

Cute, but potentially dangerous

The house mouse (*Mus musculus*) is one of the most frequently encountered rodent pests found near people and buildings. Unchecked, it can become a long-term inhabitant of your home.

Less common rodent house guests include the Norway rat (*Rattus norvegicus*), deer mouse (*Peromyscus maniculatus*), and white-footed mouse (*Peromyscus leucopus*).

Together, mice, rats, and their parasites transmit dozens of diseases to humans; several pose serious health risks and some are potentially epidemic. House mice may also cause fires and incapacitate appliances by chewing on electrical wires. Their urine, musky odor, and gnawing can ruin food, clothing, papers, woodwork, insulation, and plumbing.

To evict mouse guests and prevent future invasions, use integrated pest management (IPM)—a sustainable approach that combines methods to minimize risks to human health and the environment. If you choose to hire a pest management professional, seek one who's been certified by the New York State Department of Environmental Conservation, and request an IPM approach.

Step one: inspect your home

Management strategies differ slightly for mice and rats. Thorough monitoring will help you identify the species and find their hiding places and entrances.

Signs of rodent activity:

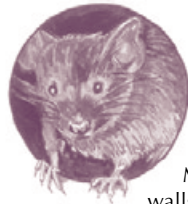
Droppings and urine stains. The droppings of a house mouse have pointed ends and are about $\frac{1}{8}$ - $\frac{1}{4}$ " long. (A Norway rat's fecal pellets are about $\frac{1}{2}$ - $\frac{3}{4}$ " long, with blunt ends). Urine stains on the woodwork and a musky odor may be noticeable.



Mouse droppings, actual size.



Norway rat droppings, actual size.



Burrow holes (shown actual size at left). Entrance holes to their burrows are typically one inch in diameter. But mice fit through dime-sized spaces that are only $\frac{1}{2}$ " high! Look in baseboards, corners, walls, entryways, and foundations.

Runways, tracks, and "rub marks" (smudges).

Mice have poor eyesight, so they tend to hug the walls during travel. They memorize routes between food and nest and rarely stray; this helps them run rapidly along a path, even in the dark. In time, a faint, dark "trail" of body oil and dirt may become visible on woodwork. In dirt or insulation, you may see a smooth, worn path. Shine a strong flashlight at a low angle across a dusty area to look for footprints.

Noise. You may hear scuttling, squeaking, or gnawing inside the walls, especially at night. Other animals make similar noises, so this is not a definitive sign of rodent infestation. House pets may be disturbed by sounds of rodent activity that you cannot hear.

Nesting and hiding places.

INSIDE: Mice nest in any undisturbed location, often in wall cavities, attics, garages, and basements. Their nests are made of shredded fibrous materials such as cloth or paper, and are approximately 5" in diameter. Deer mice and white-footed mice line their nests with fur, feathers, shredded cloth, or other fine material. Droppings, seeds, and pet food will often be located near the nest.

If they can find a quiet spot in the kitchen, mice will often nest close to food. Check in and under cabinets, sinks, and appliances, behind and under refrigerators, stoves, and dishwashers, and wherever pipes or wires penetrate wall openings. Inspect stored clothes or bedding.

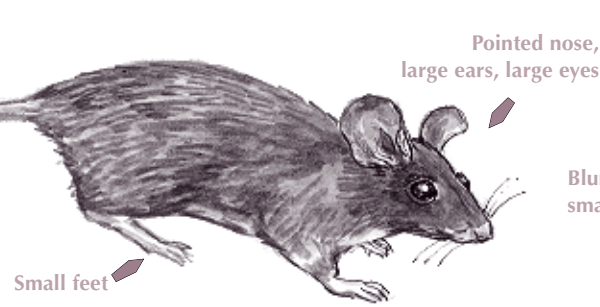
OUTSIDE: Thick vegetation (weeds, bushes, vines), debris (garbage, leaves), clutter (bricks, lawn furniture, discarded appliances), and piles of wood or rocks are favored by mice.

Search cabinets, drawers, counters, corners, under sinks, and near food. Disinfect, then wipe up the droppings (see safety tips below). Check frequently for fresh droppings to determine when all the mice have been eliminated.

Gnaw marks and shavings. Mice gnaw frequently to help trim their constantly growing teeth. Look for tooth marks on baseboards, doors, window and door casings, packaged goods, cabinets, and around pipes, and for piles of wood chips or shavings.

Smooth tail

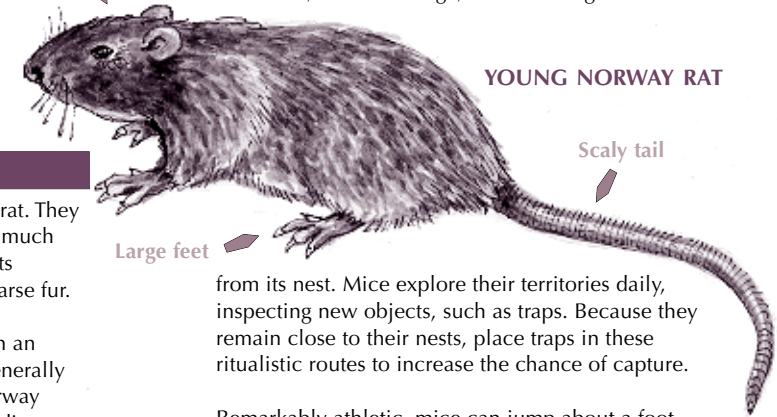
Small feet



ADULT HOUSE MOUSE

Pointed nose, large ears, large eyes

Blunt nose, small ears, small eyes



YOUNG NORWAY RAT

Know the beast

First, determine if you've got a mouse or Norway rat. They can be confused because a young rat may not be much larger than an adult mouse. In addition to the traits illustrated above, mice have fine fur; rats have coarse fur.

The slender house mouse usually weighs less than an ounce. Its body is 2-3 $\frac{1}{2}$ " long; its tail, which is generally a bit longer than its body, adds another 3-4". (Norway rats are robust, weighing about a pound. Their bodies are 7-10" long; their tails are often a bit shorter than their bodies, measuring 6-8").

It's hard to tell the species of mice apart by their signs; the easiest way to distinguish them is to capture one. A house mouse has grayish brown fur and a nearly naked tail. Both wild mice species (*Peromyscus* spp.) are two-toned, with grayish brown backs and white bellies; their feet and the undersides of their noticeably furry tails are also white.

Mice are primarily nocturnal, feeding mostly at dusk and dawn. They get all the water they need from their food



Safety tips for rodent contact

Wear rubber gloves and a face mask with a HEPA filter while cleaning rodent droppings, urine, or nest materials. Ventilate the area. Don't stir up dust by sweeping or vacuuming; the dust could contain hantaviruses, LCM (lymphocytic choriomeningitis) virus, or other airborne disease organisms. Instead, thoroughly wet contaminated materials with a 10% chlorine bleach solution (1 $\frac{1}{2}$ cups bleach in 1 gallon of water) or household disinfectant. Wipe up with a damp sponge. Spray dead rodents and nests with disinfectant, then double-bag and dispose of them.

Disinfect toys, silverware, or other items that may have been contaminated—but discard contaminated foods, drinks, napkins, paper plates, or cups. For more details, see the Centers for Disease Control and Prevention (CDC) website listed on the back of this brochure.

but will drink water when it's available. They'll eat many foods, but prefer seeds and cereal grains. Mice tend to nibble on the edges of grain, leaving behind the core (rats often leave half-eaten pieces of grain).

If there's ample food, their foraging range may be only a few feet, but on average, a mouse ranges 10-30 feet

from its nest. Mice explore their territories daily, inspecting new objects, such as traps. Because they remain close to their nests, place traps in these ritualistic routes to increase the chance of capture.

Remarkably athletic, mice can jump about a foot high, climb up the sides of buildings, and, like a tightrope walker, cross cables and wires. They also swim. Consider these habits and abilities as you look for their pathways.

Step two: eliminate food and shelter

- Store food, bird seed, pet food, garbage, compost, and recyclables in secure metal, glass, ceramic, or heavy-duty plastic containers with tight-fitting lids. (Mice have strong teeth and can gnaw through wood, aluminum siding, sheetrock, lead or copper pipes, and plastic garbage cans).
- Keep birdfeeding areas clean of spilled seed.
- Clean garbage cans, dumpsters, and chutes regularly. Screen dumpster drainage holes with hardware cloth.
- Feed pets at scheduled times. Put unfinished food in the refrigerator.
- Promptly clean up spills and crumbs.
- Elevate compost piles or enclose them with $\frac{1}{4}$ " wire mesh.

Remove their nesting sites.

INSIDE: Keep stored items off the floor. Reduce clutter. Remove cardboard boxes, if possible.

OUTSIDE: Move firewood, garbage cans, debris piles, discarded appliances, and vehicles away from the house. For easier inspection, maintain a foot-wide gravel border that's free of vegetation around the foundation or keep plants closely trimmed.

Step three: evict them

Trapping. Snap trapping is recommended—but **keep traps out of reach of children and pets.** Try concealing snap traps inside coffee cans or PVC pipe. Set traps at night, when mice are most active, and check or remove them in the morning. Live traps should be checked morning and evening to prevent the animal(s) from dying of hunger, dehydration, or stress.

Live trapping with box traps or glue boards may be used for monitoring and for removal. The technique raises legal, ethical, and biological concerns, especially with exotic species such as the house mouse and Norway rat; these issues are discussed in the “Beasts be gone!” brochure.



A BETTER MOUSE TRAP. Modern trap designs are easier to use than the traditional mouse trap. Shown are a metal lever trap with a cloth-spin-like closing mechanism and an expanded trigger snap trap.

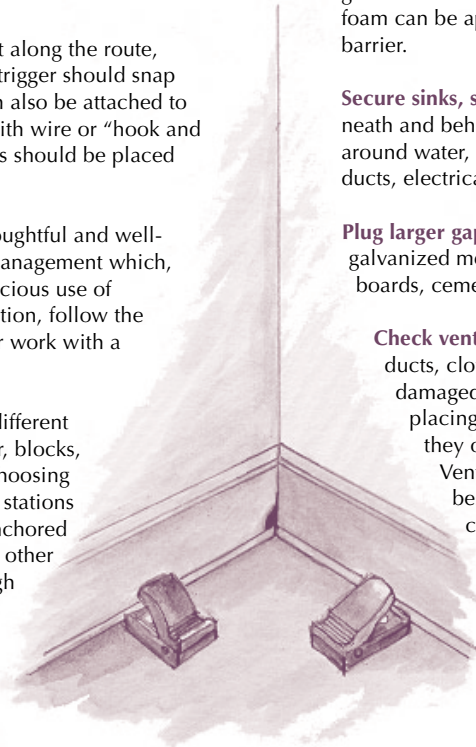
It's better to trap intensively for a few days than to set only a few traps for a long time. Place the traps within travel routes, in corners, or near holes or nests. Traps set in pairs are more effective than single traps. A dab of crunchy peanut butter on the trigger is an enticing lure.

Space snap traps every 5-10 feet along the route, at a right angle to the wall. The trigger should snap towards the wall. Snap traps can also be attached to rafters with nails and to pipes with wire or “hook and loop” (“Velcro”) strips. Live traps should be placed parallel to the wall.

Rodenticides. IPM stresses a thoughtful and well-coordinated approach to pest management which, in some cases, includes the judicious use of pesticides. If you choose this option, follow the manufacturer's label carefully or work with a professional.

Rodenticides are sold in many different forms, including pellets, powder, blocks, and meal. Keys to success are choosing the proper bait, placing the bait stations effectively (make sure they're anchored and tamper-proof), removing all other foods, and giving the bait enough time to work.

These pesticides can be hazardous to children, pets,



and wildlife. In addition, animals that eat poisoned mice could be poisoned themselves. Poisoned rodents may die inside walls and subfloors where they cannot easily be removed. Their slow decomposition creates foul odors and attracts other pests, such as flies and beetles.

Given these risks, a safer and more environmentally sensitive strategy is to trap the mice that are already inside and prevent others from entering your home. Another reason to “mouse-proof” your home is the large reproductive capacity of the house mouse—just one female can produce over 40 young each year. Mouse populations can recover quickly, so couple eviction with “exile” for a long-term solution.

Step four: exile them

Exclude mice from your home. Seal all of their points of entry from ground level to at least three feet high (to the roof, if possible)—because mice are good climbers. Prune branches away from the roof.

Close the door! Mice commonly enter houses through open doors. Install door sweeps and weather-stripping. Don't prop doors open—use a screen door. Check garage doors, too.

Repair holes in walls and screens. Wearing gloves, poke steel wool, wire mesh, or flexible aluminum “gutter-guard” into the holes with a screwdriver. Caulk or aerosol foam can be applied over steel wool to strengthen the barrier.

Secure sinks, stoves, dishwashers. Seal openings underneath and behind appliances with latex caulk. Seal gaps around water, gas, and heating pipes, heat registers, air ducts, electrical chases, and false ceilings.

Plug larger gaps around pipes with sheet metal plates, galvanized metal “pipe-chase” covers, paper-backed glue boards, cement, plaster of paris, or mortar.

Check vents of sewer pipes, kitchen hoods, furnace ducts, clothes dryers, attic fans, and roofs. If vent is damaged or vulnerable, consider screening or replacing it. Check the end caps on ridge line vents; they often loosen, providing easy access to attics. Ventilation openings in soffits (under eaves) are best protected with metal louvers. Covering chimneys will prevent many mammal and bird species from “dropping in.”

MORE IS BETTER. Set the right number of traps. Skimping decreases effectiveness.

To protect children and pets, choose a tamper-proof model or conceal the trap in a coffee can or PVC pipe.

For more information

Braband, L. 2000. *Beasts be gone! A Practitioner's Guide to IPM in Buildings.* IPM # 609. (800) 635-8356; <www.nysaes.cornell.edu/ipmnet/ny>.

Caslick, J. and D. Decker. *Rat and Mouse Control.* Information Bulletin No. 163. Biological Sciences—Natural Resources 12. Cornell Cooperative Extension, Ithaca, NY 14853. (607) 255-2080.

Klass, C. and K. Snover. 2000. *Pest Management Around the Home: Cultural Methods.* Miscellaneous Bulletin 574. Cornell Cooperative Extension, Ithaca, NY. (607) 255-2080.

Oklowski, W., S. Daar, and H. Olkowski. 1991. *Common-Sense Pest Control.* Taunton Press, Newtown, CT, 716 pp.

Selecting a Pest Control Service. 1994. Illinois Department of Public Health. www.idph.state.il.us/envhealth/pcpestcntrl.htm

Simon, L. and W. Quarles. *Integrated Rat Management.* *Common Sense Pest Control Quarterly.* Vol. XII, No. 1, Winter 1996.

Timm, R. 1994. House Mice and Norway Rats. In *Prevention and Control of Wildlife Damage.* Cooperative Extension Division, Inst. Agr. & Nat. Res., University of Nebraska.

Other resources:

- Contact your local Cooperative Extension office: www.cce.cornell.edu
- NYS IPM Program: www.nysaes.cornell.edu/ipmnet/ny
- Centers for Disease Control and Prevention: www.cdc.gov Hantavirus (carried by deer and white-footed mice): <www.cdc.gov/ncidod/diseases/hanta/hps/index.htm>; LCM virus (carried by house mouse): <www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/arena.htm>
- NYS Dep't. of Health, Center for Environmental Health: To find local health dep't. phone numbers, call (800) 458-1158 or check www.health.state.ny.us
- Cornell's Pesticide Management Education Program: <http://pmep.cce.cornell.edu>
- National Pesticide Telecommunications Network: (800) 858-PEST; <http://ace.orst.edu/info/nptn>

The New York State IPM Program



We encourage people to adopt a sustainable approach to managing pests, using methods that minimize environmental, health, and economic risks. For more information: NYS Integrated Pest Management Program, 1-800-635-8356; NYSAES, Geneva, NY14456; <www.nysaes.cornell.edu/ipmnet/ny>. For additional copies of this brochure (IPM No. 603), contact your local Cooperative Extension office or the NYS IPM Program. Produced by the Community IPM Program, which is funded by Cornell University, Cornell Cooperative Extension, and the New York State Department of Environmental Conservation. Based on a brochure by Kathleen Sharpe. Editing/design: Jill Shultz; Carrie Koplinka-Loehr; Karen English-Loeb. Illustrations: Susan MacKay. **The recommendations in this publication are not a substitute for pesticide labeling. Read the label before applying any pesticide.** Cornell Cooperative Extension provides equal program and employment opportunities. 6M AP 9/00.

Evict and exile

MICE

from your home



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