

**HOW TO  
PREVENT  
AND REMOVE  
MILDEW**

**home methods**

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# HOW TO PREVENT AND REMOVE MILDEW

## home methods

*By Margaret S. Furry, Textile Chemist*

Molds that cause mildew grow on anything from which they can get enough food. In homes they develop most often on cotton, linen, rayon, silk, wool, leather, wood, and paper. Many manmade fibers are resistant to mildew.

Molds are simple plants belonging to the group known as fungi. Though always present in the air, molds that cause mildew need moisture and certain temperatures in order to grow. They commonly develop in muggy summer weather, especially in houses that are closed.

Molds that cause mildew flourish wherever it is damp, warm, poorly aired, poorly lighted—in cellars, in crawl spaces of houses without basements, in clothing closets, on draperies and rugs in basement recreation rooms, on shower curtains, on damp clothes rolled up for ironing. These molds are also likely to grow in a newly built house because of moisture in the building materials.

As the molds grow they cause considerable damage. They often leave a musty odor. They discolor fabrics and sometimes eat into them so severely that the fabrics rot and fall to pieces. They decay wood and discolor leather and paper. The most common mildew organisms do not cause disease.

## TO PREVENT MILDEW

### Keep Things Clean



Keep closets, dresser drawers, basements, any place where mildew is likely to grow, as clean as possible. Soil on

articles can supply sufficient food for mildew to start growing when moisture and temperature are right. Greasy films, such as those that form on kitchen walls, also contain many nutrients for mildew organisms.

Clean clothing is less likely to mildew than soiled clothing. Because most manmade fibers, such as acetate, Acrilan, Dacron, Dynel, nylon, and Orlon, are resistant to mildew, clean fabrics of these fibers will not support mold growth. But soil even on these fabrics may supply food to start mildew. Thorough cleaning of all soiled fabrics, regardless of the kind of fiber in them, may help prevent them from mildewing.

### Get Rid of Dampness

#### By removing the cause

Try to control the cause of dampness. Otherwise, with high moisture, mold spores—always present in the air—settle on articles and have ideal conditions for growth.

Cooking, laundering, and bathing without adequate ventilation may add 2 or more gallons of water to the air in a house within 1 day. If possible, have your automatic clothes dryer vented to the outdoors. Dampness in a basement often is caused by condensation of moisture; warm, moist air coming in condenses on cooler surfaces.

Damaging moisture may indicate that repairs are needed. Replace cracked or defective mortar. Make

certain that outside drainage is adequate. Some basements are continually wet from water leaking through crevices in the wall.

For waterproofing concrete and other masonry walls above ground, apply two coats of cement water paint, tinted with mineral coloring, if desired. Waterproofing treatments to seal absorbent brick and other outside surfaces may be needed.

In crawl spaces under houses, spread a layer of moisture-barrier material over the soil under the building. Heavy roofing paper or polyethylene plastic film can be used. This barrier plus good ventilation will keep the crawl space dry and prevent mustiness.



## By providing adequate ventilation

Ventilate the house when outside air is drier than that inside. As the air comes in, it takes moisture from the damp interior walls and furnishings. Then the moisture vapor is carried outdoors. Since cool air holds less moisture than warm air, take advantage of cool nights to freshen the air in the entire house.

Run an electric fan in places that cannot be exposed to outdoor breezes. Special-purpose fans, such as adjustable window fans, can be used to help remove moisture and keep the house well ventilated.

Poorly ventilated closets get damp and musty during continued wet weather, and articles stored in them are likely to mildew. Hang clothing loosely so that air can circulate around it. Keep suitcases, shoes, and other articles that are highly vulnerable to mildew on shelves, preferably perforated ones, at the top of the closet. Dry all clothing wet by rain or perspiration thoroughly before putting it in the closet.

Leave closet doors and dresser drawers open occasionally to keep moisture from gathering and to stir up the enclosed air. Take special care to ventilate linen closets in bathrooms and to circulate air behind and under beds.

## By drying the air

**Heat.**—If necessary, get rid of the dampness by heating the house for a short time with a stove, furnace, or an electric heater. Then open doors and windows to let out the warmed air that



has taken up the extra moisture; use an electric fan to force it out quickly.

To dry the air in closets and other small areas, burn a small electric light in them continuously. The heat from the lamp is enough to prevent mildew if the space is not too large. Or place an electric heater on the closet floor. Heat at the bottom of the closet increases air movement and gives better drying efficiency. Keep the closet door shut to conserve the heated air.

In using electric lamps and heaters, be sure to observe precautions against fire.

**Mechanical dehumidifiers.**—Mechanical dehumidifiers, sometimes called "basement dryers," are useful wherever condensation of moisture causes damage. This piece of equipment removes moisture from the air by

drawing in the damp air, then condensing the moisture on refrigerated coils. The water can then be drained off.

A humidistat can be attached to the dryer to control the humidity in a room. When using a dehumidifier, keep windows and doors closed.

**Chemicals that absorb moisture.**—Silica gel, activated alumina, or calcium chloride may be used to absorb moisture from the air. They are sold in department stores and drugstores and by building-supply dealers, sometimes under various trade names.

Silica gel and activated alumina are not harmful to fabrics. The porous granules remain dry feeling even when saturated—they hold half their weight of water. To use, hang cloth bags of the chemical in clothing closets. Or place an open container of it in the closet—on a shelf preferably, or on the floor. Keep closet doors closed so that moisture from outside air will not get in. You may scatter the dry granules through layers of clothing and other articles that are to be stored in tightly closed chests or trunks.

Both silica gel and alumina can be used over and over, if dried between times. To dry, simply place moist granules in a vented oven at 300° F. for several hours. Then put in an airtight box and cool before re-using. Silica gel specially treated with a color indicator is pink when full of moisture, blue when dry.

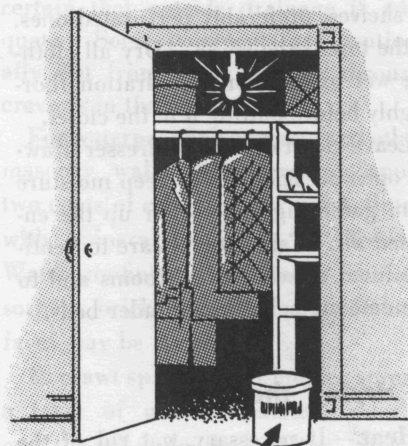
Calcium chloride also absorbs moisture from the air. It is available both in small white granules of the chemical,

and in specially prepared products that employ calcium chloride soaked on a porous claylike material.

Calcium chloride-on-clay products do not drip when saturated; they can be regenerated by driving off the absorbed moisture in an oven. To use one of these products, hang cloth bags that contain it in closets, basements, pantries, or wherever dampness occurs.

Granular calcium chloride holds twice its weight of water. But, as it absorbs moisture it liquefies. Do not let this chemical come in contact with clothing or household textiles; it can make holes in them.

To use granular calcium chloride, put it on a nonrusting screen supported in an enameledware container. Then place the open container in the closet and keep the door shut. When granular calcium chloride becomes liquid replace it with fresh chemical.



**CALCIUM  
CHLORIDE**

## Get Rid of Musty Odors



Musty odors, which indicate mold growth, are sometimes noticeable in such places as basements and shower stalls. Take special precautions to get rid of musty odors as soon as possible; thus, you will prevent further, really objectionable and damaging mold growth. Usually musty odors disappear if the area is well heated and dried. If the odors remain, additional treatments (described in the following paragraphs) may be necessary.

In cellars with dirt floors, use chlorinated lime (commonly called chloride of lime or bleaching powder) to remove musty odors. Sprinkle this chemical over the floor, let it stay until all mustiness disappears, then sweep it up.

On cement floors and on tiled walls and floors in bathrooms, get rid of mustiness by scrubbing with a dilute solution of sodium hypochlorite or other chlorine bleach available in grocery stores. Use  $\frac{1}{2}$  to 1 cup of liquid household bleach to a gallon of water. Rinse with clear water and wipe as dry as possible. Keep windows

open until walls and floors are thoroughly dry. *Precaution:* Work quickly and carefully on plastic and asphalt tile to avoid spotting the surface.

Low-pressure sprays (in aerosol containers) are helpful in removing mustiness in closed rooms and small areas, provided they contain a fungitoxic (mildew-inhibiting) chemical to prevent the growth of the odorous molds causing the trouble. Read the label on the can for ingredients. Most sprays without a mildew inhibitor are less effective for removing the unpleasant musty odor because they rely entirely on the masking power of a perfume or on the deodorizing action of special chemicals.

When using low-pressure sprays keep doors and windows closed. *Precaution:* Do not inhale the mist and do not spray near a flame. Follow all directions and precautions given on the can.



## Give Some Articles and Surfaces Special Care

### Clothing and household fabrics

**Keep fabrics dry.**—Never let clothing or other fabric articles lie around damp or wet. Dry soiled clothes before putting them into the hamper. Wash out dishcloths and hang them to dry. Spread out washcloths and damp towels. Stretch out wet shower curtains. It is the wet curtain left bunched together or sticking to the wall or tub that is most likely to mildew.

Wash soiled garments and household fabrics in plenty of hot sudsy water; rinse well and dry thoroughly and quickly. Fabrics dried slowly may get sour and musty smelling—a sign of mold growth. When washing musty white cotton materials, add dilute chlorine bleach as directed on the container. (Never use chlorine bleach on silk or wool. Some colored fabrics and some fabrics treated with special finishes may also be affected by chlorine.)

Sprinkle for ironing only as many articles as can be ironed in a day; shake out and dry those not ironed.



To help keep moisture out of clothing and household fabrics and thus make them less susceptible to mold growth, treat them with wax-emulsion or silicone water-repellent sprays. Use on draperies, slipcovers, mattresses, golf bags, overshoes, and jackets and other outer garments. More satisfactory in protecting such articles against mold growth are the mildew-resistant finishes described in the following paragraphs.

**Protect with mildew-resistant finish.**—Make sure that such cotton articles as shower curtains, awnings, tents, and sails have been treated with fungicides (chemicals to make them resistant to mildew) before using them. Many such articles are treated before they are placed on the market. If not, you can apply a mildew-resistant finish to these articles yourself with one of the fungicide products described below. These products are available at drugstores, hardware stores, and boat-supply houses.

Two copper treatments—copper naphthenate and copper-8-quinolinate—are especially recommended to give durable protection to canvas beach chairs, awnings, sails, and other heavy fabrics that are used outdoors. Apply them by dip, spray, or brush methods as directed on the package. They have a distinctive odor and they tint the fabric green and may stiffen it.

Another copper treatment—copper cupferron—gives good protection with only slight odor and an off-white color.

Other fungicides, such as zinc naphthenate, quaternary ammonium naph-



thenate, dichlorophenol, and salicylanilide, may be less durable to weathering, but they are odorless and colorless and, therefore, more satisfactory for shower curtains, draperies, blankets, and seat covers.

Fungicide products that can be sprayed on fabrics to give them mildew protection are available in low-pressure aerosol containers (p. 5). Some of these fungicide sprays contain a wax or a silicone resin that imparts water repellency to the sprayed fabric, in addition to mildew resistance. Some contain an insecticide that makes the sprayed fabric resistant to moths.

In order to have sufficient chemical on the fabric for mildew protection, wet the surface of the fabric thoroughly with the spray. Unless the sprayed fabrics are kept in a closed container, they should be examined frequently and resprayed. *Precaution:* Use these fungicide products on clothing only if such use is recommended on the label; some of them irritate the wearer's skin. Avoid inhaling vapors. Do not spray on plastic or asphalt tile. Follow all directions and precautions given on the can.

Here is a mildew-resistant treatment simple to apply and less expensive than those described above. It uses soap and copper sulfate and, although it colors the fabric light blue green, is suitable for many cotton articles.

First dip the article in hot soapsuds made of soft or softened water and good neutral soap (not a synthetic detergent). Soak the article a few minutes to be sure it is wet through. Then remove it, and, without rinsing,



put at once into a hot solution of copper sulfate (1½ ounces copper sulfate to a gallon of water). Stir and turn the fabric for about 15 minutes in this bath. Then wring and hang to dry. Be sure to have plenty of soap in the cloth because it is the combination of the soap and the copper sulfate that makes the treatment successful.

*Precaution:* Copper sulfate is poisonous; if regular kitchen pans and utensils are used to hold the copper sulfate solution, wash them thoroughly afterwards.

**Clean before storing.**—If clothing or household textiles are not treated with a mildew-resistant finish, be sure to wash or dryclean them before storing, as soiled articles are more likely to mildew than clean ones. And, unless you know that your laundry starch contains an inhibitor, do not leave starch in fabrics to be stored; molds feed on starch finishes.

From time to time on warm, dry days, sun and air articles stored in closets. It pays to inspect occasionally

cotton, rayon, leather, and woolen clothing put away in garment bags. Unless such materials are stored with a mildew inhibitor (see below) they may mildew; a closed bag, dampness, and hot summer weather make ideal growing conditions for molds.

**Store with mildew inhibitor.**—Certain volatile chemicals, the vapors of which inhibit mold growth, may be used to protect fabrics during storage.

One such chemical, paradichlorobenzene, effectively controls mildew on clothing and other apparel when used in packages, trunks, or garment bags kept as nearly airtight as possible. This chemical, which is widely recommended for moth control, is available in grocery and drug stores under various trade names.

Scatter paradichlorobenzene crystals through the folds of garments to be packed in boxes, or hang bags of crystals at the top of garment bags so the heavy vapors settle on the materials being protected. Use about 1 pound of the crystals for 100 cubic feet of air space, proportionately less for smaller spaces. As the vapors leak out, mildew protection disappears and the chemical must be replenished.

*Precaution:* Paradichlorobenzene damages some plastics. Therefore, remove plastic buttons and ornaments from garments and use wooden or metal instead of plastic clothes hangers.

Paraformaldehyde is another volatile chemical that has mildew-inhibiting properties. It is sold in powder form at drugstores. Sometimes various sized bags of the chemical are available. Use paraformaldehyde to pro-

tect clothing and bedding (2 ounces of the chemical for 100 cubic feet of space). Place bags of the chemical where the vapors can circulate and reach all surfaces of the stored articles.

*Precaution:* Paraformaldehyde is poisonous. Avoid inhaling the fumes. Keep it away from children.

Low-pressure sprays containing mildew-inhibiting chemicals also will help control molds and mildew growth in a closed area. To be effective, the spray must wet the interior surfaces of the closet or storage container. Thoroughly spray into cracks and crevices. Respray as frequently as necessary.

*Precaution:* Do not inhale the mist from the spray and do not use spray near flame. For additional precautions and directions for spraying fabrics, see page 7.

## Leather goods

To protect leather against mildew, sponge with a 1-percent solution of dichlorophene in denatured or rubbing alcohol. Or use other chemicals—hexachlorophene, salicylanilide, thymol, and paranitrophenol—in the same way (1-percent solution in alcohol). Your druggist can get these chemicals and make the solutions for you. Shoe and luggage stores may have the solutions packaged especially for leather goods.

Before sponging the article, test the solution on a small area where it will not show to see if it will change the color of the leather. Do not use paranitrophenol on white or light-colored leather. Treat both the inside and the





outside of shoes; repeat as often as needed.

Another way to protect leather goods is to apply a good wax dressing. In selecting the one to use, read the labels on the packages. Some shoe dressings on the market contain both a fungicide (hexachlorophene or parantrophenol) to prevent mold growth and wax or a silicone resin to protect against perspiration and wet weather. A thin coat of floor wax applied to shoes—to both



the uppers and the soles—keeps moisture out and so helps to prevent mildew.

During warm, humid weather, protect stored shoes, jackets, luggage, and other leather articles with paradichlorobenzene or paraformaldehyde (p. 8); wrap the articles in packages and seal them. If luggage has plastic fittings and hangers, do not use paradichlorobenzene.

Or use a low-pressure spray containing a fungicide to prevent mildew damage during storage (pp. 5, 7). Spray shoes and other leather articles thoroughly to wet the surface. Then as soon as they are dry, wrap them or place them in airtight containers.

*Precaution:* Do not inhale the mist from the spray and do not use spray near flame. Follow all precautions given on the can.

## Wood

**Unpainted.**—In damp, warm, poorly ventilated areas, surface mold often develops on wooden parts of buildings; sometimes timbers are severely rotted. New, unseasoned lumber is especially susceptible to mildew because it is full of moisture.

Lumber and millwork should be treated with a wood preservative to provide protection against mildew. If this has not been done at the manufacturing plant, you may apply such a preservative yourself. Use copper or zinc naphthenate, pentachlorophenol, certain phenyl mercury compounds, or coal tar creosote.

These wood preservatives are available from hardware and paint stores, lumberyards, and millwork suppliers.

In selecting the preservative for the job, consider what the wood will be used for and the properties of the preservative—its color, odor, and whether it will bleed through paint or leach out on exposure to weathering.

**Painted.**—Indoor wood surfaces covered with enamel or oil-resin paint rarely mildew unless conditions are very favorable to mold growth. Softer paints on outdoor surfaces mildew more readily. Molds feed on the oil and minerals in the paint and cause a dirty-looking discoloration. They may penetrate the paint film deeply, even to the underlying wood.

Mildew-resistant paints in all colors for outdoor wood surfaces are available at paint and hardware stores. The manufacturer has suitably formulated his products with fungicides, such as chlorinated phenols, phenyl mercurials, zinc compounds, or copper compounds, to help combat mildew attack. Because the chemical used may be poisonous, carefully observe all precautions indicated on the can. Some paint stores sell fungicide additives, which can be mixed with paint.

Adding zinc oxide or spar varnish to oil paint makes it less susceptible to mildew, because it makes the paint dry to a hard film. These materials tend to make the paint brittle, however; on aging it may peel.

### **Paper and books**

In damp summer weather keep papers and books as dry as possible to



help control mold growth. Burn a small electric light continuously in the bookcase, with doors closed as tightly as possible. Or use a chemical dehumidifier, such as silica gel or calcium chloride (see p. 4), in a closed space.

Also effective in preventing mildew are the volatile mildew inhibitors, paradichlorobenzene and paraformaldehyde (p. 8). Hang a bag containing one of these in the closed bookcase. Or dust books and papers with paraformaldehyde, then wrap them in tight packages. Use this chemical sparingly; it is poisonous and may be very irritating to some persons.

Or you may use low-pressure sprays containing a fungicide (pp. 5, 7) to protect paper products against mildew. Unless they are kept in a closed container respray them frequently.

To prevent mildew on book covers, apply a clear shellac or thin varnish to which 2 to 3 percent of salicylanilide or dichlorophene has been added. First try the shellac on a small section of the cover, to see if it will change the color.

## TO REMOVE MILDEW

### Clothing and Household Fabrics

Remove mildew spots as soon as they are discovered. Don't give the mold growth a chance to weaken or rot the material. Brush off any surface growth outdoors to prevent scattering the mildew spores in the house. Sun and air fabrics thoroughly. If any mildew spots remain, treat washable articles as described below. Dryclean nonwashable articles.

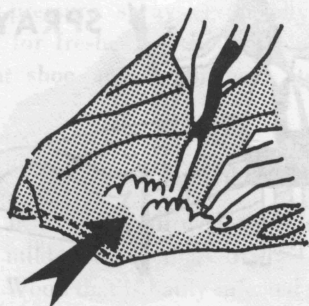
Wash mildew-stained articles at once with soap and water. Rinse well and dry in the sun. If any stain remains, bleach with lemon juice and salt, sodium perborate bleach (available at grocery stores), or a dilute solution of sodium hypochlorite or other household chlorine bleach.

**Lemon juice and salt.**—Moisten stain with a mixture of lemon juice and salt. Spread in the sun to bleach. Rinse thoroughly and dry. Use this treatment with care on colored fabrics.

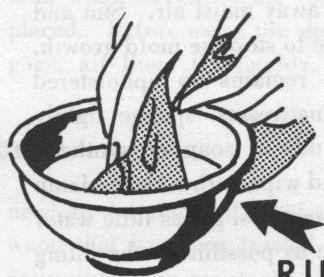
**Perborate bleach.**—Mix sodium perborate bleach and water—1 table-

spoon bleach to each pint of water. Use hot water if the fabric will stand it; otherwise, use lukewarm water. Sponge stain with solution or soak stain in it. Or sprinkle powder directly on the dampened stain. Let solution or powder remain on the stain one-half hour; then rinse well. Repeat if stain remains. Before using sodium perborate on colored fabric, test it on a sample of the fabric or on a seam or hem of garment to see if the bleach will change the color.

**Chlorine bleach.**—Dip stains on undyed cotton, linen, or rayon fabric in a dilute solution of sodium hypochlorite, or other household chlorine bleach, as directed on the container. If the stained fabric is colored, first test the bleach on a sample of the cloth to be sure it will not change the color. Never use a chlorine bleach on silk or wool. Some fabrics treated with a glazed, embossed, wrinkle-resistant, or other special finish are also damaged by chlorine.

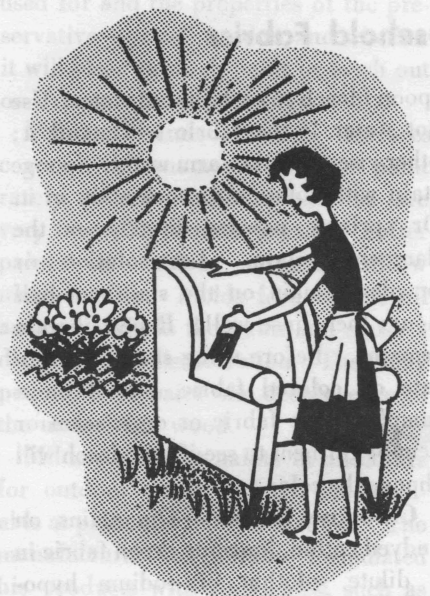


**SODIUM PERBORATE**



**RINSE  
WATER**

## Upholstered Articles, Mattresses, Rugs



First remove loose mold from outer coverings of upholstered articles, mattresses, rugs, and carpets by brushing with a broom. Do this outdoors if possible to prevent scattering mildew spores in the house. Run a vacuum cleaner attachment over the surface to draw out more of the mold. Do everything conveniently possible to dry the article—use an electric heater and a fan to carry away moist air. Sun and air the article to stop the mold growth.

If mildew remains on upholstered articles or mattresses, sponge lightly with thick suds of soap or synthetic detergent, and wipe with a clean, damp cloth. In doing this, get as little water on the fabric as possible so the filling does not get wet.

Another way to remove mildew on upholstered furniture is to wipe it with a cloth wrung out of dilute alcohol (1 cup denatured or rubbing alcohol to 1 cup water). Dry the article thoroughly.

Sponge mildewed rugs and carpets with thick suds or a rug shampoo. Then remove the suds by wiping with a cloth dampened in clear water. Dry in the sun if possible.

Use a low-pressure spray containing a fungicide (pp. 5, 7) to get rid of musty odors and mildew; respray frequently, especially in localities where mildew is a major problem.

Vapors of paradichlorobenzene or paraformaldehyde used in closed areas as directed on page 8 will stop mold growth.

If molds have grown into the inner part of an article, send it to a reliable drycleaning or storage company for thorough drying and fumigation. Fumigation will kill molds present at the time but will not protect the article against future attacks.





## Leather Goods

To remove mildew from leather goods, wipe with a cloth wrung out of dilute alcohol (1 cup denatured or rubbing alcohol to 1 cup water). Dry in a current of air. If mildew remains, wash with thick suds of a mild soap, saddle soap, or a soap containing a germicide or fungicide. Then wipe with a damp cloth and dry in an airy place. Polish leather shoes and luggage with a good wax dressing (p. 8).

Shoes contaminated with fungus growth on the inside often develop unpleasant odors, and variously colored growths show on the inner sole and linings and up into the toe. You can remove this kind of mildew with formaldehyde solution, obtainable from your druggist. Moisten a cotton-tipped applicator stick with the solution and swab the inside of each shoe thoroughly. Then wrap shoes tightly in a paper or plastic bag and allow the formaldehyde vapors to permeate the shoe materials for at least an hour.

Before wearing the shoes, air them thoroughly out-of-doors. *Precaution:* Vapors of formaldehyde are very irritating; do not inhale them. Do not get the solution on your skin.

Low-pressure sprays especially intended for freshening shoes are available at shoe and department stores.



**FUNGICIDE  
SPRAY**

They contain hexachlorophene, dichlorophene, or other fungicides. Use them as directed and repeat as needed.

Another way to stop mold growth in leather goods is to scatter crystals of paradichlorobenzene or to dust paraformaldehyde powder in shoes or luggage, then place in tight containers (see p. 8). The vapors from these chemicals are effective in killing molds that have grown into leather, but they give no lasting protection against future contamination. As the vapors leak out, the chemicals must be replaced. Before using the shoes or luggage, air them thoroughly.

## Wood

Use heat and improved ventilation to get mildewed wood as dry as possible. Wood that is badly infected may

need to be replaced, preferably with wood that has been treated or that is naturally decay resistant.

Thoroughly clean mildewed floors, woodwork, and other wooden parts of structures by scrubbing them with a mild alkali, such as washing soda or trisodium phosphate (4 to 6 tablespoons to a gallon of water). Paint and grocery stores sell these products under various trade names. Rinse well with clear water and allow the wood to dry thoroughly. Then apply a mildew-resistant paint (see p. 10).

If the mold has grown into the wood under paint or varnish, it may be necessary to scrub the wood first with an abrasive cleaner. Then wash with a solution containing 4 to 6 tablespoons of trisodium phosphate and 1 cup of household chlorine bleach to a gallon of water. Finally, rinse the wood well with clear water. Dry thoroughly and apply a wood preservative (see p. 9) before repainting.

## Paper and Books

Remove any dry, loose mold from paper with a clean, soft cloth. If mildewed paper is damp, dry it first—in an airy place if possible. To dry wall-paper, heat the room for several hours or days to dry the plaster as well as the paper. Plaster should be dried slowly to prevent it from cracking.

If mildewed paper is washable, wipe it with a cloth wrung out of thick soap-suds, then with clear water. Take care not to wet the paper more than necessary. Do not rub it. Finally pat with a soft, dry cloth. If stains remain, bleach with a commercial ink eradicator. Be careful if the paper is colored; the eradicator will bleach print and dyes as well as stains.

Spread pages of books out fanwise to air. If the books are very damp, sprinkle cornstarch or talcum powder between the leaves to take up the moisture. Leave starch or powder on for several hours, then brush off. See suggestions on page 10 for keeping books and papers dry. Use a mildew inhibitor—paradichlorobenzene or paraformaldehyde—to stop mold growth (p. 8).

