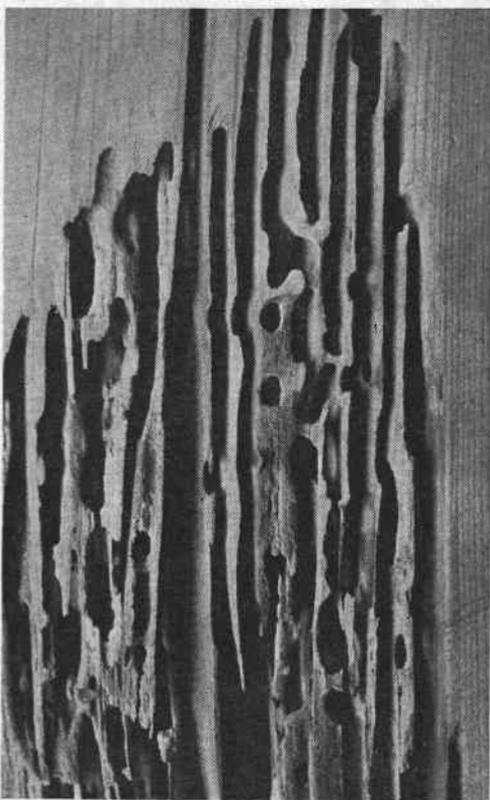


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Carpenter Ant Control in Oregon

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and

U. S. Department of Agriculture
Bureau of Entomology and Plant Quarantine
Forest Insect Investigations
Cooperating

Illustration on cover—

Wood damaged by carpenter ants.

Carpenter Ant Control in Oregon

By

R. L. FURNISS*

CARPENTER ants† are serious pests to dwellings in Oregon,‡ particularly in the region west of the Cascade Mountains. Records indicate that they are the most common wood-boring insects attacking houses in this region. These ants are seldom easy to control. Frequently they persist in the face of strenuous efforts to exterminate them, and in extreme cases they constitute so perplexing a problem that people have been known to move rather than continue to struggle against them. Fortunately such drastic action is unnecessary, for control is possible, provided suitable measures are chosen and carefully followed. Investigations conducted during the past several years have shown that no one measure is effective under all conditions. This circular outlines the principal control methods and indicates how and under what conditions each should be applied.

HOW TO RECOGNIZE CARPENTER ANTS

Many people are familiar with the large black ants that commonly mine in logs, stumps, and hollow trees in the fields and forests. These are the carpenter ants that become pests when they forsake their normal outdoor habitations for living quarters in houses. As they are social insects that mine in wood, they are frequently mistaken for the more widely publicized termites.§ Carpenter ants, however, are quite distinct from termites in both appearance (compare Figures 1 and 2) and habits.

Ants and termites are alike in having several different castes in each colony. The worker caste of each gives most trouble to human beings. Carpenter ant workers are long-legged, large, black ants that are very conspicuous because of their habit of running rapidly about outdoors on warm days from early in the spring until late in the fall. In contrast, termite workers are yellowish to grayish white, short-legged, rather slow-moving insects that spend their entire lives hidden from view, unless their galleries are broken open.

* United States Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine. This study was conducted in cooperation with the Oregon Agricultural Experiment Station Department of Entomology.

† Three species: *Camponotus herculeanus modoc* Wheeler, *C. laevigatus* (F. Smith), and *C. maculatus vicinus* Mayr, have been found infesting buildings in Oregon.

‡ Similar conditions exist in western Washington, where some of the control tests mentioned in this circular were conducted.

§ In Oregon the common damp-wood termite *Zootermopsis angusticollis* (Hagen) is by far the most abundant termite. It is the one principally referred to in this circular. The small damp-wood termite, *Z. nevadensis* (Hagen), and the western subterranean termite, *Reticulitermes hesperus* Banks, also occur in Oregon.

Winged carpenter ants are black or nearly so, wasp-waisted, and have front wings much larger than the hind ones. Migration of the winged ants to found new colonies takes place on warm days early in the spring. Winged termites are brown, thick-waisted, and have

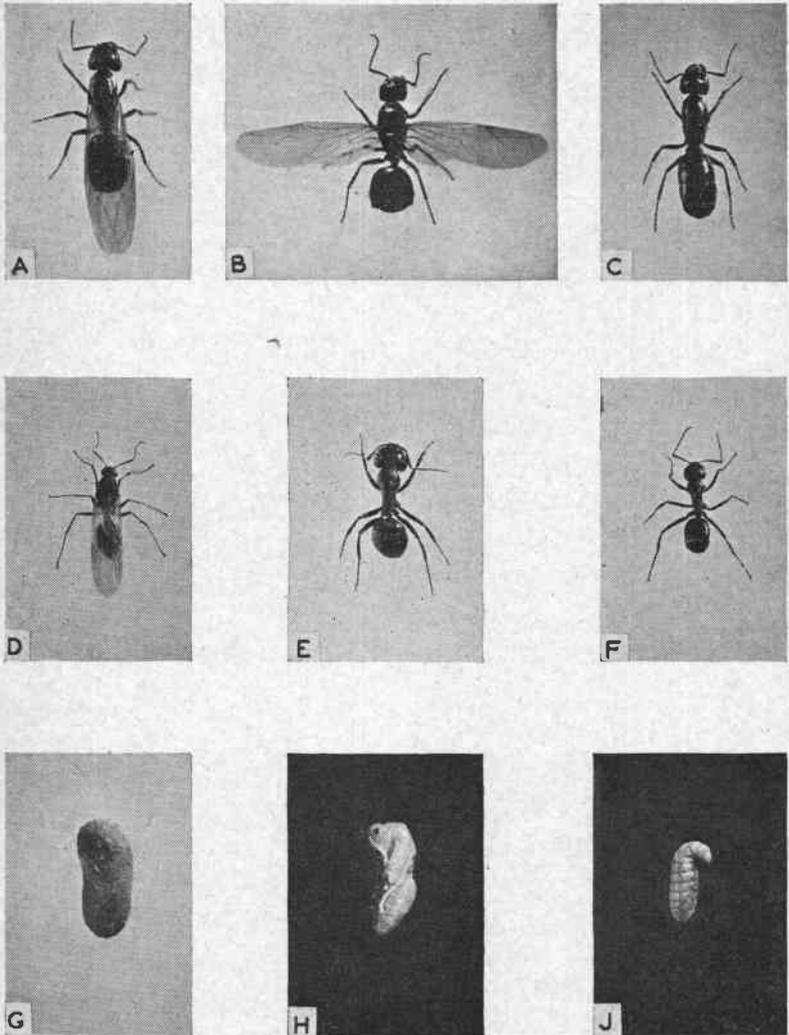


FIGURE 1. Forms and life stages of carpenter ants. ($1\frac{1}{2}$ times natural size.) *A*, Queen with wings folded as at rest; *B*, queen with wings spread as in flight; *C*, queen after having shed her wings; *D*, male with wings folded as at rest; *E*, major worker; *F*, minor worker; *G*, cocoon; *H*, pupa; *J*, immature larva.

wings of approximately equal size. Damp-wood termites, with which carpenter ants are most likely to be confused, migrate principally during warm humid evenings in the fall. When a carpenter ant colony is exposed the ants run excitedly about, many of them

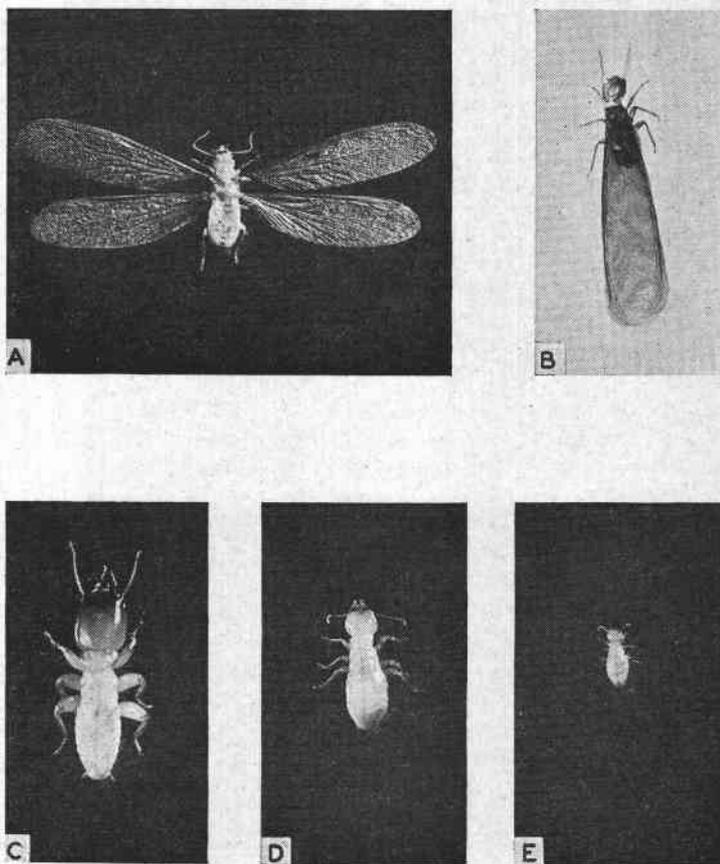


FIGURE 2. Forms of the damp-wood termite. ($1\frac{1}{2}$ times natural size.) *A*, Adult with wings spread as in flight; *B*, adult with wings folded as at rest; *C*, soldier; *D*, large nymph; *E*, small nymph.

carrying away helpless, small, white, grublike forms. These forms are the immature stages, sometimes mistakenly called "ant eggs," that ultimately develop into workers and winged adults. In a termite colony the young are fully able to move about by themselves and, except for size, look much like the workers.

Carpenter ants and termites differ radically in food habits. The ants feed on dead insects, the secretions of aphids and certain other insects, and many kinds of human food, whereas termites feed primarily on wood and other cellulose materials. Because of this fundamental difference the work of the two can be readily distinguished. Carpenter ants do not feed on wood, but bore into it only to provide living quarters for themselves. All their borings are removed in the form of "sawdust" from their galleries. Termites consume the wood through which they bore and do not expel "sawdust" from their galleries.

WHAT CARPENTER ANTS DO

Besides being destructive, carpenter ants in houses are a nuisance, crawling over things, getting into food, and swarming in the living quarters. Although there is no danger that they will actually destroy a house, they cause material damage by mining in building timbers. Where an infestation is of long standing and the colony is a large one, consisting of several thousand ants, structural damage is frequently extensive enough to require major repairs. If the infestation is noted at an early stage, however, all that may be necessary is to get rid of the ants.

Carpenter ant colonies become established in new situations either through invasion by a fertile queen and development of her progeny, or through immigration of all or part of an existing colony. The latter seems to be the more common way in which houses become infested. Evidence gathered over a period of several years shows that houses near wooded areas, "stump" land, or brush-covered vacant lots are most likely to become infested, although it is by no means uncommon for carpenter ants to invade dwellings in thickly populated districts of a city. Ants from any neighboring colony may move into a house, especially when seriously disturbed, as often happens in the clearing of building sites; in fact, cases are on record where disturbed carpenter ants became established in new houses before the home owners moved in. Usually they take the course of least resistance and enter any available openings about the foundations, but occasionally they exhibit considerable ingenuity in gaining access to a house, and have even been known to enter along telephone and electric wires. Often the point, or points, of entry are a considerable distance from the place where the brood galleries are excavated.

All kinds of houses, from the oldest to the newest and from the most poorly constructed to the best, may become infested. In general, the houses most subject to attack are frame buildings without

basements or with only part basements, those with very low foundations, those with open rambling porches, and those of loose construction, such as rustic cabins. The ants show some preference for moist rotting timbers about the foundations, but readily mine sound dry wood any place in a house. Among the commonly mined portions are porch pillars and supporting timbers, sills, girders, joists, studs, and casings. In many instances ants become established in

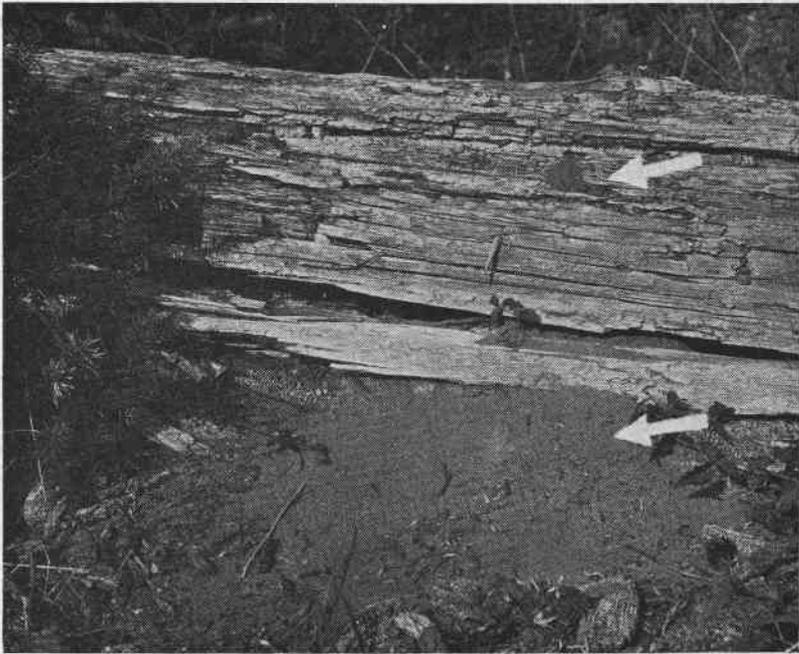


FIGURE 3. Carpenter ant-infested logs, such as this, are a potent source of infestation of houses. Note characteristic piles of "sawdust" indicated by arrows.

masses of fir needles and other refuse that they accumulate within walls, under floors, in attics, and in other undisturbed places. Usually in such instances little structural damage is done to the house.

In addition to damaging buildings, carpenter ants are destructive in several other ways. They occasionally mine telephone poles so extensively that the normal service period of the attacked poles is

appreciably reduced. A record of considerable damage to boxes containing stored dynamite indicates that similar damage may be done to fruit and vegetable crates kept from year to year in open storage. Much of the "wormy" cedar that must be discarded in post- and shingle-cutting operations is caused by carpenter ants mining the heartwood in the basal portion of living trees. Orchard and ornamental trees are similarly mined and weakened. Finally, by tending aphids for honeydew, the ants are suspected of fostering the increase of these pests on cultivated plants.

EVIDENCES OF INFESTATION

When a house becomes thoroughly infested there is little likelihood that the fact will be long unnoted by the human occupants. The continued presence of numerous workers, whether they are attracted to food or are merely running about the rooms, is strong though not conclusive evidence that a colony is established in the house. On warm days early in the spring many people first become aware of carpenter ants in their homes when swarms of large winged ants emerge from the walls and try to escape through the windows. The appearance of these winged forms is an almost certain sign of continued trouble, for the main part of the colony remains behind and continues to develop, unless controlled. A faint, rustling sound in walls, floors, and woodwork is another common clue to the presence of carpenter ants. Often the workers make slitlike openings through the surface of infested wood and through these openings expel their borings, which accumulate beneath in characteristic piles of fibrous "sawdust." Such refuse piles can be found most frequently in basements, in dark closets, under porches, and in similar out-of-the-way places. They are a sure sign that a colony is established and that structural damage of the type illustrated on the cover page of this circular is being done.

HOW TO PREVENT INFESTATION

It has already been pointed out that carpenter ants probably become established in houses in two ways—through entry by a fertile queen or through immigration of a colony from outdoors. Prevention of the former presents the greater difficulty. At some time during the flight season early in the spring, winged queens may be seen crawling over almost any house in western Oregon or Washington. Each of these queens is a potential source of infestation. Tight construction should minimize the danger of their gaining

access to a house, but it is doubtful whether they can be kept out entirely by this means.

Much more can be done to prevent infestation through immigration of an existing colony. Old logs, stumps, and waste wood in the vicinity of a house should be burned, for these materials frequently harbor carpenter ants. (See Figure 3.) The practice of leaving stumps in the ground under buildings is to be especially condemned. Such stumps are a probable source of trouble from both carpenter ant and termite infestation. Colonies in hollow trees within a radius of several hundred feet from a house should be destroyed. Upon delivery, fuel wood should be examined to determine whether any of it is infested with carpenter ants. All infested pieces should be immediately burned, or treated by one of the methods recommended in this circular.

The use of foundation timbers that have been pressure treated with creosote is sound building practice to guard against some of the damage caused by carpenter ants, termites, and rot. Since only the treated timbers are fully protected, however, this measure is generally least effective against the ants, because these insects commonly initiate attacks in the superstructure of a house. In fact, no structural methods should be relied on to prevent all infestation by carpenter ants. Nevertheless, a tightly constructed house with concrete foundations, good clearance, and, preferably, a full basement provides conditions least favorable for the establishment of the ants and most favorable for the application of control measures, should these become necessary.

HOW TO CONTROL CARPENTER ANTS

Where carpenter ants have become established in a house, control measures are usually necessary to get rid of them, for most colonies persist for many years and gradually become more destructive. Selection of the particular control measure that will give best results depends on the situation of the colony. For this reason, time will be well spent in observing the ants to determine their means of entrance to the house and the location of their main runways and brood galleries, before any attempt is made to apply control. When a suitable method has been chosen, close attention should be given to the details of application to make sure that all the ants are killed. The fact that workers are not seen for a time following treatment does not invariably denote success. A close check should be made, especially at night when the workers are most likely to be running about the house, to determine whether the ants have actually been exterminated or have merely moved to other quarters.

The following discussion of control methods is offered as a guide for treatment. It should be fully realized that control alone will not insure permanent results. Prevention of reinfestation is also necessary, for the most successful control will be ineffective if other ants are allowed to move in. The individual situation, therefore, should be considered with regard to the instructions in the preceding section on prevention. In many instances one or more outside sources of infestation that should be eliminated will be found.

Baits

Poisoned baits are a well-known and widely used means of reducing the numbers of various kinds of household ants that are attracted to food. Several baits have been recommended for control of carpenter ants. Some of these are attractive to the ants and kill many of them but seem to lose this attractiveness rapidly. So far, tests of representative baits have failed to reveal any that effectively control carpenter ant colonies in the Pacific Northwest; consequently, the use of baits for this purpose is not advised.

Contact insecticides and fumigants

A very effective method of control under certain conditions is to open a colony and kill the exposed ants with a contact insecticide applied with a hand sprayer. This method can be used when infested wood is fairly accessible or when a colony must be exposed in order that buildings may be repaired. Treatment should be immediate and thorough, so that none of the ants will escape and become established elsewhere. The following are among the familiar materials that can be used to kill carpenter ants by contact: Carbon tetrachloride, fly spray, kerosene, diesel oil, and turpentine. *Except for carbon tetrachloride, these materials are inflammable, and when they are used in buildings special care should be taken to prevent fire.* Where colonies in logs and stumps are to be destroyed by burning, diesel oil or a similar material can often be used to advantage, not so much to kill the ants by contact as to generate additional heat to aid with the burning process.

Numerous materials that act both as contact insecticides and as fumigants have been suggested for control of carpenter ants in houses. Materials of this type are injected directly into colonies, and, to be effective, must come either in contact with the ants or be confined in their galleries long enough to kill them by fumigating action. Usually colonies in houses are too scattered or too inaccessible to permit practical treatment by this method. Furthermore, the numerous openings in a house commonly allow a gas to dissipate too rapidly to effect complete control. Because of their general ineffec-

tiveness, none of the combination contact and fumigant insecticides are recommended for treatment of infested houses, although some, such as orthodichlorobenzene, may give control under special conditions.

Investigations conducted in New England by Friend and Carlson* showed that a mixture of equal parts of coal-tar creosote and gasoline was very effective in controlling carpenter ants in telephone poles. This mixture might be used to advantage in similar infestations where the limits of a colony are known, where the gas can be confined in the ant galleries, and where the odor and inflammability of the material are not objectionable.

Fumigation with hydrocyanic acid gas has been widely used against carpenter ants by control operators. Results are variable. In houses where colonies are localized in inner walls and under floors, control is often complete by this method. Where colonies are wholly or even partly in large timbers, porch pillars, and similar places where the gas will not penetrate, this type of fumigation, as ordinarily practiced, will not yield effective control. If used at all, *hydrocyanic acid gas should be applied by an experienced control operator who is equipped to handle this deadly material.* In most cases it will be necessary to employ supplementary measures to eliminate the ants completely.

Dusts

The grooming habit of ants makes it possible to control them with dusts that act as stomach poisons. A dust of this kind should be applied directly to as many ants as possible and also to places where numerous others will walk through it. Eventually the poison will be taken internally by the ants, for they frequently groom themselves and one another with their mouth parts. Those that get the dust on their bodies act as carriers to others in the colony. The two most promising materials for such use are sodium fluoride and derris or cube.

Sodium fluoride is generally effective. It can be applied readily with a garden-type hand duster. The best procedure is to apply a liberal quantity of dust directly into the ant chambers. This usually can be accomplished by forcing the dust through holes bored into infested timbers. Where this is impracticable, dusting the principal runways in the house and about the foundations often gives good results. Dusting within walls and under floors where the ants are active is strongly recommended. Several applications may be necessary, especially where the survivors of a treatment move to another

* Friend, R. B., and Carlson, A. B., 1937. The control of carpenter ants in telephone poles. Connecticut Agricultural Experiment Station Bulletin 403, pp[913]-929, illus.

part of the house. It is essential that the dust be kept dry so that it will adhere to the ants. A pound or two per application is sufficient to treat a medium-sized colony. It should be kept in mind that sodium fluoride is a slow-acting poison that does not kill by contact. For this reason, dust-covered ants may be seen running actively about a day or more after treatment. Sodium fluoride is toxic to both plant and animal life. It causes severe foliage burn to plants and may be fatal to man and animals when taken internally in sizeable quantities. *Special care should be used both in the manner of application and in the method of storage to prevent accidental consumption of sodium fluoride by human beings and pets.*

A derris or cube dust containing 4 per cent of rotenone, first suggested by Downes* for use against carpenter ants, is at least equally as effective as sodium fluoride for this purpose. Evidence indicates that dust of a lower rotenone content also will give satisfactory control, but how low a concentration will be effective has not been definitely established. Rotenone is a contact insecticide that has the advantage of being nontoxic to man, animals, and plants. Carpenter ants dusted with this material become partly paralyzed within a few minutes and succumb within an hour or so. Application is by the same method as with sodium fluoride, but when using rotenone it is even more important to introduce at least some of the dust into inhabited galleries. Rotenone rapidly loses its insecticidal value upon exposure to light and heat, either in storage or following application; therefore, special care should be taken to insure that the material used is fresh and that conditions are favorable for control of the ants. In especially difficult situations one or more re-treatments may be necessary.

Control of carpenter ants established in living trees presents a problem in that the material used must kill the ants but not injure the trees. Both sodium fluoride and derris have been used successfully against colonies in ornamental trees without detrimental effects on the trees. For this particular purpose, application should be made during the summer months when the infested wood is relatively dry, when the ants are active, and when action of the insecticide is most rapid.

Special notice

At present rotenone-containing dusts are not available for control of such insects as carpenter ants, because the limited supplies are being conserved by federal regulations for military needs and for use against pests of certain agricultural crops and farm animals.

* Downes, W. 1939. Derris for ants and wasps. *Journal of Economic Entomology*. 32 (6) : 883-884.

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