonry porches, and, if necessary, basement floors, are treated as for slab houses.

Soil Insecticides

Soil insecticides are usually sold as emulsifiable concentrates for mixing with water. Those acceptable for termite control in Connecticut are chlordane, aldrin, and dieldrin.

Chlordane has been used as 1 percent solution which means 1 gallon of 45 percent concentrate added to 44 gallons of water.

Aldrin and dieldrin were formerly available to the general public for termite control. Formulations labelled for this purpose are now available only to pest control operators.

Since these insecticides are toxic to people, the concentrates should be handled only when wearing rubberized gloves and stored where children or pets cannot get at them. Directions for safe use printed on the label should be read and followed carefully.

The Federal Housing Administration has issued standards for wells. These standards require (1102-3.3) that the minimum distance between a well and chemically treated soil be 100 feet. This distance may be reduced to 50 feet "only where the ground surface is effectively separated from the water bearing formation by an extensive, continuous impervious strata of clay, hardpan, rock, etc."

The standards state further that "individual water supply systems are not acceptable in areas where chemical soil poisoning is practiced if the overburden between the ground surface and the water bearing formation is coarse-grained sand, gravel or creviced or channeled rock which will permit the recharge water to carry the toxicants into the zone of saturation (1102-3.5)".

Commercial Termite Control Companies

There are companies that specialize in termite control, and pest control operators (sometimes called exterminators) will also make termite treatments. All must pass examinations on safe use of pesticides to receive a license.

As in many other home maintenance projects a competent professional with proper equipment and a knowledge of the subject can often do a better job than an inexperienced homeowner.