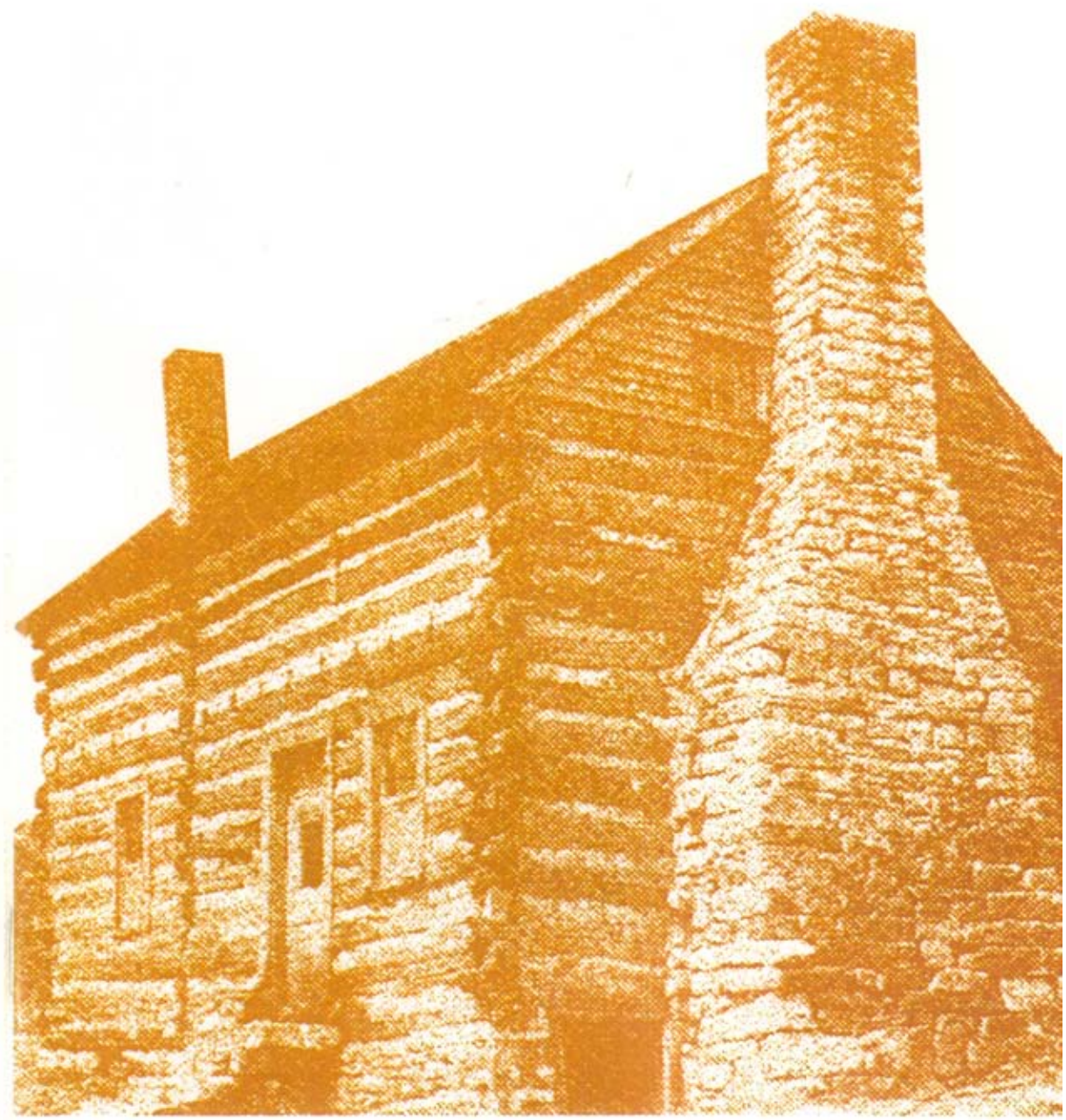
Wood Decay in Houses

How To Prevent and Control It



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Wood Decay in Houses: How To Prevent and Control It

Seasoned, properly used wood is a dependable building material. In properly designed houses that are well built and well maintained, decay causes little damage. Most damage can be avoided. Prevention is cheap; cure is sometimes costly.

Cause of Damage

Wood decay is caused by minute plants called fungi. These plants consist of microscopic threads that are visible to the naked eye only when many of them occur together (fig. 1). But it is easy to see the fruiting bodies of fungi, from which their spores are distributed (fig. 2). Some fungi merely discolor wood, but decay fungi destroy the fiber. Decayed wood is often dry in the final stages, but not while the decay is taking place, because fungi cannot work in dry wood. That is why there is no such thing as "dry rot," and why decay is a minor problem in the driest parts of the country.

Figure 1 – *A decay fungus and its effect on wood. Fungi consist mainly of tiny threads that grow within the wood and can be seen there only with a microscope. In very moist air they may develop on the surface in sufficient quantity to be visible. The upper part of this piece of wood is softened and weakened, and the lower edge is cracked and nearly disintegrated. Decay fungi make no definite galleries like those cut by termites.*

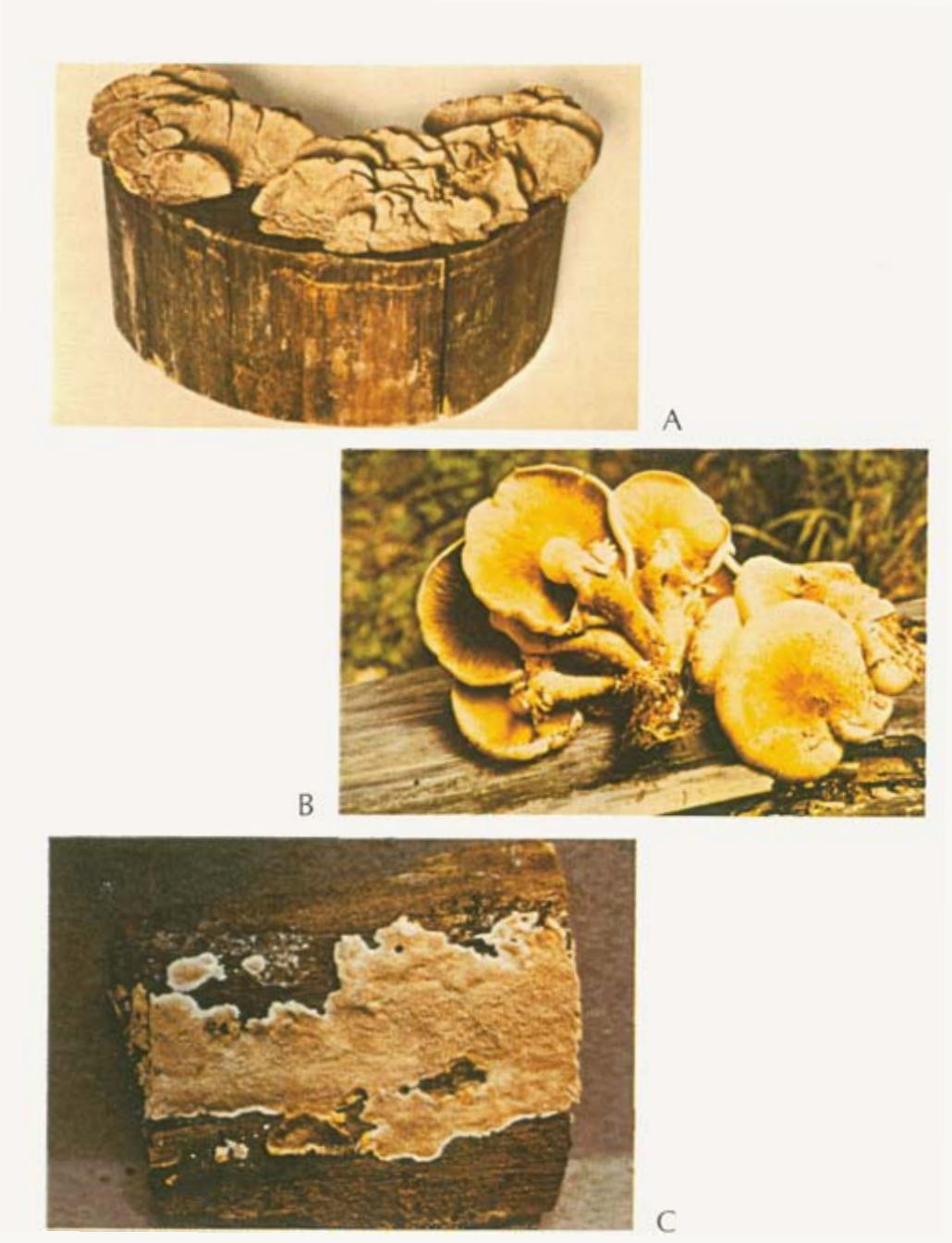

Figure 2 – *Fruiting bodies of different types of wood-rotting fungi. A. One of the bracket-form pore fungi. B. Upper and lower surfaces of a gill fungus. C. A resupinate, crustlike member of the pore fungi. The microscopic spores that serve to spread these fungi to new locations are produced on the gills or pore surfaces on the undersides of the fruiting bodies.*

Two species of fungi spread from moist soil or wood into dry wood by conducting water to wood through vinelike structures. Occasionally they cause great damage to buildings, but fortunately most fungi cannot conduct moisture in this way.

Fungi and termites may sometimes work in the same wood. Decay fungi soften the wood and, in the final stages, make it spongy or cause it to shrink or crack and crumble (fig. 1). None of the fungi produces the continuous, clear-cut tunnels or galleries characteristic of termite infestation. Methods of controlling soil-nesting termites are given in Home and Garden Bulletin No. 64, *Subterranean Termites: Their Prevention and Control in Buildings (Revised October 1983).*

Serious decay damage is most often due to one or more of the following errors in construction or maintenance:

1. Undrained soil and insufficient ventilation under basementless houses.
2. Wood such as grade stakes, concrete forms, or stumps left on or in soil under houses.
3. Wood parts of the house in direct contact with the soil, especially at dirt-filled porches.
4. Wood parts embedded in masonry near the ground.
5. Use of unseasoned and infected lumber.
6. Sheathing paper that is not sufficiently permeable to moisture vapor.
7. Inadequate flashing at windows, doors, and roof edges.
8. Poor joinery around windows and doors and at corners, and inadequate paint maintenance.
9. Lack of rain gutters and roofs without overhang.
10. Unventilated attics.
11. Roof leaks; leaks around shower-bathtub combinations, kitchen fixtures, and laundry rooms.
12. Failure to use preservatively treated or naturally durable wood where moisture cannot be controlled.

General Safeguards

To prevent decay, keep decay fungi from entering the lower part of the structure. Use dry wood as far as practicable, and build in a way that will keep wood dry most of the time. Spores or "seeds" of decay fungi are always present in the air; they can't be kept away from wood. But fungi can grow in wood only when it contains more than 20 percent moisture. Air-dry wood is regularly below this danger point.

Use of Dry lumber

Use only seasoned and sound lumber. Compared with green lumber, it has better nail-holding capacity, shrinks and warps less, and is safer from decay. During construction, store lumber off the ground and protect it from rain.

If only green material can be obtained, it should be open-piled on the job and allowed to dry as much as possible before it is used. The piles should be supported off the ground, the layers separated from each other by narrow strips of l-inch dry lumber. Space the boards in each layer to let air move around them on all sides. If the piles cannot be put under cover, slope them toward one end. Overlap the boards in the top layer and extend them out at the front and back to keep rain off the boards beneath. Green lumber requires 60 days or more for thorough seasoning. But even a shorter period will do much to decrease the chance of decay.

Particularly avoid infected lumber that is wet. It is especially dangerous where the lumber is so enclosed that it cannot dry. Wood infested heavily by stain fungi should also be avoided, since it often contains decay fungi as well.

Protection Against Rain

Roofs with considerable overhang, both at eaves and gable ends, give more protection to the rest of the house than those with narrow overhang. In fact, a good roof overhang can do much to offset decay hazards in siding and around windows and doors. As a rule, an overhang of 12 inches is desirable for a l-story house. In regions with heavy snow, flash the lower courses of shingles to keep melting snow from working into the walls. Gutters and downspouts are particularly desirable for houses without overhanging eaves. Flash horizontal wood surfaces or projections, including windows and doors, with a noncorroding metal.

In general, architectural frills or novel forms of construction should be studied carefully to determine whether they will provide entrance points or pockets in which moisture will remain long enough to let decay get started. Lumber takes water most readily through exposed ends, as in joints.

Naturally Decay-Resistant Wood

The sapwood of all species of trees is susceptible to decay. Heartwood of most species, usually recognizable by its redder or darker color, is more durable. In Douglas-fir, southern pine, and white oak the heartwood is classed as moderately resistant. In tidewater red cypress, most cedars, and in redwood, it is highly resistant to decay and can even be used in contact with soil and semipermanent construction if there is no sapwood attached. However, even these woods do not have the decay resistance of wood fully impregnated with an effective preservative. The highly durable hardwoods, such as black walnut, catalpa, Osage-orange, and the better varieties of black locust, are too hard or too scarce for general use in construction. Heartwood of resistant species is increasingly difficult to obtain and cannot be the principal reliance for safety in most house construction. Where preservative-treated lumber is not available for use, it is good practice to pick out the pieces containing only heartwood for use in sills, porches, outside steps, and the lowest siding boards.

Paint and Preservatives

Paint is not a preservative. However, it helps to prevent decay by protecting wood from intermittent wetting, especially if applied to ends and edges as well as to exposed faces and so maintained as to allow the fewest possible cracks at joints. When applied to wood that is not seasoned, it may favor decay by hindering further drying. Painting is not a substitute for good construction and maintenance. In warm moist climates or in rooms with very moist air, molds may develop on the paint or on dirt or small insects that adhere to it, and make it unsightly. Paints having low oil content and much zinc oxide are safest in this respect. On the gulf coast, where mildew is most common, fungicides to protect paint can be obtained from paint stores, with instructions for use. Many of the fungicides are poisonous, and should be used with caution. Observe the instructions on container labels.

To prevent decay, use treated wood for any members that are not likely to be properly protected against excessive moisture, unless heartwood of a highly resistant species is available. Sills or plates, sleepers, joists, beams, and girders in or on concrete, and exposed porches and steps are the members for which thorough preservative treatment can be most easily justified.

To be fully protected, wood must be deeply impregnated with the preservative. This can be done best by treatment under pressure, using, when necessary, preservatives that permit painting. Less efficient but often adequate treatment can be given by so-called vacuum treatment or by heating wood and then soaking it in a cold preservative; for thin or short pieces, cold soaking is sufficient. Wood that is cut and fitted after treatment should be given a soaking or heavy brush treatment of the cut surfaces.

Wood can be given some protection from decay by more superficial treatments with preservatives, although chemicals added by dipping penetrate the wood of most species surprisingly little. Such treatment, while it is not dependable for wood exposed to severe conditions, can considerably increase the service life of wood that will be exposed to rain but not be in contact with the ground. Including water-repellent materials in the preservative formula makes the treatment more effective, particularly if the wood is to be left unpainted. Painting the wood with a latex paint after treatments of this type increases their effectiveness, especially if water repellents are not added.

it is even possible in some situations to give a somewhat effective treatment to uninfected wood already in place in a building, especially at joints and column ends. Repeated brushing with water-repellent preservatives into joint areas can be helpful. Also, certain greaselike preservatives are being sold for this purpose. However, there are difficulties with these types of treatment. The parts of a building most likely to decay are not always easily reached, or if covered with a good paint coat will not take treatment. Moreover, a surface thoroughly treated with a solution or grease containing one of the heavier oils may not take paint for some months. It is much easier and better to treat the wood before it goes into construction; but treated or untreated, it should still be guarded against excessive moisture.

How To Safeguard Woodwork Close To The Ground

The older type of house built well above the ground is the safest, but most people prefer the modern low type of house. This, together with the unavoidable use of sapwood from second-growth timber, has operated to increase the decay hazard. Sills, joists, floors, and lower walls may suffer heavily from decay fungi that come up from the soil. Their decay may also be hastened by moisture that comes from the soil as vapor and condenses on the cold sills or the outer ends of the joists when the outdoor temperature is low (fig. 3). The following precautions are advised.

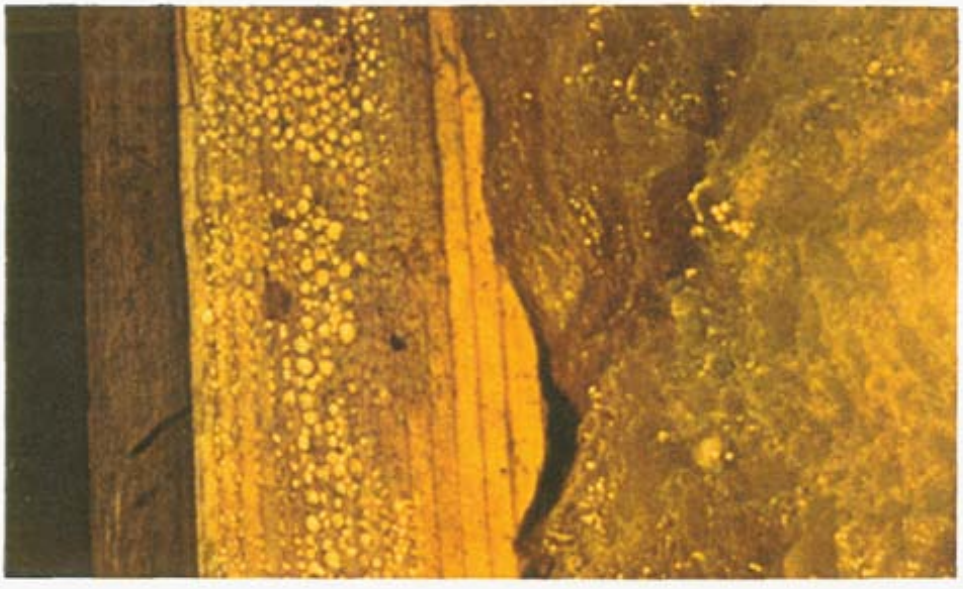

Figure 3—*Moisture condensation on joists and insulation of a basementless house on a moist site. This occurs in cold weather and would in the end lead to decay. It can be avoided by ventilation or, at low cost, by covering the soil below with roll roofing.*

Drainage

Moist building sites should be well drained. The soil surface should slope away from the house, and downspouts should discharge into approved drains or into masonry gutters or splash blocks that lead the water several feet away fromt he house. Dense shrubbery or vines planted too close to the house can interfere with drainage and air movement and thus promote fungus growth.

Contact of Wood With Soil

Allow no wood to be in contact with the soil unless the wood is thoroughly impregnated with a suitable preservative. For the greatest safety to permanent buildings, there should be no wood-soil contact of any kind. Remove all wood forms, grading stakes, and spreader sticks from concrete work under houses, porches, or steps. Keep wood skirting off the soil by putting a low concrete base under it; do the same with lattice, or suspend it above the soil with a clearance of at least 2 inches. This also applies to wood housings around plumbing and water pipes underneath houses. Mineral insulation is preferable to wood housing around pipes cold enough to "sweat."

Good building practice requires that foundation walls supporting wood frame construction should extend at least 8 inches above the finish grade, with at least 6 inches of the exterior wall exposed. This means that the bottom of sills or sleepers would be at least 8 inches above finish grade. The minimum interior clearance between the ground and bottom of joists should be 18 inches; for girders, 12 inches.

Dirt fills under concrete or masonry porch floors frequently provide points of entry for decay fungi (fig. 4). If the dirt under the porch

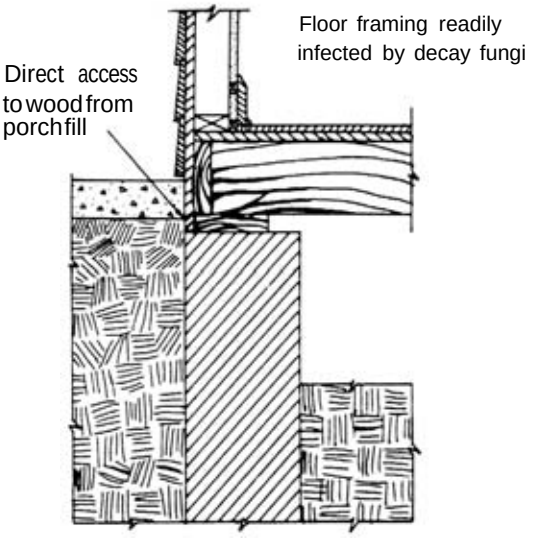

Figure 4 – *A badly constructed porch with din fill. The most destructive of the decay fungi are likely to enter the house from soil contacts of the kind shown here.*

comes up to the level of the sills or joists of the house, these can be protected from contact with the soil by noncorrosive metal flashing or by building the porch as an independent unit separated from the house at all points by an air space 2 or 3 inches in width and covered at the top. A safe and perhaps easier method is to abandon the use of the dangerous dirt fill and pour a reinforced concrete porch slab. If this is done, a sufficient opening must be left to allow removal of wood forms and to serve as a permanent access for inspection. Where this is impracticable, sheet-metal forms are suggested.

Contact of Wood With Concrete or Masonry

Embedding wood in concrete near the soil is an invitation to decay. This is especially true of stakes left projecting through the concrete. For slab-on-ground construction, impregnate plates, sleepers, and any other wood in contact with the slab with a preservative or use naturally durable wood. Either treated or naturally durable wood also is desirable for frames and doors of access openings in foundation walls.

Protect wood posts resting on concrete floors from floor moisture by placing them on raised concrete bases (fig. 5) or by using treated or naturally durable wood.

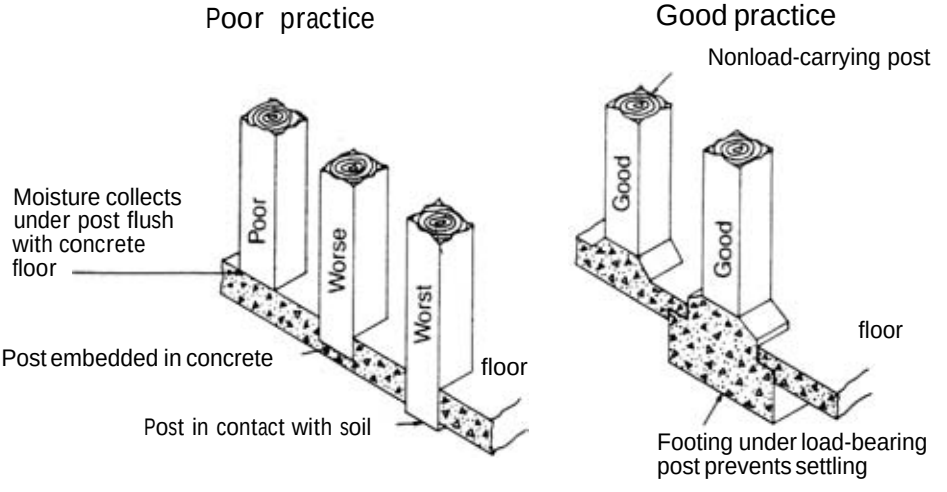

Figure 5 – *Wood posts on concrete basement floors.*

If a wood floor is laid on a concrete slab, there should be a dampproof membrane either under, in the upper part of, or on the slab (fig. 6). Even with such protection it is safest if sleepers and plates, and the subfloor if it touches the concrete, are impregnated with a water-borne preservative. Linoleum or other vapor-barrier coverings on wood floors increase the chance of trouble where moisture may rise through the slab from the ground beneath. Vapor barriers are beneficial if placed where they will keep moisture from getting into the wood, but can be harmful if they keep moisture from getting out.

Around houses with wood floors and masonry walls the outside soil grade should be kept below the level of the joists unless the wall is thoroughly moistureproofed. Joists or girders framed into masonry should have a 1/2-inch air space on each side and at the ends, or the ends should be dampproofed.

Ventilation

Under houses without cemented basements, the soil supplies moisture vapor to the air. In winter this may condense on the cold sills and joist ends, just as the moisture of the air condenses on a glass of ice water. This "sweating" (fig. 3), if continued, wets the wood to

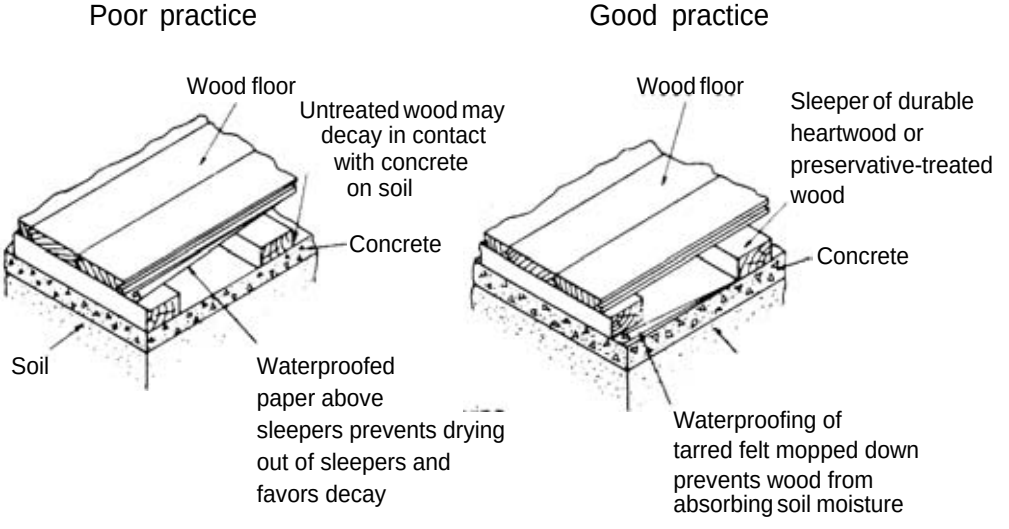

Figure 6 – *Wood floors on concrete slabs. Waterproofing membranes may be placed in, under, or on top of the slab.*

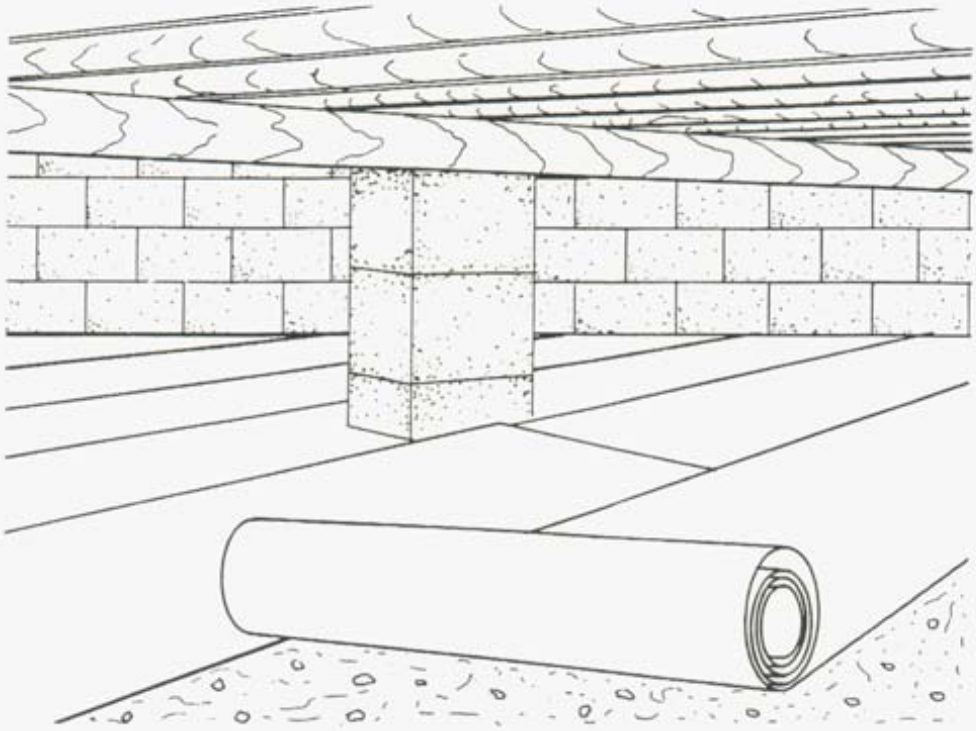

Figure 7 – *Roll* roofing used to cover the soil under a house. Such a cover keeps the soil moisture from vaporizing into the air and then condensing on the sills and joists. Where roll roofing is used, the crawl-space ventilators, or most of them, can be safely closed during the winter.

the point where decay fungi can attack it. To avoid this, and also to make inspections possible, leave a crawl space under the house with at least 18-inch clearance under the joists.

There are two ways to prevent condensation. One way is to provide cross ventilation for all parts of the crawl space by openings in the foundations or skirting on opposite sides of the buildings, best near the corners. For most houses, the formula of 1 square foot for each 25 linear feet of wall is sufficient. If the vents have grills in them, count only the area of the actual openings. If the vents have louvers, they should be twice as large, or if both louvers and 16-mesh screen, 3 times as large as the formula calls for. Insect screen commonly becomes clogged with paint, dirt, and cobwebs; it is better to use 1/4-inch mesh, which keeps out rodents. Keep vents open in winter,

with such insulation of pipes and floors as may be needed for protection from cold. It is only on the more moist sites that so much ventilation is needed for occupied houses. When houses are not occupied and not heated during the winter, condensation may occur on all floor members instead of being limited to those near the outside.

The second way to prevent condensation is to place a vapor-resistant cover over the ground in the crawl space. This stops at its source the moisture vapor that causes the sweating, and makes it possible to use smaller vents or to close most or all of the vents during the cold weather without bringing on decay. Smooth-surfaced roll roofing weighing 55 pounds or more per roll of 108 square feet has been used successfully under many houses. Roll out the roofing with a 2-inch lap at the edges; no cementing is needed (fig. 7). Other vapor barrier materials, such as 6-mil polyethylene, may be used in this way, but the brief experience with many of them to date precludes any recommendation concerning their use.

Soil cover under basementless houses also decreases the likelihood of moisture condensation in winter in attics and possible subsequent decay. For recommended ventilation in attics, see the section on roofs.

Where the water supply enters the house at a temperature as low as 50°F., there may be enough condensation of moisture on concealed pipes in walls and floors to favor decay. In houses with such a supply system, insulate the coldwater pipes before they are enclosed. Ventilation cannot fill the need in such cases.

How To Safeguard Parts of Houses Exposed To Rain

Porches and Steps

As previously stated, overhanging roofs and flashing help to protect woodwork. Some decay is to be expected in porch steps, floors, railings, or pillars exposed to rain. This, however, can be much delayed. Provide abundant ventilation under porches. Base the lower ends of stair carriages or stringers on bricks, stone, or concrete, well above the ground level.

Design the construction, wherever possible, to shed rainwater. For example: Build railings so that the handrail extends over the top of the posts or balusters and keeps them from taking rainwater through the ends; make porch floors slope toward the outside; see that frames for screens have openings through the bottom of the frame to let rainwater escape.

Chemical preservative treatment against decay is especially likely to repay its cost for porches, outside steps, and railings made of wood of low natural durability. There are commercial impregnation treatments available for wood to be painted. When a more thorough treatment is not practicable, immerse the lumber in one of the water-repellent preservatives that does not interfere with painting later (fig. 8). Keep the wood in the preservative at least 3 minutes and prefer-

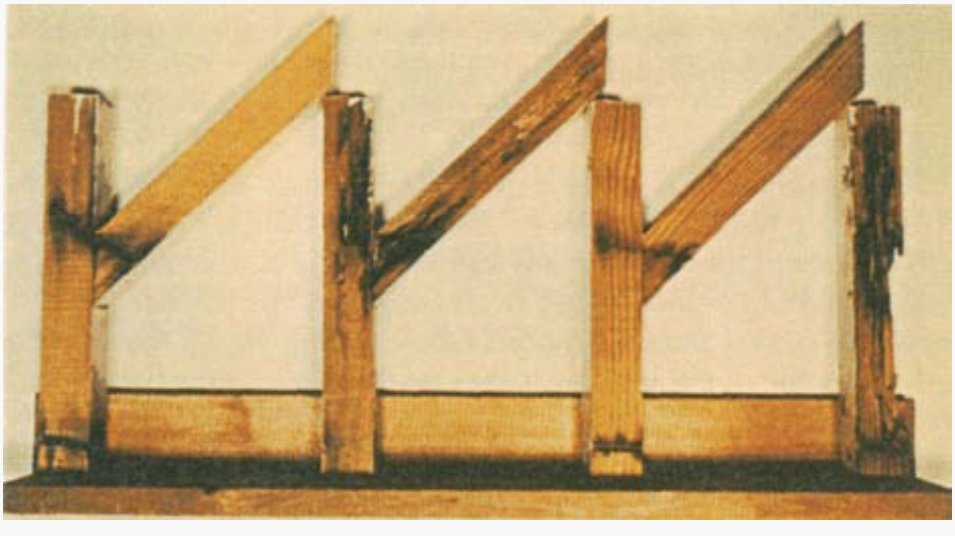

Figure 8 – *Western hemlock (left pair) and southern yellow pine (**right** pair) postrail joints cut open after 7 years' outdoor exposure in Mississippi. Decay is evident in the second and fourth (from the left) test joints. The first and third test joints were treated for 3 minutes in a solution of 5 percent pentachlorophenol in mineral spirits.*

ably 10 to 15 minutes or longer. Before painting, allow the treated wood to dry long enough for the solvent to evaporate.

The preservative treatment will have considerable value, provided the wood is dry at the time of treatment and is not put in direct contact with the ground. Where the entire length cannot be immersed, the ends may be dipped and the sides liberally brushed. Always treat the lumber after it is cut and fitted but before it is put in place, so that all ends have the protection. Solutions of pentachlorophenol, 5 percent, containing a water repellent, and of copper naphthenate containing 2 percent of metallic copper, are among the preservatives that have given good results in dipping tests for service above ground. If the wood is to be painted, mineral spirits or naphtha are good solvents. For wood to be left unpainted, use a heavier solvent such as diesel or No. 2 fuel oil. Many of the compounds used are poisonous; some are flammable. Exercise caution in using them, and observe all warnings given on the container label.

If no preservative is used, apply oil base paint to the ends and edges of floor boards before they are put in place, to hinder the absorption of water at the joint. Paint the upper surfaces and ends and edges of floor boards and stair treads, but not the lower surfaces. Protect bases of porch pillars against moisture by using a thick coating of asphalt or water-repellent paint on the lower surface; a preservative treatment beforehand is also desirable.

Windows and Doors

Window sash may discolor or decay, especially in the colder climates where water condenses on the inside of the glass in winter and runs down into the wood. Storm sash is effective in decreasing such condensation. To hinder moisture absorption by the wood, sash should be primed and back-puttied before glazing (fig. 9). Much of the sash and some of the window frames on the market have been dip-treated with a water-repellent preservative which increases their resistance to fungi. The lower ends of window and door screens, if not treated by the manufacturer, can profitably be soaked for a few minutes in a similar solution prior to painting to get the preservative into the joints. Any surfaces newly exposed when fitting should be given one or two heavy brush coats of the water-repellent preservative.

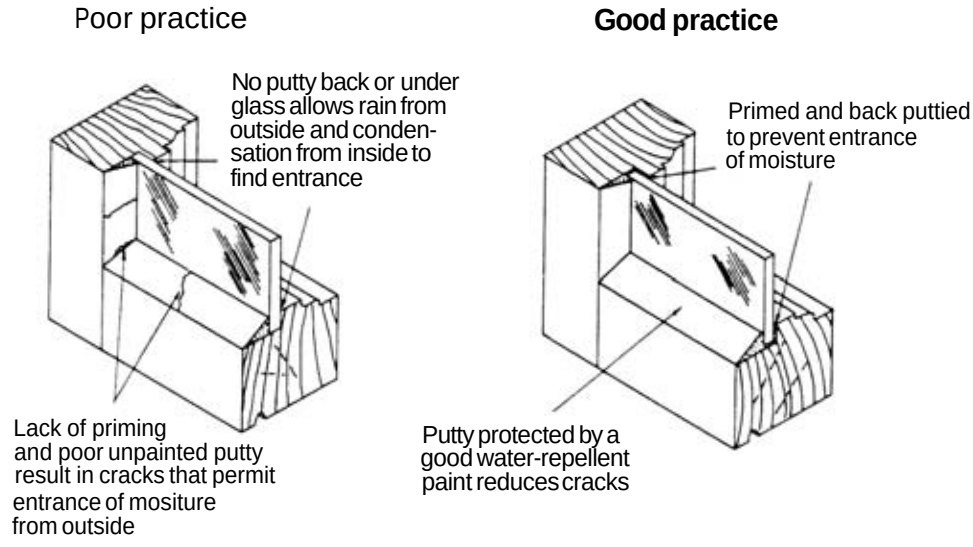

Figure 9 – Poor and good practices with window glass.

Garage doors should be built to shed water. Rails, braces, or moldings are best placed on the inner face of the door. If on the outside, they trap water between them and the vertical members. The use of treated doors or the application of preservative to all contact surfaces in joints, as suggested for porches and steps, is desirable here also. Doorframes should not extend into the concrete. Recommended construction is shown in figure 10. Any glass in the door should be set in putty, and the wood cleats bedded in putty (fig. 10). The overhead or lateral-sliding type of door is less exposed to conditions favoring decay than the outward-swinging type.

Walls

Roofs without overhang or gutters let too much rainwater run over the siding. Leaks in cornices, gutters, or downspouts can lead to decay in the walls below them. In well-maintained houses, however, frame walls well above the soil line suffer from decay only when there is some unusual conbination of the factors that permits accumulation of water in the siding or the interior of the wall. Common sources of excessive moisture are green lumber, wet plaster, condensation in the wall of water vapor from the interior of the house during cold

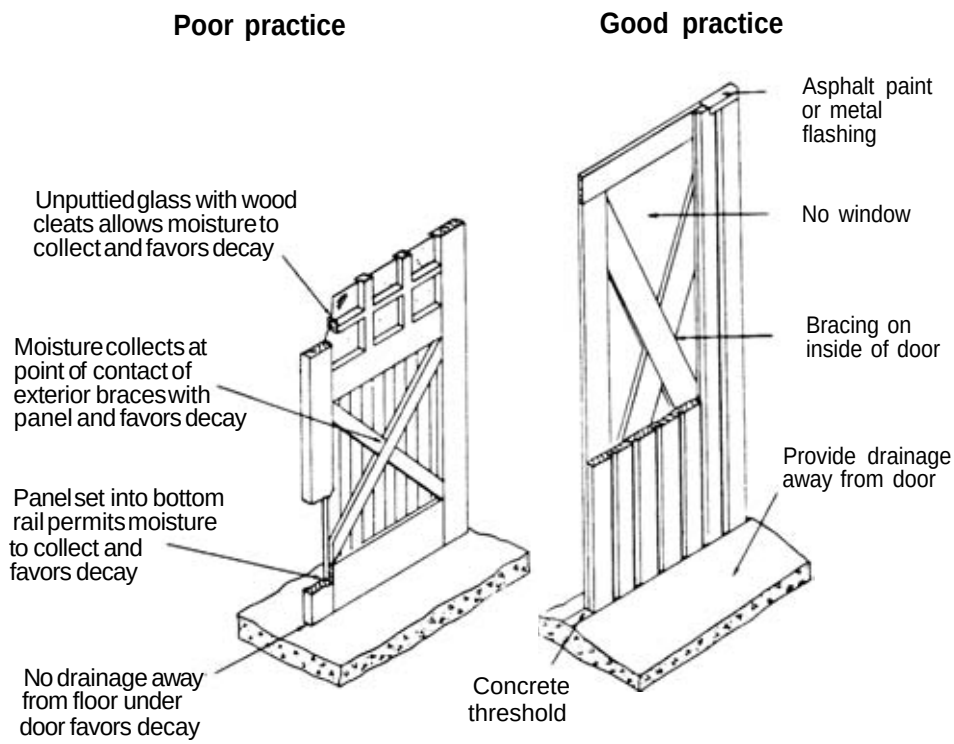

Figure 10 – *Poor and good practices in installing garage doors. If windows are installed, prime and back-putty before glazing and set cleats in putty. Use of preservative-treated wood is often desirable.*

weather, rain driven by wind, and excessive running of lawn sprinklers against the house. One of the most important safeguards is to use only dry lumber, free of fungus stains.

Flashing of noncorroding metal should be used to keep water out of joints that are otherwise difficult to protect. Ornamental drop siding with rounded or slanting lower edges, which lead water into the joints, is not so safe as the more usual types shaped so that water drips from the lower edge of each board to the face of the siding board next below. Siding decay is most frequent in ends that are butted against the trim, as at windows, doors, and corners. If the siding ends are under the trim, as is common with drop siding, less moisture gets into the ends and there is less chance for decay.

Some building papers, especially those with a continuous internal layer of asphalt or a shiny asphalt coating, greatly hinder the passage of moisture vapor. In a cold climate such vapor barriers help to keep the wall dry if put on the inner face of the studding. For sheathing paper outside the studding only "breathing" papers should be used. Most asphalt-saturated but uncoated papers weighing as much as 15 pounds per 100 square feet may be too impervious for sheathing paper. Insulating material having a vapor-barrier surface should be placed in the wall so that the barrier surface is at the inner (warm) face of the wall.

The danger of decay of siding is not great enough to justify the expense of thorough preservative treatment. However, a dip or the equivalent treatment of siding is finding increasing favor as a safeguard against decay and for better paint performance. If not completely treated, it may be helpful in warm, moist climates to dip the ends of sapwood siding in a water-repellent preservative. Also, give all surfaces of the siding boards near the bottom of the wall a heavy brush or spray treatment with the preservative before painting. For greatest safety the lowest board should be 6 inches or more above the outside soil level.

Roofs

In time, shingles deteriorate from weathering, mechanical wear, and decay. Roof decay due to rain leaks and improper flashing sometimes is troublesome in sheathing and fascia boards. Leaks may also occur near the eaves from the water that backs up under melting snow, unless flashing is carried up under the lower shingles. Condensation on the lower surface of the roof of moisture vapor that comes from living quarters or moist soil under basementless houses also can lead to decay. Such condensation is rare under slate or wood-shingle roofs unless a nonbreathing sheathing paper has been used in the roof. It is common in winter under asphalt roofing, and in cold climates, particularly if there is ceiling or roof insulation without an efficient vapor barrier below it.

Soil moisture under the house can be stopped at its source by the soil cover described in the section on ventilation. Flues for ventilating basements or crawl spaces should never open under the roof. Vapor-barrier paint on walls and ceilings of the living quarters, or vapor-barrier paper or foil just above the ceiling is helpful. Attics

should be ventilated, with vents at opposite sides and preferably near the peak, with a total unobstructed area of 1/300 of the ceiling area. Multiply the vent area by 1.25 if the vents are covered by 1/8-inch mesh screen, or by 2.25 if louvers are also added. In addition to ventilation, flat roofs particularly need protection by vapor barriers properly placed, because it is often difficult to get free air movement under all parts of such roofs.

Using New Types of Building Material

Plywood and the various fiberboards used in recent construction generally require the same precautions as lumber. Resin glues used in exterior-grade plywood are fungus-resistant but do not penetrate the wood enough to make it fungus-proof. With either fiberboard or plywood, joint construction should be carefully designed to prevent the entrance of rainwater. On edges of exposed plywood use a heavy coat of thick paint or other moisture-resistant coating. Avoid or flash horizontal joints or water tables on the outside of walls because they often let rainwater get in behind them. Use .exterior grades of plywood not only in places exposed to rain but preferably also where the plywood is used as roof sheathing or over a crawl space beneath a house.

When heat insulation is used, the likelihood of moisture condensation and decay in the structure may be increased. To counteract this, place a vapor barrier between the insulating material and the inside of the house. Tight vapor barriers on the outer (cold) surface of the insulation increase the chance of decay.

Maintenance

A building frequently requires correction or compensation for shortcomings in the original construction. But even if the builder's job has been well done in every respect, inspection and continued care are needed.

No kind of house will long stand neglect. Rust stains around nail heads, paint peeling and blistering, paint discoloration at joints, and swelling and buckling of siding are some of the signs that moisture is not being controlled. Leaks in roofs, gutters, or plumbing and the clogging and overflow of gutters, downspouts, or drains can lead to wood decay. Cold pipes that "sweat" and, moisten adjacent wood for long periods should be insulated. If ventilators under basementless houses are closed in winter, be sure to open them in early spring to lessen chances of decay. Do not allow soil, trash, firewood, or lumber to pile up against walls or sills. Likewise, do not raise the exterior grade to a level that brings it dangerously close to the wood.

Stopping Ordinary Decay

If the house has a wood porch or steps, replacement of obviously decayed boards or bases of pillars should be made with treated or naturally durable wood. Localized decay in joints and bases of uprights may be arrested by flooding treatments with water-repellent preservatives. Decay in sash or window sills often means that there has been too much condensation of moisture on the inside of the glass; if this sweating cannot be sufficiently decreased by the measures suggested under "windows and doors" (page 16), take the sash out and allow it to stand with the bottom rail submerged in a water-repellent preservative solution. Replacement sash should be factory-treated or should be given a short soak in the same preservative before it is installed or painted. Decay in window or door frames often means that more flashing is needed. If there is decay in siding, follow the recommendations in the section on walls. If cracks open up so that water can run into them, use a calking gun occasionally.

If there are unheated spaces under the first floor in which the net area of constantly open vents does not meet the requirements of the section on ventilation (page 12), the sills and ends of the joists, particularly at the north side, should be examined in winter for decay or for visible moisture. The moisture may appear as conspicuous hanging drops (fig. 3), or simply as a wet surface. Measures for avoiding decay

from excess moisture that cannot be traced to leaks or direct soil contact can be found under "ventilation" (page 12).

In midwinter examine attics, especially insulated attics, lacking the amount of ventilation advised under "roofs." Examine for condensation moisture or frost accumulation and decay, especially at the eaves level at the north side of the house. if paint failures are especially troublesome on the north wall or dark stains develop from moisture seeping out from under the siding, it may indicate moisture condensation in the walls. Persistence of condensation into the period of warm weather can permit decay. Attic condensation difficulties can be corrected easily by increased ventilation. This, together with the ventilation or soil cover advised for crawl spaces (section on ventilation) and such vaporproofing as can still be done for the warm faces of the walls, should make the walls reasonably safe.

Stopping "Dry Rot"

Occasionally decay is found to extend many feet from the nearest possible source of moisture. This is likely to mean that it is caused by one of the water-conducting fungi. Between two layers of wood, such as floor and subfloor, these fungi commonly produce rootlike strands thicker and more conspicuous than those shown in figure 1. The mistaken term "dry rot" is most often associated with these species. Ventilation or vapor barriers may limit their spread, but may not stop them entirely.

The treatment needed for these fungi is to trace the fungus back to its source of moisture, usually the ground, and cut off the connection. Often it comes up through a brace, frame, wooden concrete form, or grade stake that serves as a bridge to let the fungus grow from moist soil to a joist or sill. Sometimes a joist is in direct contact with a tree stump that has been left under the house. In other cases, the source from which the fungus is bringing its moisture may not be so easily located. These special fungi sometimes get their moisture from the soil, without direct wood contact, through strands of mycelium that grow a foot or two over the surface of foundation walls, or through cracks in loosely built masonry.

Use sound dry wood to replace any that has been made useless by decay. if the sources of the moisture that enabled the decay to get started are entirely eliminated, replace only the wood that has been weakened. When there is any doubt as to the moistureproofing, how-

ever, especially if the original infection has spread rapidly, it is safest to remove also the apparently sound wood 2 feet in each direction from the part appreciably decayed, and to make replacements with wood that has been thoroughly impregnated with a preservative (page 8). Before putting the new wood in place, give all adjacent old wood and masonry surfaces a heavy brush treatment with a preservative.

Precautions for the Use of Pesticides

Pesticides used improperly can be injurious to humans, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Avoid prolonged inhalation of pesticide vapors; wear protective clothing and equipment if specified on the container.

In case a pesticide is swallowed or gets in the eyes, follow the first-aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

NOTE: Registrations of pesticides are under constant review by the U.S. Environmental Protection Agency. Use only pesticides that bear a Federal registration number and carry directions for home and garden use.