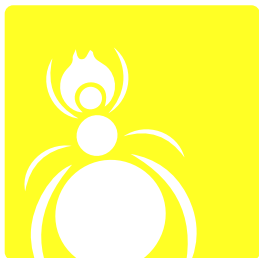
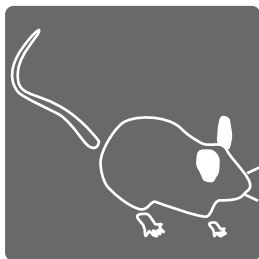
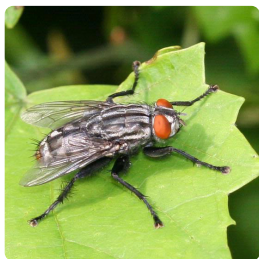


# Common Pests of Schools & Structures in Colorado



Colorado State University  
Extension

EXTENSION  
Utah State University





Any products, services or organizations that are mentioned, shown or indirectly implied in this publication do not imply endorsement by Colorado State University.

2015

# Common Pests of Schools & Structures in Colorado

Ryan Davis, Utah State University  
Deborah Young, Colorado State University  
Kelsie Johnson, Utah State University  
Roberta Armenta, Colorado State University  
Genevieve Berry, Colorado State University



## ORDERING INFORMATION

A pdf version is available online at the Colorado IPM Center Website (<http://ipm.agsci.colostate.edu>).

### Cover and inner cover photo credits:

Flesh fly: Johnny N. Dell, Bugwood.org.

Brownbanded cockroach: Kansas Department of Agriculture Archive, Bugwood.org.

Stink bug: David R. Lance, USDA APHIS-PPQ, Bugwood.org.

Bed bug: Gary Alpert, Harvard University, Bugwood.org.

Deer mouse: David Cappaert, Michigan State University, Bugwood.org.

Pavement ant: Joseph Berger, Bugwood.org.

German cockroach: Lmbuga, Wikimedia Commons.

© Colorado State University Extension  
Department of Bioagricultural Sciences and Pest Management  
08/2015

# TABLE OF CONTENTS

## Ants

Carpenter .....	4
Field.....	6
Odorous House .....	8
Pavement .....	10
Pharaoh .....	12

## Biting Insects

Bed Bugs .....	14
Head Lice.....	16
Mosquitoes.....	18

## Cockroaches

American.....	20
Brown Banded.....	22
German .....	24
Oriental .....	26

## Flies

Blow .....	28
Cluster .....	30
Drain .....	32
Flesh .....	34
Fruit.....	36
Fungus Gnats.....	38
House .....	40
Humpbacked (phorid) .....	42
Stable .....	44

## Nuisance Pests/Occasional Invaders

Booklice.....	46
Boxelder Bug .....	48
Brown Marmorated Stink Bug .....	50
Carpet Beetles .....	52
Clover Mite .....	54



# TABLE OF CONTENTS

Crickets .....	56
Elm Seed Bug.....	58
Ground Beetles .....	60
Isopods.....	62
Millipedes and Centipedes .....	64
Silverfish and Firebrats .....	66
Springtails.....	68
Western Subterranean Termite .....	70

## Stored Products Pests

Grain and Flour Beetles .....	72
Indianmeal Moth .....	74
Warehouse Beetle .....	76

## Spiders

Black Widow .....	78
Cellar.....	80
Ground.....	82
Hobo and Grass.....	84
Jumping.....	86
Orb Weaver.....	88
Sac.....	90
Wolf.....	92
Woodlouse .....	94

## Stinging Insects

Baldfaced Hornet .....	96
Bumble Bees .....	98
Honey Bee.....	100
Mason, Potter and Mud-Dauber Wasps .....	102
Paper Wasps.....	104
Sand Wasps and Cicada Killer.....	106
Solitary and Ground-Nesting Bees.....	108
Western Yellowjacket .....	110

# TABLE OF CONTENTS

## Vertebrate Pests

Bats .....	112
Deer Mice .....	114
House Mouse.....	116
Norway Rat .....	118
Rock Pigeon .....	120
Voies .....	122

## References

References.....	124
-----------------	-----

# FOREWORD

This guide was developed to aid in the identification and control of common arthropod and vertebrate pests found in and around Colorado's schools, urban buildings, and homes. It is not an exhaustive list of all urban pests in Colorado. After using this guide to identify a pest, verify the pest's identity using online resources or by contacting the Colorado State University Plant Diagnostic Lab. <http://plantclinic.agsci.colostate.edu>

Included in this handbook are pests common to the region and those documented to be a problem in schools and urban buildings. Each spread includes:

## IDENTIFICATION:

Brief description of the pest.

## NESTING HABITS:

Common nesting locations, structures, and nest components.

## DIET:

Preferred food of the pest.

## SIGNIFICANCE:

Consequences caused by the pest.

## IPM RECOMMENDATIONS:

Brief suggestions on how to handle the pest problem in a healthy and environmentally safe way.

# Carpenter Ants

Camponotus spp.

## Identification

- one node (see right arrow in top image)
- black or black with a reddish brown body
- abdomen covered in yellowish hairs
- ants of many sizes
- evenly rounded thorax differentiates them from field ants (see left arrow in top image)
- sawdust outside of nests/galleries (see middle image)

## Nesting Habits

- establish nests in wood (especially decaying wood)
- have a primary nest and separate satellite nests
- foragers—they go out in search of nutrients but return to the outdoor nest

## Diet

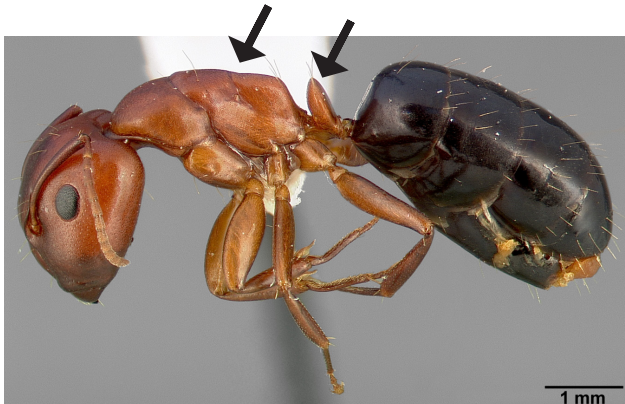
- living and dead insects, meats, and sweets, such as jelly, honey and honeydew excreted by aphids and other insects
- DO NOT eat wood but remove it to create galleries and tunnels

## Significance

- damage wood, infest food and may bite

## IPM Recommendations

- Have ants identified to determine possible damage severity.
- Find nesting locations by following workers back to their nest, if possible.
- Destroy indoor and outdoor primary and satellite nests.
- Remove and replace water-damaged or decaying wood.
- Seal potential ant entryways.
- Remove food and water sources.
- Use ant baits to help eliminate hard-to-find and nests.



Adult carpenter ant; thorax evenly rounded (April Nobile, Antweb.org)



Carpenter ant damage (Edward H. Holsten, USDA Forest Service, Bugwood.org)



Carpenter ant damage (Joseph O' Brien, USDA Forest Service, Bugwood.org)

# Field Ants

Formica spp.

## Identification

- black or reddish brown and black
- single node
- most common ant found in yards and gardens
- often mistaken for carpenter ants, but not as likely to forage indoors (observed indoors most commonly in spring)
- ants of multiple sizes
- depression in thorax differentiates them from carpenter ants

## Nesting Habits

- nest outdoors in loose soil
- may produce mounds (sometimes incorporating twigs, dried leaves and other plant materials) in exposed areas or nest under rocks, logs, etc.
- do not frequently come indoors

## Diet

- variety of foods
- prefer sweet materials such as honeydew excreted by aphids and other insects
- can be scavengers or predators

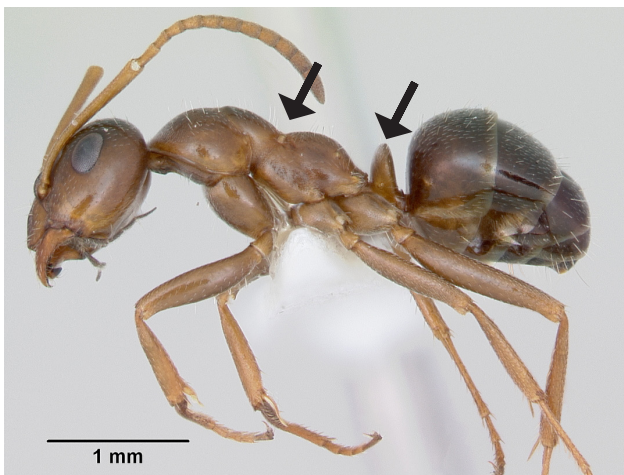
## Significance

- become a nuisance during swarming flights
- can create mounds in turf areas

## IPM Recommendations

- Seal potential ant entryways.
- Store food in airtight containers and dispose of trash regularly.
- Locate and destroy nests in lawn and adjacent areas.
- Control soft scale, mealybug or aphid populations on nearby ornamental plants.





Adult field ant; depression in thorax (arrow) (April Nobile, Antweb.org)



Field ant mound (Steven Katovich, USDA Forest Service, Bugwood.org)



Field ant worker (David Cappaert, Michigan State University, Bugwood.org)

# Odorous House Ant

*Tapinoma sessile*

## Identification

- dark brown to black
- 1/8 inch long
- ants of one size
- single-node ant; node difficult to see
- emit an odor similar to coconuts when disturbed or smashed
- raise abdomens in air and run around when disturbed

## Nesting Habits

- outdoors: nests shallow, in mulch next to buildings and in soil under protection
- indoors: nest in wall voids and under carpet, usually near water pipes or heaters

## Diet

- insects and sweets, especially honeydew excreted by aphids and other insects
- forage indoors for sweets, cooked vegetables, fruit and pastries

## Significance

- contaminate foods such as sweets, meats, dairy products and vegetables

## IPM Recommendations

- Locate and destroy all nests to avoid reinfestation. (Follow ants back from their food).
- Clean ant trails with soap and water.
- Trim shrubbery and trees away from buildings.
- Store food in airtight containers and dispose of trash regularly.
- Seal potential ant entryways.
- Use a bait specific to the odorous house ant.



Adult odorous house ant; hidden node (Fort Ord UCSC Reserve, Antweb.org)



Adult odorous house ants (Susan Ellis, Bugwood.org)



Adult odorous house ant and larva (Dale Ward, Discoverlife.org)

# Pavement Ant

*Tetramorium caespitum*

## Identification

- two nodes (bumps between middle and rear body sections)
- light to dark brown in color with fine grooves lining the head and thorax (middle body section)
- appendages (legs and antennae) lighter in color than the rest of the body
- workers of one size

## Nesting Habits

- characteristically produce small mounds at the entry of nests
- nests often located outdoors under stones, pavement cracks, wood, next to buildings and under building foundations
- enter homes through cracks in concrete
- nest in walls, under floors and around sinks
- typically swarm in spring after rain; can swarm indoors

## Diet

- prefer greasy and protein materials such as meats, pet food, sweets, bread, nuts and insects

## Significance

- contaminate foods and food-prep areas
- nuisance pest indoors and outdoors

## IPM Recommendations

- Inspect: locate and destroy nests.
- Store food in airtight containers.
- Dispose of trash regularly.
- Clean spills and food daily.
- Seal potential ant entryways.
- Use insecticidal baits.



Adult pavement ant (April Nobile, Antweb.org)



Pavement ant with wings (Whitney Cranshaw, Colorado State University, Bugwood.org)



Pavement ant swarm (Joseph Burger, Bugwood.org)



# Pharaoh Ant

*Monomorium pharaonis*

## Identification

- 1/12 - 1/16 inch long
- two nodes
- workers of the same size
- 12-segmented antennae with 3-segmented club
- golden yellow to red with darker markings down the back

## Nesting Habits

- wide variety of secluded places in cracks and crevices (countertops, baseboards, wall voids, under floors)
- prefer a warm and humid environment (e.g., near furnaces, hot water pipes and heat ducts)
- can travel along pipes and wiring
- more likely to nest indoors than other ants
- can have very large colonies
- can have multiple queens in one colony

## Diet

- sweets, protein, fat/grease
- syrups, jellies, grease, cake, pet food, dead insects, toothpaste, soap and several other things most insects would not feed on

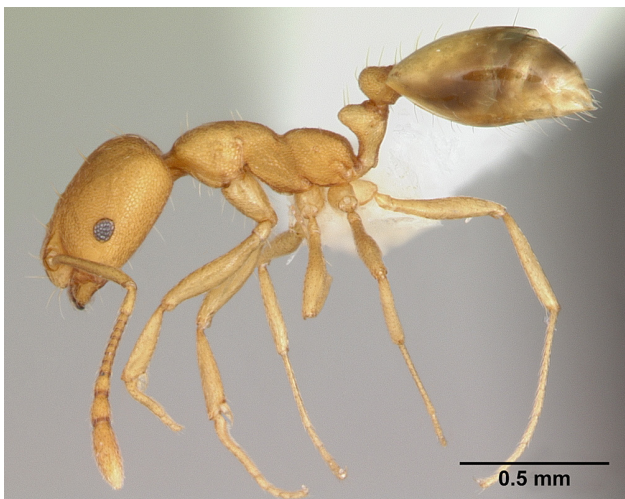
## Significance

- contaminate sweets and greases
- serious pest of dormitories, hospitals, schools and apartments

## IPM Recommendations

- Control may be hard because nests can be difficult to find and there may be multiple nesting sites in the building.
- Use a bait specific to the pharaoh ant.
- Baits could take time (months) to eliminate infestation.
- Do not use liquid or dust insecticides; they could spread ants, making the problem worse.





Adult pharaoh ant (April Nobile, Antweb.org)



Adult pharaoh ant dorsal (Eli Sarnat, Bugwood.org)

Adult pharaoh ant head and antennae (Eli Sarnat, Bugwood.org)



# Bed Bug

*Cimex lectularius*

## Identification

- clear (unfed young) to straw-colored to reddish-brown
- oval-shaped, flat bodies
- NEVER with wings; six legs

## Nesting Habits

- rest in crevices and cracks near or on furniture
- student backpacks, clothing, wheelchairs, books, personal items, etc.

## Diet

- human blood; can feed day or night
- must feed between every life stage

## Significance

- can be difficult and costly to eliminate
- bites may result in redness, itching and swelling
- infestations can cause sleeplessness and nervousness in those who have been bitten
- negative social publicity for schools and social stigma

## IPM Recommendations

- Develop a bed bug action plan before bed bugs are present, and train all faculty and staff.
- Consider identification by a professional entomologist.
- Inspect and monitor areas with upholstered furniture as well as donations, lost and found items and children's belongings.
- Remove clutter or store in sealable containers.
- Seal cracks and crevices.
- Heat-treat individual infested items.
- Be discrete in dealing with persons bringing bed bugs into buildings on personal belongings.
- There are many controls available, consult with a professional entomologist on best control methods.



Adult bed bug (Gary Alpert, Harvard University, Bugwood.org)



Bed bugs in fabric (Gary Alpert, Harvard University, Bugwood.org)



Hatched bed bug eggs (Gary Alpert, Harvard University, Bugwood.org)

# Head Lice

*Pediculus humanus capitis*

## Identification

- adults: small, rust-colored insect about the size of a sesame seed
- eggs (nits) resemble dandruff flakes both in appearance and size

## Nesting Habits

- hold on to hair above ears and near neckline with claw-like legs
- spread by direct contact with infested persons or belongings

## Diet

- feed by piercing skin with claws and sucking out blood

## Significance

- bites result in small, red, itchy bumps on scalp and shoulders
- will die within 2 days if they are not on a host

## IPM Recommendations

- Perform inspections often, especially when other children are known to have lice.
- Encourage children NOT to share brushes, combs, hats, barrettes, towels and bedding.
- Clean carpets and furniture in classrooms frequently.
- Be aware of medical and privacy issues.
- Consult your school nurse.



Adult head louse (Gilles San Martin, Wikimedia Commons)



Head Lice (Jim Occi, BugPics, Bugwood.org)

Head lice nits (Kosta Momcuoglu, Wikimedia Commons)



# Mosquitoes

Culicidae

## Identification

- delicate biting fly
- long, needle-like mouthparts
- immature stages are found in water
- larvae move by wriggling their bodies

## Nesting Habits

- eggs laid in standing or slow-moving water or moist areas that occasionally flood

## Diet

- blood (females)

## Significance

- some species can transmit West Nile Virus
- bites can cause itching

## IPM Recommendations

- Locate and remove all sources of standing water, including clogged gutters/spouts, play equipment, irrigation boxes, poorly drained turf, clogged drains, holes in trees, etc.
- In areas of standing water that can't be drained, a product known as "mosquito dunks", containing a bacteria toxic to mosquito larvae, can be used.
- Keep screens in good repair to prevent adult mosquitos from entering a building.
- Avoid outside activity when mosquitos are active (dawn and dusk).
- Wear long-sleeved shirts, long pants and a hat.





Adult mosquito (Susan Ellis, Bugwood.org)



Mosquito feeding on a human (Ary Farajollahi, Bugwood.org)



Mosquito larvae (Jim Occi, BugPics, Bugwood.org)

# American Cockroach

*Periplaneta americana*

## Identification

- reddish-brown with a lighter border around the head
- largest species commonly found in Colorado; up to 2 inches long

## Nesting Habits

- can live outdoors and indoors
- usually found in basements or on the first floor
- move indoors during hot weather and flooding
- found in warm, moist areas—under sinks, in bathtubs, in sewer drains and in furnace and boiler rooms

## Diet

- eat almost anything but mostly decaying vegetation, insect remains and sweets

## Significance

- may carry disease pathogens and excrete a foul smelling odor
- cause allergic reactions, similar to asthma, in some people
- can be an asthma trigger

## IPM Recommendations

- Continually monitor for roaches in pest vulnerable areas, especially kitchens, boiler rooms, custodial closets, etc. using sticky trap monitors.
- Educate occupants of building or room(s) of their role in eliminating roaches.
- Improve sanitation: dispose of trash regularly to remove food and shelter sources.
- Store food in pest-proof containers.
- Repair any leaks or plumbing malfunctions because cockroaches are attracted to damp environments.
- Caulk, install weather stripping or replace door sweeps where cockroaches can potentially enter the building.



Adult American cockroach (Daniel R. Suiter, University of Georgia, Bugwood.org)



American cockroach nymphs (Daniel R. Suiter, University of Georgia, Bugwood.org)



American cockroach egg case (Gary Alpert, Harvard University, Bugwood.org)

# Brown Banded Cockroach

*Supella longipalpa*

## Identification

- about 1/2 inch long; brown with light band behind head
- bell-shaped pattern on the back of the head

## Nesting Habits

- egg capsules are fastened to walls, ceilings, and in protected areas
- more commonly found in warmer, drier areas than the other common roaches– ceilings, high areas on walls, picture frames, furniture, etc.

## Diet

- may consume materials like glue or paste, starch and certain color dyes present in stamps, older books and draperies

## Significance

- chew on nonfood materials such as fabric
- feed on and harbor within food stored indoors
- carry pathogens that cause diseases on their bodies that can be deposited on food, cookware, etc.
- can trigger asthma or allergic reactions

## IPM Recommendations

- Educate occupants of building or room(s) of their role in eliminating roaches.
- Improve sanitation.
- Store food in pest-proof containers.
- Inspect and monitor all areas where food is prepared, stored, or eaten and where moisture and heat are present.
- Use cockroach traps to determine species, harborage location and movement.
- Vacuum (with a HEPA filter) existing roaches and ootheca (egg cases).
- Use roach baits.



Adult brown banded cockroach (Kansas Department of Agriculture Archive, Bugwood.org)



Brown banded cockroach nymphs and fecal matter (Gary Alpert, Harvard University, Bugwood.org)



Brown banded cockroach eggs (Pest and Diseases Image Library, Bugwood.org)

# German Cockroach

*Blattella germanica*

## Identification

- light brown with two dark strips right behind the head
- small: 1/2 - 5/8 inch long

## Nesting Habits

- prefer warm, moist areas near food preparation and/or storage (primary kitchen-infesting roach in Colorado)
- found near sinks, appliances, furnaces, etc.

## Diet

- highly varied and diverse

## Significance

- may carry pathogens on their bodies and contaminate food
- can cause allergic reactions or asthma symptoms

## IPM Recommendations

- Educate occupants of building or room(s) of their role in eliminating roaches.
- Inspect incoming shipments of food or products for roaches or egg sacs.
- Improve sanitation (deep clean infested areas).
- Inspect and monitor all areas where food is prepared, stored, or eaten, and where moisture and heat are present.
- Use cockroach traps to determine infestation level, harborage location, movement and control success.
- Store food in pest-proof containers.
- Vacuum (with a HEPA filter) existing roaches and ootheca (egg cases).
- Use roach baits.
- Dispose of trash regularly to remove food and shelter sources.
- Do not store items in cardboard boxes long-term.
- Repair leaks and plumbing malfunctions.





German cockroach adult (Gary Alpert, Harvard University, Bugwood.org)



German cockroach adults and nymphs (Ryan Davis, Utah State University)



German cockroach egg (Gary Alpert, Harvard University, Bugwood.org)

# Oriental Cockroach

*Blatta orientalis*

## Identification

- dark brown to black with wings that are not as long as the body or that appear absent

## Nesting Habits

- often found in basements, cellars, crawl spaces and sewers, near drains, leaky pipes and faucets and under refrigerators and sinks
- also referred to as “water bugs” because they can be found in cool, damp, dark areas
- infestations common in spring through fall
- very commonly come up and out of floor drains

## Diet

- garbage and decaying organic material

## Significance

- cause allergic reactions, similar to asthma, in some people
- may carry pathogens on their bodies and spread food contamination

## IPM Recommendations

- Prevent roaches from coming out of drains.
- Improve sanitation.
- Store food in pest-proof containers.
- Inspect and monitor all areas where food is prepared, stored, or eaten, and where moisture and heat are present or where floor drains exist.
- Use cockroach traps to determine infestation level, harborage location, movement and control success.
- Repair leaks or plumbing malfunctions.
- Caulk and install weather stripping and door sweeps where cockroaches can potentially enter the building.
- Use cockroach baits to control populations.



Adult oriental cockroach (Kansas Department of Agriculture Archive, Bugwood.org)



Oriental cockroach remains (Bestiasonica, Wikimedia Commons)



Oriental cockroach adults and nymphs (Acrocynus, Wikimedia Commons)

# Blow/Bottle Flies

Calliphoridae

## Identification

- medium-sized and robust with a metallic appearance
- metallic-looking green and blue are common forms

## Nesting Habits

- eggs may be laid on dead animals, garbage/dumpster receptacles, decaying organic material and manure
- many flies indoors may indicate that an animal has died in a wall void or somewhere within the building

## Diet

- larvae feed on animal carcasses, garbage, decaying organic material and manure

## Significance

- could spread disease from one food source to food preparation areas, other food, etc.
- nuisance inside buildings

## IPM Recommendations

- Keep exterior doors closed, install screen doors, or install an automatic door closer, especially on doors leading into the kitchen.
- Keep screens in good repair.
- Improve sanitation.
- Keep dumpsters at least 50 feet from the building.
- Locate breeding substrate, if possible, and remove.
- Keep trash cans, dumpsters and garbage areas clean and free of odor.
- Close lids on dumpsters and garbage cans.
- Exclude fly entry via caulking, weather stripping, door sweeps, etc.
- Properly place light traps to catch flies that come indoors.
- Use a fly swatter.



Blue bottle fly adult (Obsidian Soul, Wikimedia Commons)



Green bottle fly adult (Julia Wilkins, Wikimedia Commons)



Blow fly larvae (Joel Smith, Utah State University)

# Cluster Flies

Pollenia spp.

## Identification

- dull grayish-brown
- yellow hairs on the thorax
- slow moving; frequent at indoor windows in the winter

## Nesting Habits

- adult flies lay eggs in soil and the maggots move to and develop on earthworms in fields and turf
- as many as four generations per growing season
- seek overwintering sites in buildings in August and September; attracted to sunny, warm walls on building exterior
- typically overwinter in upper levels of buildings (e.g., attics, wall voids, false ceilings)

## Diet

- larvae (maggots) develop as parasites of earthworms
- not associated with garbage or animal wastes
- adults feed on flower nectar

## Significance

- adults seek sheltered areas to overwinter such as crevices and cavities in buildings in late summer and early fall
- may become active during warm periods of winter

## IPM Recommendations

- Monitor for cluster flies in the fall on the outside of buildings on south- and west-facing sunny walls.
- Monitor for cluster flies in the winter on window sills.
- Caulk and seal exterior openings, cracks and crevices on building exterior.
- Keep screens in good repair.
- Vacuum flies.
- Use a fly swatter.



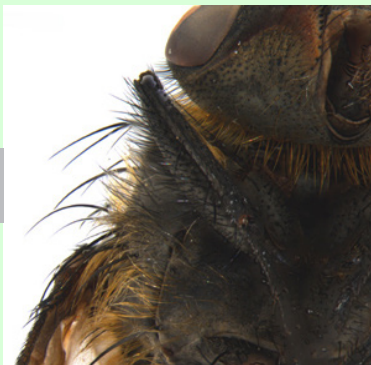


Adult cluster fly with checkerboard pattern (Ryan Davis, Utah Sate University Extension)



Adult cluster fly (Tristram Brelstaff, Wikimedia Commons)

Yellow hairs on cluster fly (Ryan Davis, Utah State University Extension)



# Drain (Moth) Fly

*Psychoda phalaenoides*

## Identification

- small: about 1/8 inch in length
- very hairy
- wings covered in fine hairs give them a moth-like appearance

## Nesting Habits

- develop in the scum lining drains and sewer lines or decaying organic material
- larvae hide behind scum making attempted treatments with boiling water, pesticides or other chemicals ineffective
- can breed around broken pipes/drains beneath slabs or in crawlspaces, and enter buildings through floor cracks, etc.

## Diet

- drain scum
- decaying organic matter

## Significance

- have the potential to carry pathogens acquired from drains
- bodies of dead flies may disintegrate to form allergens

## IPM Recommendations

- Locate the breeding site and remove.
- Remove larval habitat by using a hard bristle brush to remove the scum film from inside the drain.
- Use an enzyme drain cleanser to maintain drains free of organic film.
- If flies are coming from voids, crawl spaces or slabs, fix the moisture issue causing the problem.





Adult drain fly (Joseph Berger, Bugwood.org)



Adult drain fly (Sanjay Acharya, Wikimedia Commons)



Drain fly pupa (Charles Olsen, USDA APHIS PPQ, Bugwood.org)

# Flesh Flies

*Sarcophaga* spp.

## Identification

- large and gray with a checkerboard pattern on abdomen
- three dark stripes on top of thorax (house fly has four)

## Nesting Habits

- eggs may be laid on dead animals, in or around garbage/dumpster receptacles, and decaying organic material
- many flies indoors may indicate that an animal has died in a wall void or somewhere within the building

## Diet

- larvae feed mostly on animal carcasses, garbage, and decaying organic material

## Significance

- could spread disease from one food source to food preparation areas, other food, etc.
- nuisance inside buildings; infrequent indoor pest

## IPM Recommendations

- Keep exterior doors closed, install screen doors or install an automatic door closer, especially on doors leading into the kitchen.
- Keep screens in good repair.
- Improve sanitation.
- Keep dumpsters at least 50 feet from the building.
- Locate breeding substrate, if possible, and remove.
- Keep trash cans, dumpsters and garbage areas clean and free of odor.
- Close lids on dumpsters and garbage cans.
- Exclude fly entry via caulking, weather stripping, door sweeps, screens, etc.
- Properly place light traps to catch flies that come indoors.
- Use a fly swatter.



Adult flesh fly (Johnny N. Dell, Bugwood.org)



Adult flesh fly (Muhammad Mahdi Karim, Wikimedia Commons)



Flesh fly larva (Pest and Diseases Image Library, Bugwood.org)

# Fruit Flies

*Drosophila* spp.

## Identification

- small; 1/8 inch long
- bright red eyes

## Nesting Habits

- eggs laid on ripe or over-ripe fruit, vegetables or on decaying organic material

## Diet

- ripened fruit, vegetables or decaying organic material

## Significance

- nuisance indoors
- can transmit disease to food or food handling areas

## IPM Recommendations

- Keep exterior doors closed, install screen doors or install an automatic door closer, especially on doors leading into the kitchen.
- Exclude fly entry via caulking, weather stripping, door sweeps, screens, etc.
- Keep screens in good repair.
- Locate breeding substrate, if possible, and remove.
- Improve sanitation, especially with fruit and food material, soda cans (recycle), juice boxes, mop and broom heads and even floor drains.
- Keep dumpsters at least 50 feet from the building.
- Keep trash cans, dumpsters and garbage areas clean and free of odor.
- Close lids on dumpsters and garbage cans.
- Regularly clean floor drains.
- Vinegar traps or commercially produced fruit fly traps can catch flies that come indoors.



Adult fruit fly (Mohammed El Damir, Bugwood.org)



Fruit flies feeding on cake (Pest and Diseases Image Library, Bugwood.org)



Fruit fly adult (Muhammad Mahdi Karim, Wikimedia Commons)

# Fungus Gnats

Sciaridae and Fungivoridae

## Identification

- smaller, dark, delicate-looking flies similar in appearance to mosquitos
- light gray to clear wings
- long slender legs
- segmented antennae

## Nesting Habits

- eggs and larvae nest in soil/moist organic material
- usually originate from soil in potted plants
- can develop in soil or mulch outside of building
- attracted to light (e.g., windows and exterior lighting)

## Diet

- larvae feed on fungi in soil, potting mix, mulch, etc.

## Significance

- flies inside are a nuisance
- when present in large numbers, larvae can damage roots and stunt growth of seedlings and young plants

## IPM Recommendations

- Locate breeding substrate and remove or alter.
- Do not overwater plants.
- Let soil in potted plants dry out between watering.
- Keep exterior doors closed, install screen doors, or install automatic door closers.
- Exclude fly entry via caulking, weather stripping, door sweeps, screens, etc., especially around windows and doors.
- If flies are coming from outside, consider changing exterior lighting to sodium vapor lighting.
- Use nematode-based insecticides (e.g., Gnatrol) on soil of affected potted plants.





Adult fungus gnat (Johnny N. Dell, Bugwood.org)



5509587

Adult fungus gnat (Whitney Cranshaw, Colorado State University, Bugwood.org)



Fungus gnat larvae (Whitney Cranshaw, Colorado State University, Bugwood.org)



# House Fly

*Musca domestica*

## Identification

- 1/4 inch long
- four black stripes on the prothorax
- similar in appearance to the face fly

## Nesting Habits

- eggs laid on animal manure or decaying organic matter (especially garbage and dumpsters)

## Diet

- larvae feed on manure and decaying organic material
- adults feed on manure, decaying organic material and human food products

## Significance

- could spread disease from one food source to food preparation areas, other food, etc.
- nuisance inside buildings

## IPM Recommendations

- Keep exterior doors closed, install screen doors, or install an automatic door closer, especially on doors leading into the kitchen.
- Keep screens in good repair.
- Improve sanitation.
- Keep dumpsters at least 50 feet from the building.
- Locate breeding substrate, if possible, and remove.
- Keep trash cans, dumpsters and garbage areas clean and free of odor.
- Close lids on dumpsters and garbage cans.
- Exclude fly entry via caulking, weather stripping, door sweeps, etc.
- Properly place light traps to catch flies that come indoors.
- Use a fly swatter.



Adult house fly (Pest and Diseases Image Library, Bugwood.org)



House fly life cycle: eggs (top middle), adults (right), larvae (bottom left), pupae (top left) (Clemson University Slide Series, Bugwood.org)

# Phorid (Humpbacked) Flies

Phoridae

## Identification

- very small; 1/64 - 1/8 inch long
- steep arch or humped back behind head
- eyes not red

## Nesting Habits

- eggs laid on decomposing organic material
- larvae need moist, organic material to survive
- floor drains are a common breeding ground
- occasionally found near broken pipes under slabs
- trash cans, dumpsters, moist food in floor or kitchen equipment cracks/crevices, soil in potted plants, dirty mopheads and pet cages (on moist feces/food)

## Diet

- decomposing organic materials

## Significance

- nuisance pest indoors
- could transmit disease to food or food-handling areas

## IPM Recommendations

- Locate breeding substrate, if possible, and remove.
- Regularly clean floor drains.
- Keep exterior doors closed, install screen doors, or install an automatic door closer, especially on doors leading into the kitchen.
- Exclude fly entry via caulking, weather stripping, door sweeps, screens, etc.
- Keep dumpsters at least 50 feet from the building.
- Close lids on dumpsters and garbage cans.
- Inspect and clean trash cans, dumpsters and garbage areas.
- Keep food preparation area floors and equipment very clean.



5509597

Phorid fly adults (Whitney Cranshaw, Colorado State University, Bugwood.org)



Phorid fly adult (USDA ARS, Wikimedia Commons)



Adult phorid fly (Charles Lewallen, Wikimedia Commons)

# Stable Fly

*Stomoxys calcitrans*

## Identification

- 1/4 inch; gray
- four dark stripes on top of thorax (similar to house fly)
- mouth parts are long and straw-like for blood feeding

## Nesting Habits

- eggs may be laid on moist straw or decaying organic matter such as hay and grass clippings and chicken manure

## Diet

- larvae feed mostly on animal carcasses, garbage, and decaying organic material

## Significance

- can inflict painful bites
- nuisance inside buildings; enter buildings from outside

## IPM Recommendations

- Keep exterior doors closed, install screen doors, or install an automatic door closer, especially on doors leading into the kitchen.
- Keep screens in good repair.
- Improve sanitation.
- Keep dumpsters at least 50 feet from the building.
- Locate breeding substrate, if possible, and remove.
- Keep trash cans, dumpsters and garbage areas clean and free of odor.
- Close lids on dumpsters and garbage cans.
- Exclude fly entry via caulking, weather stripping, door sweeps, screens, etc.
- Properly place light traps to catch flies that come indoors.
- Use a fly swatter.
- If animals are raised on school-adjacent properties, consider discussing control options with owner.



Adult stable fly (Whitney Cranshaw, Colorado State University, Bugwood.org)



Adult stable fly mouthparts (Pavel Krok, Wikimedia Commons)



Stable fly life cycle (University of Nebraska)

# Booklice/Psocids

Psocoptera

## Identification

- minute: 1/32 - 1/4 inch long
- very common on pest monitors; look like small specks; use hand lens to identify
- mostly wingless, but may also have wings
- some psocids are also called barklice

## Nesting Habits

- require moisture or high humidity
- can be found around damp books, around leaking/sweating pipes, in voids, in cardboard boxes or anywhere where mold growth can be supported

## Diet

- mold spores

## Significance

- nuisance pest indoors
- indicator of moisture issues

## IPM Recommendations

- Reduce relative humidity within trouble areas.
- Vacuum.





Booklice (Tony Willis, Wikimedia Commons)



Booklice (David Sheltar, Ohio State University, Bugwood.org)



Barklice (Wikimedia Commons)

# Boxelder Bug

*Boisea trivittata*

## Identification

- black bugs with red markings on body
- immature forms are smaller but easily distinguished from adults by their lack of wings and red abdomens
- look similar to red fire bugs and other related groups

## Nesting Habits

- found in and around buildings in the spring and fall
- female boxelder trees or other seed-producing maples
- overwinter in cracks and crevices of buildings, especially in unshaded, sunny sides/areas of exterior walls or leaf litter

## Diet

- prefer boxelder seeds, which are only found on female boxelder trees, but may feed on other maple seeds

## Significance

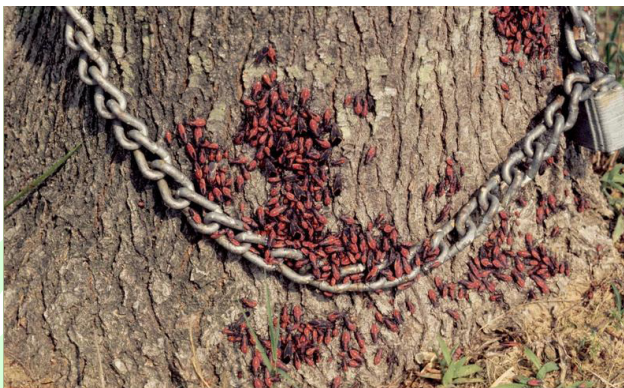
- nuisance: congregate on exterior walls of buildings in spring and summer; can come indoors and annoy occupants
- overwinter in cracks and crevices in buildings
- may stain lightly colored materials and emit an unpleasant odor when smashed
- not a health threat

## IPM Recommendations

- Remove female boxelder trees in the area if possible.
- Seal cracks that may allow boxelder bugs to enter buildings.
- Use a vacuum cleaner to remove indoor populations.
- Remove boxelder from tree planting lists.
- Plant non-maple trees to eventually shade sides of buildings where box elder bugs like to congregate.
- Vacuum often during spring and fall.



Adult boxelder bug (Joseph Berger, Bugwood.org)



Boxelder bug infestation (Jim Baker, North Carolina State University, Bugwood.org)



Left: Boxelder bug eggs (William M. Ciesla, Forest Health Management International, Bugwood.org)

Right: Boxelder bug adults and nymphs (Steven Katovich, USDA Forest Service, Bugwood.org)

# Brown Marmorated Stink Bug

*Halyomorpha halys*

## Identification

- shield-shaped insect; generally brown/gray in color
- alternating white and black bands on antennae
- smooth shoulders (no spines)
- black and white alternating pattern surrounding wing

## Nesting Habits

- can overwinter in mass in buildings and houses
- lay eggs on host plants

## Diet

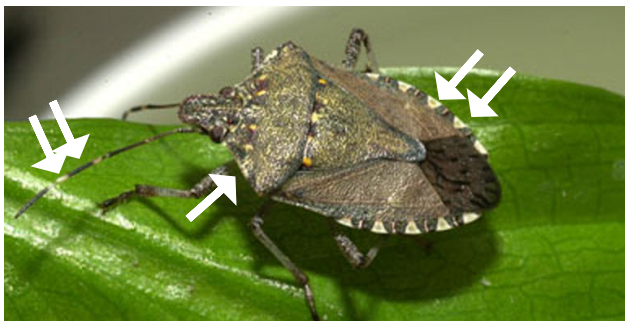
- broad host range including fruits, vegetables, field crops, ornamentals, weeds and native species

## Significance

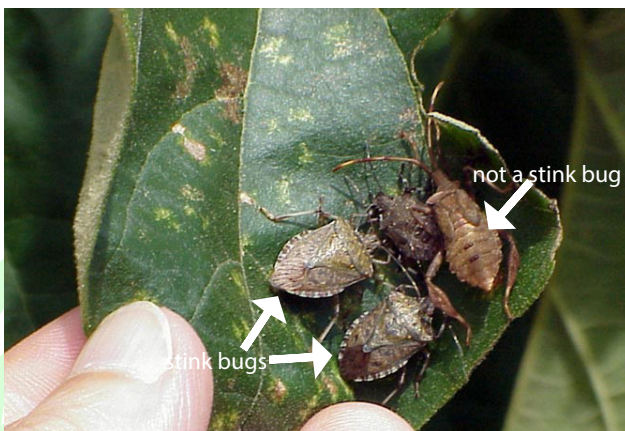
- nuisance: congregate indoors over winter; can annoy building occupants
- overwinter in cracks and crevices in buildings
- emit an unpleasant odor when smashed
- not a health threat
- can cause damage to host plants

## IPM Recommendations

- Seal cracks and crevices that may allow stink bugs to enter buildings.
- Vacuum to remove indoor and outdoor populations.
- Avoid planting host plants around buildings if possible.



Adult brown marmorated stink bug (David R. Lance, USDA APHIS PPQ, Bugwood.org)



Stink bug leaf damage (Gary Bernon, USDA APHIS PPQ, Bugwood.org)



Stink bug eggs and nymphs (David R. Lance, USDA APHIS PPQ, Bugwood.org)

# Carpet Beetles

Dermestidae

## Identification

- 1/16 - 1/4 inch beetle
- color highly variable: black to multi-colored
- often found in window sills
- larvae are small, hairy, tan-to-brown, sometimes black

## Nesting Habits

- live indoors and outdoors
- stored foods, animal hides/materials/textiles, dead animals in voids, grain-based rodenticides, under carpeting, baseboards, and furniture, under seat cushions of upholstered furniture or anywhere hair, lint, dead insects and food crumbs collect are prime areas
- areas of minimal use such as attics, basements, cubbies, under unused or seldom-moved furniture or appliances, etc., are also prime locations

## Diet

- varies by species (see above)

## Significance

- can damage fabrics and furniture
- can infest and destroy food items
- larval hairs can cause throat irritation if consumed

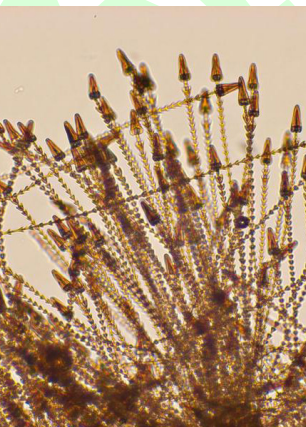
## IPM Recommendations

- Locate source of beetles (see above) and remove infested items.
- Locating the source of beetles can be very difficult.
- Seal cracks around the outside foundation wall.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Vacuum beetles that enter buildings.
- Store food in pest-proof containers.
- Thoroughly clean food storage and preparation areas.





Top left: Furniture beetle and Top right: Black carpet beetle (Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org); Bottom left: Warehouse beetle (Whitney Cranshaw, Colorado State University, Bugwood.org); Bottom right: Carpet beetle larva (Joseph Berger, Bugwood.org)



Left: Carpet beetle larvae (Whitney Cranshaw, Colorado State University, Bugwood.org)

Right: Carpet beetle larval hairs (Pest and Diseases Image Library, Bugwood.org)



# Clover Mite

*Bryobia praetiosa*

## Identification

- very tiny; about the size of a period on a typed page
- green to black, sometimes with red/orange markings/legs
- very long front legs that look like antennae (see arrows)
- use a hand lens to identify

## Nesting Habits

- live primarily in turfgrass

## Diet

- primarily turfgrass

## Significance

- migrate indoors in the late spring and fall (often up the exterior sides of buildings and through windows)
- mites numbering in the hundreds or thousands can be a major nuisance
- can stain fabric when smashed
- not a health threat

## IPM Recommendations

- Create a turf- and weed-free boundary around buildings 3-5 feet wide minimum.
- Within boundary, use pea-gravel or mulch to repel mites.
- Within boundary, use plants that are unattractive to clover mites, such as geranium, chrysanthemum, zinnia, marigold, salvia, rose, petunia or shrubs such as barberry, juniper and yew.
- Ensure that seals around windows are in good repair.
- Vacuum mites indoors and outdoors.
- Double-sided carpet tape can reduce numbers coming into buildings. Place tape as a barrier to building entry.
- Use supplemental irrigation in drought-stressed or hot parts of the turf to suppress mite migration.



Adult clover mite (Rayanne Lehman, Pennsylvania Department of Agriculture, Bugwood.org)



Clover mites (Whitney Cranshaw, Colorado State University, Bugwood.org)

Clover mite adult and eggs  
(J. Kalisch, University of  
Nebraska)



# Crickets

Gryllidae

## Identification

- 1/2 - 1 1/8 inches
- light brown to black, sometimes green
- long threadlike antennae that are longer than their body
- long “stingerlike” appendage coming out the rear of their body
- make a chirping noise

## Nesting Habits

- overwinter as eggs in soil
- found in moist areas such as mulch beds, woodpiles, weeds, stone piles, etc.

## Diet

- agricultural grain crops and vegetables
- fabrics, synthetics or leather and fur, especially when soiled with human perspiration

## Significance

- can cause damage to fabrics
- nuisance pest indoors

## IPM Recommendations

- Find and eliminate harborage outdoors such as weedy ornamental beds, wood piles, rock piles and moist, secluded areas.
- Seal cracks around the outside foundation wall.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Vacuum crickets that enter buildings.



House cricket (Clemson University, Bugwood.org)



Field cricket (Joseph Berger, Bugwood.org)

5402825



Snowy tree cricket (Joseph Berger, Bugwood.org)

# Elm Seed Bug

*Arocatus melanocephalus*

## Identification

- black and red bug about 1/3 inch long
- triangular segment between the top part of the wings
- triangle is black and surrounded by red on the top portion of the wings (see bottom picture, 2nd bug)
- alternating black and red pattern outside of wings (see top photo)
- red abdomen on underside (see middle photo)

## Nesting Habits

- found in and around buildings in the spring and fall, especially outdoors where elm seeds have accumulated in the spring
- elm trees

## Diet

- elm seeds

## Significance

- nuisance: congregate around buildings that have nearby elm trees and elm seeds; can come indoors and annoy occupants
- overwinter in cracks and crevices in buildings
- may stain lightly colored materials and emit an unpleasant odor when smashed
- not a health threat

## IPM Recommendations

- Remove elm trees in the area if possible.
- Seal cracks that may allow bugs to enter buildings.
- Vacuum to remove indoor populations.
- Vacuum to remove outdoor populations.
- Remove elm seeds that have collected around buildings.
- Remove elm from tree planting lists.
- Remove volunteer elm while they are small.



Elm seed bug (Charles Olsen, USDA APHIS PPQ, Bugwood.org)



Elm seed bug (Charles Olsen, USDA APHIS PPQ, Bugwood.org)



Elm seed bug life stages (Ryan Davis, Utah State University Extension)

# Ground Beetles

Carabidae

## Identification

- 1/16 to 1 3/8 inches long
- most are black or dark red, although some are blue, brown, or green
- typically have shiny/glossy/metallic sheen
- very common in pest monitors

## Nesting Habits

- outdoors under logs, rocks, debris, etc.

## Diet

- predaceous on other arthropods

## Significance

- nuisance indoors
- beneficial outdoors

## IPM Recommendations

- Minimize hiding areas near the foundation.
- Seal cracks around the outside foundation wall.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Vacuum beetles that enter buildings.
- Change exterior lighting to sodium vapor bulbs.





Predaceous ground beetle (Jim Jasinski, Ohio State University, Bugwood.org)



Predaceous ground beetle (Llona L., Wikimedia Commons)



Predaceous ground beetle (Wikimedia Commons)

# Isopods

Isopoda

## Identification

- also known as sowbugs or pillbugs
- range from 1/4 to 5/8 inch long
- dark to slate gray
- oval, segmented, armored bodies
- can roll up into a tight ball when disturbed

## Nesting Habits

- many habitats including moist soil, leaves, grass, wood piles, mulch and stones
- require high moisture
- come indoors when moist conditions exist

## Diet

- decaying organic material

## Significance

- occasionally come indoors under thresholds/doors
- may be a nuisance indoors

## IPM Recommendations

- Minimize moisture and hiding/feeding areas near the foundation.
- Seal cracks around the outside foundation wall.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Vacuum individuals that enter buildings.



Adult pill bug (Joseph Berger, Bugwood.org)



Adult pill bugs (Gary Alpert, Harvard, Bugwood.org)



Pill bugs (Wikimedia Commons)

# Millipedes/Centipedes

Diplopoda; Chilopoda

## Identification

millipedes:

- 1/16 inch to 2 inches long (commonly); rounded
- dark brown to gray, sometimes clear
- two pair of legs per segment
- common in pest monitors

centipedes:

- 1/8 inch to 2 inches long (commonly); flatter
- yellowish to brown
- one pair of legs per segment

## Nesting Habits

millipedes:

- lay eggs in soil or organic material
- need high moisture

centipedes:

- areas of high moisture, especially in basements, wash rooms, etc.
- under bark, under organic material, under rocks, etc.

## Diet

- millipedes: decaying/moist organic material
- centipedes: predatory on other insects and spiders

## Significance

- can be a nuisance indoors
- presence of either indicates a moisture issue inside or outside of the building
- not a health risk

## IPM Recommendations

- Reduce or eliminate moisture issues indoors and outdoors.
- Exclude entry via caulking, weather stripping, door sweeps, screens, etc.
- Vacuum when present.



Adult millipede (Whitney Cranshaw, Colorado State University, Bugwood.org)



Adult centipede (Joseph Burger, Bugwood.org)



House centipede (Joseph Burger, Bugwood.org)



# Silverfish and Firebrats

*Lepisma* spp.; *Ctenolepisma* spp.; *Thermobia* spp.

## Identification

- 1/2 - 3/4 inch long and have scales
- slender, wingless soft-bodied insects
- fire brats are brown or gray, and silverfish are shiny silver or pearl gray
- long antennae
- three long filaments off the back end
- very common in pest monitors

## Nesting Habits

- females lay eggs in crevices, on cloth or buried in food or dust, usually around moist (moisture not always necessary), warm areas or paper products
- very common around vending machines, art rooms, libraries, or anywhere there is moisture, heat, and paper
- present in most buildings

## Diet

- paper, fabrics, and similar materials
- glue or pastes in paper/books
- dead insects

## Significance

- scrape surface of paper

## IPM Recommendations

- Complete control is difficult.
- Reduce moisture by fixing leaky plumbing.
- Remove or store potential food sources in sealed containers.
- Vacuum regularly under vending machines and in cracks and crevices around vending machines, book shelving, etc.
- Seal all cracks and crevices in the above-mentioned areas.





Adult silverfish (Clemson University, Bugwood.org)



Adult firebrat (Clemson University, Bugwood.org)



Silverfish damage (Clemson University, Bugwood.org)

# Springtails

Collembola

## Identification

- very small: 3/16 inch
- appear to jump or fling when disturbed
- color ranges from black to gray to white
- do not have wings
- use a hand lens to identify

## Nesting Habits

- naturally very numerous in soil/turf
- require moisture; prefer cool, moist conditions
- can overcrowd in moist soils with high amounts of organic matter
- frequently seen crawling around on concrete

## Diet

- decaying vegetation, fungi, bacteria, pollen, algae, lichens, arthropod feces, carrion

## Significance

- can migrate indoors in large numbers in late spring/early summer when soil starts to dry out, seeking moisture

## IPM Recommendations

- Inspect area under sinks and other moisture sources for springtails, because they seek moisture indoors.
- Seal cracks and crevices where springtails may enter structures.
- Reduce clutter and clean under sinks and around areas with a water source.
- Thoroughly clean baseboards, cracks and crevices around problem areas.
- Vacuum springtails that enter structures.



Adult springtail (Ryan Davis, Utah State University Extension)



Springtails (Samuel Abbott, Utah State University)



Springtails (Ryan Davis, Utah State University Extension)

# Western Subterranean Termite

*Reticulitermes hesperus*

## Identification

- swarmers (winged) 3/8 inch long; dark body and legs
- Winged termites differ from winged ants in that termites have equal-length front and back wings, bead-like antennae and a broad connection between the middle and rear of the body
- workers 1/4 - 3/8 inch long; pale cream color
- soldiers similar to workers but have a large head and mouthparts (see comparison in middle image)

## Nesting Habits

- prefer to nest in moist wood in contact with the soil
- mud tubes are used to cross masonry or other surfaces
- indoors can be found anywhere wood products and moisture exist

## Diet

- feed directly on wood, typically the softer layers (springwood) or on wood byproducts (e.g., drywall, paper-based ceiling tiles)

## Significance

- can cause structural damage to wood and wood products

## IPM Recommendations

- Eliminate wood-to-soil contact.
- Seal cracks and crevices in the foundation.
- Wood siding, stucco and foam board should be at least 6 inches from the ground.
- Keep Vegetation trimmed and away from the foundation.
- Repair leaking plumbing and other moisture sources.
- Reduce humidity in basements, crawlspaces, etc.
- Use baits in conjunction with moisture-reducing tactics to eliminate colonies.
- Consider hiring a professional to control termites.





Eastern subterranean termite (Gary Alpert, Harvard University, Bugwood.org)



Eastern subterranean termites (Gary Alpert, Harvard University, Bugwood.org)



Termite mud tubes (USDA FS Wood Products Insect Lab Archive, Bugwood.org)

# Grain Beetles

*Oryzaephilus* spp.; *Tribolium* spp.

## Identification

- 1/8 inch long; brown to red
- use hand lens to identify
- sawtoothed grain beetle has spines on side of body behind the head
- red flour beetles have clubbed antennae and eyes split above and below the head
- other small beetles in grain also exist; consider collecting beetles for identification by USU Extension

## Nesting Habits

- eggs laid on stored food products, especially of high moisture content
- both prefer damaged food rather than intact grains, kernels, etc.

## Diet

- highly varied
- grain products, cereals, breads, peas, beans, dried meats, macaroni, nuts, dried fruits, spices, chocolate, drugs, tobacco, herbarium, insect and museum specimens

## Significance

- infest food rendering it inedible

## IPM Recommendations

- Inspect all incoming food items for pests.
- Quickly clean up all spilled food products, especially in food storage areas.
- Properly store all susceptible food items in pest-proof containers.
- Keep food in regular rotation.
- Keep moisture low in food storage areas by improving ventilation.
- Dispose of infested food items.





Sawtoothed grain beetle (Kansas Department of Agriculture Archive, Bugwood.org)



Left: Red flour beetle adults (Emilie Bess, USDA APHIS PPQ, Bugwood.org)

Above: Red flour beetle larva (Frank Peairs, Colorado State University, Bugwood.org)



Red flour beetle in wheat (Clemson University, Bugwood.org)

# Indian Meal Moth

*Plodia interpunctella*

## Identification

- very tiny moth: 5/8 - 3/4 inch long
- weak, meandering flier
- wings with copper-colored tips
- use hand lens to see wing tips if necessary
- typically fly at night

## Nesting Habits

- lay eggs on stored food products
- pupate off food in food storage area, containers, etc.

## Diet

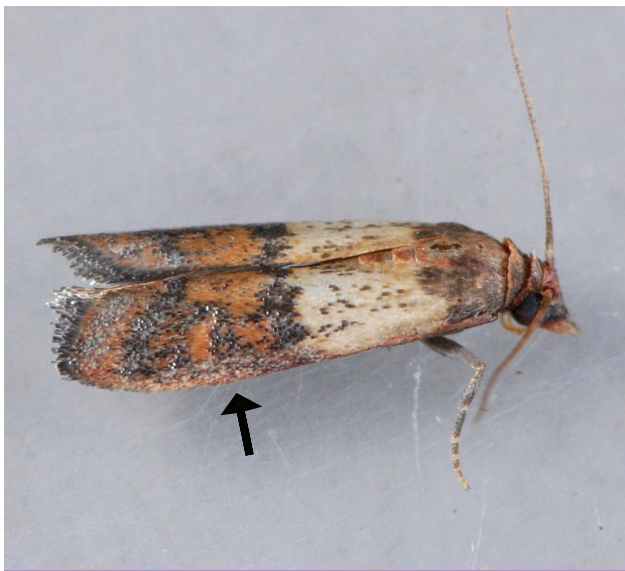
- wide variety of stored food products
- grains/grain products, cereals, dried fruits, seeds, nuts, powdered milk, biscuits, chocolate, candy, spices, dry pet food, bird seed, etc.

## Significance

- very common in homes and food storage areas
- larvae feeding destroys stored food items
- contamination by larvae droppings and silken webs
- moths are an annoyance to building occupants

## IPM Recommendations

- Inspect all incoming food items for pests.
- Quickly clean up all spilled food products and food storage shelves and storage areas in general.
- Properly store all susceptible food items in pest-proof containers.
- Keep food in regular rotation.
- Keep moisture low in food storage areas by improving ventilation.
- Dispose of infested food items.
- Consider monitoring in food storage areas with an Indian meal moth pheromone lure and trap.



Indian meal moth adult (Mark Dreiling, Bugwood.org)



Indian meal moth larvae and adult (Clemson University, Bugwood.org)

# Warehouse Beetle

*Trogoderma variabile*

## Identification

- 1/8 inch long
- covered in orange, white and black scales/hairs
- look similar to other carpet beetles; verify ID

## Nesting Habits

- lay eggs in stored food products and any animal or plant-based products

## Diet

- cake mix, candy, cereals, chocolate, cookies, corn, dog food, pasta, oats, peas, potato chips, dried fruit, rice, spices
- anything of animal origin including dead animals and pet and human hair that has collected on the floor, etc.

## Significance

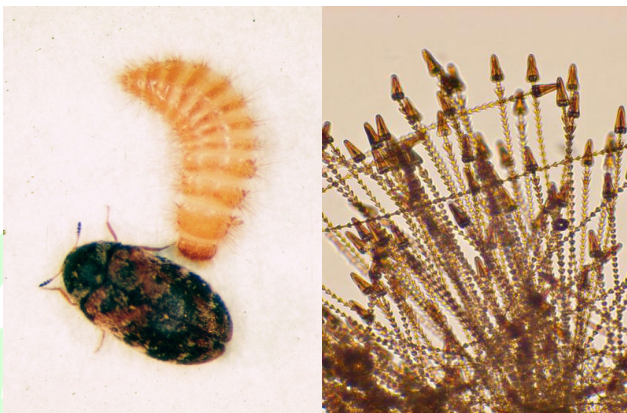
- infest and ruin food
- hastasetae (arrow-shaped hairs) on larvae can irritate throat if consumed

## IPM Recommendations

- Inspect all incoming food items for pests.
- Quickly clean up all spilled food products, especially in food storage areas.
- Properly store all susceptible food items in pest-proof containers.
- Keep food in regular rotation.
- Keep moisture low in food storage areas by improving ventilation.
- Dispose of infested food items.
- Consider monitoring in food storage areas with a warehouse beetle pheromone lure and trap.



Adult warehouse beetle (Joseph Berger, Bugwood.org)



Left: Adult and larval warehouse beetle (Whitney Cranshaw, Colorado State University, Bugwood.org)

Right: Carpet beetle larval hairs (hastasetae) (Pest and Diseases Image Library, Bugwood.org)



Warehouse beetle larva (Ryan Davis, Utah State University Extension)

# Black Widow Spider

*Latrodectus hesperus*

## Identification

- adult female is shiny black with a red hourglass on the underside of the abdomen (there are beneficial look-alikes without the red hourglass)
- immature females have a pale-brown to black body with white to orangish banding; they get progressively more solid black as they molt toward adulthood
- males are about 1/3 the size of females and are pale-brown with white markings, resembling immature females

## Nesting Habits

- prefer pre-existing holes in dark, undisturbed areas
- hide during the day and are in their cobwebs at night
- common around building foundations, rock piles, wood piles, outbuildings, water meter/irrigation boxes and around exterior lighting

## Diet

- insects and spiders

## Significance

- can be a serious health risk, especially to children and aged people
- bite can cause pain, nausea, cramping or death (rare)

## IPM Recommendations

- Minimize nesting habitat around property.
- Seal exterior cracks and crevices to reduce hiding places.
- Regularly vacuum individuals and webs.
- Reduce clutter indoors and outdoors.
- Install tight-fitting door sweeps.
- Install tight-fitting screens in windows.
- Reduce other insects that serve as food.
- Change exterior lighting to sodium vapor bulbs.

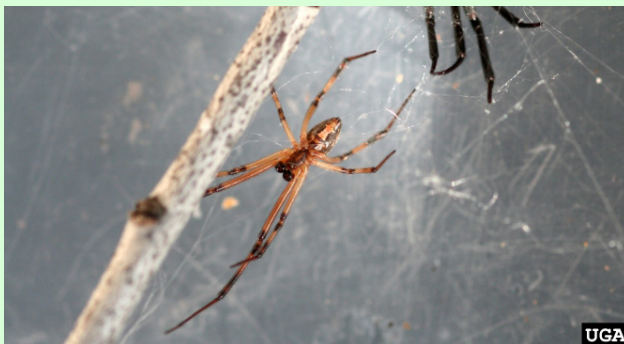




Adult female black widow spider (Clemson University, Bugwood.org)



Immature female black widow (Joseph Berger, Bugwood.org)



Adult male black widow (Whitney Cranshaw, Colorado State University, Bugwood.org)

# Cellar Spiders

Pholcus spp.

## Identification

- long delicate legs with small, elongate or globular body
- pale tan or yellow with a gray mark in the center of the carapace

## Nesting Habits

- common in basements, crawlspaces and behind HVAC units, furniture, pianos and other seldom-moved objects, but can occur outdoors, too
- make irregular cobwebs near windows, over pipes, or all over the ceiling and walls, especially in corners
- female spider carries eggs in her fangs

## Diet

- insects and other arachnids

## Significance

- webs build up over time and collect dirt/dust making areas where they are located unsightly
- not known to be a health hazard
- beneficial

## IPM Recommendations

- Minimize nesting habitat around property (e.g., plants).
- Seal exterior cracks and crevices to reduce daytime hiding places.
- Regularly vacuum individuals and webs inside and outside of buildings.
- Reduce clutter in favored areas.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Install tight-fitting screens in windows.
- Keep windows closed.
- Reduce other insects that serve as food.
- Change exterior lighting to sodium vapor bulbs.



Adult cellar spider (Joseph Berger, Bugwood.org)



Adult cellar spider with eggs (Olei, Wikimedia Commons)



Cellar spider eyes (Joseph Berger, Bugwood.org)

# Ground Spiders

Gnaphosidae

## Identification

- many different kinds; typically earthtone coloration
- found crawling around (not within a web)
- two large spinneretts sticking out the rear of the abdomen are even in size throughout their length (rather than tapering toward the end)

## Nesting Habits

- found in leaf litter, grasses, ornamental plantings, areas around buildings
- make web chambers in which they lay eggs
- are active hunters that wander in search of food

## Diet

- other insects and spiders

## Significance

- nuisance when indoors
- not known to be a health hazard
- beneficial

## IPM Recommendations

- Minimize nesting habitat around property.
- Seal exterior cracks and crevices.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Vacuum individuals that enter buildings.
- Step on or smash individual spiders that enter.
- Catch-and-release (with a glass jar) spiders found indoors.
- Change exterior lighting to sodium vapor bulbs.
- Use pest monitors to capture invading spiders, especially between August and October.



Adult ground spider (Joseph Berger, Bugwood.org)



Adult ground spider (Joseph Berger, Bugwood.org)



Adult ground spider (Joseph Berger, Bugwood.org)

# Hobo and Grass Spiders

Agelenidae

## Identification

- many spiders look similar; verify your spider identification with Colorado State University Extension

## Nesting Habits

- outside in grass, gardens, ornamental plants and trees, along foundations, log piles, under rocks and lawn ornaments, etc.

## Diet

- insects

## Significance

- hobo spider: threat to humans is uncertain, but recent research suggests that hobo spiders do not pose a human health threat; caution should be taken when handling any spider
- very common indoors between August and October
- spiders should be considered beneficial

## IPM Recommendations

- Minimize nesting habitat around property.
- Seal exterior cracks and crevices.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Vacuum individuals that enter buildings.
- Step on or smash individual spiders that enter.
- Catch-and-release (with a glass jar) spiders found indoors.
- Change exterior lighting to sodium vapor bulbs.
- Use pest monitors to capture invading spiders, especially between August and October.





Hobo spider (Ryan Davis, Utah State University Extension)



Domestic house spider (Sanchom, Wikimedia Commons)



Left: Adult grass spider (Joseph Berger, Bugwood.org)  
Right: Funnelweb-type web made by grass spiders, hobo spiders and other funnelweb spiders (David Stephens, Bugwood.org)

# Jumping Spiders

Salticidae

## Identification

- smaller spiders
- eye pattern gives appearance of two small eyes and large nostrils
- active during the day
- very agile and erratic movement
- the most common jumping spider in Colorado, the bold jumper, has a black body with green chelicera and a white dot on the back of the abdomen; the color of the dot may vary (most frequently red)

## Nesting Habits

- often found on walls (indoors and outdoors) or ceilings
- make silk retreats in which the female will lay eggs

## Diet

- insects and spiders

## Significance

- could be a nuisance pest indoors
- not known to be a health hazard
- beneficial

## IPM Recommendations

- Minimize nesting habitat around property.
- Seal exterior cracks and crevices.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Install tight-fitting screens in windows.
- Keep windows closed.
- Vacuum individuals that enter buildings.
- Step on or smash individual spiders that enter.
- Catch-and-release (with a glass jar) spiders found indoors.
- Change exterior lighting to sodium vapor bulbs.



Bold jumper (Kaldari, Wikimedia Commons)



Jumping spider (David Cappaert, Bugwood.org)



Jumping spider (Karan A Rawlins, University of Georgia, Bugwood.org)

# Orb Weaver Spiders

Araneidae; Tetragnathidae

## Identification

- small to large spiders
- generally with a large, bulbous abdomen
- make classic orb-shaped web

## Nesting Habits

- often found around buildings and homes in late summer and early fall, especially around overhanging structures (e.g., porches or entryways) or in ornamental plantings
- spiders die out every year and leave egg sac behind
- eggs hatch in spring and spiderlings disperse
- common near exterior lighting

## Diet

- insects and spiders

## Significance

- could be a nuisance pest outdoors, especially the webs
- not known to be a health hazard
- beneficial

## IPM Recommendations

- Minimize nesting habitat around property.
- Seal exterior cracks and crevices to reduce daytime hiding places.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Install tight-fitting screens in windows.
- Keep windows closed.
- Vacuum individuals and webs inside and outside of buildings on a daily basis.
- Step on or smash individual spiders that enter.
- Catch-and-release (with a glass jar) spiders found indoors.
- Change exterior lighting to sodium vapor bulbs.



Left: Banded garden spider (Ward Upham, Kansas State University, Bugwood.org)

Right: Catface spider (Joseph Berger, Bugwood.org)



Left: Shamrock orb weaver (David Cappaert, Michigan State University, Bugwood.org)

Right: Typical orb web (Tom Bean, Encyclopædia Britannica Online)



Long-jawed orb weaver (David Cappaert, Michigan State University, Bugwood.org)

# Sac Spiders

Cheiracanthium spp.

## Identification

- yellowish coloration
- ends of legs with brown-to-black tufts of hairs that look like socks

## Nesting Habits

- found indoors and outdoors
- under bark, rocks, leaf litter, in rolled leaves, etc.
- behind or in clutter/storage
- often make a silk, saclike retreat where walls meet other walls or ceilings, or other hidden places; they spend the day in the sac and hunt at night
- easily climb slick surfaces

## Diet

- insects and spiders

## Significance

- could be a nuisance pest indoors
- not known to be a health hazard, but can aggressively bite when trapped against the skin
- painful bite
- beneficial

## IPM Recommendations

- Minimize nesting habitat around property.
- Seal exterior cracks and crevices.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Install tight-fitting screens in windows.
- Keep windows closed.
- Vacuum individuals and silk retreats in buildings.
- Step on or smash individual spiders that enter.
- Catch-and-release (with a glass jar) spiders found indoors.
- Change exterior lighting to sodium vapor bulbs.





Adult yellow sac spider (Joseph Berger, Bugwood.org)



Newly hatched yellow sac spiders (Joseph Berger, Bugwood.org)



Sac spider eggs (Joseph Berger, Bugwood.org)

# Wolf Spiders

Lycosidae

## Identification

- small to very large spiders
- unique eye pattern (top image)
- females carry egg sacs on spinneretts and spiderlings on their back

## Nesting Habits

- solitary wandering hunters
- not found in webs
- found in ornamental plantings, under objects, woodpiles, in mulch, etc.
- some small black species occur in great numbers in lawns in the spring, causing alarm

## Diet

- insects and spiders

## Significance

- can be a nuisance when mistakenly entering buildings
- not known to be a health hazard
- beneficial

## IPM Recommendations

- Minimize nesting habitat around property.
- Seal exterior cracks and crevices to reduce hiding places.
- Regularly vacuum individuals and webs.
- Reduce clutter indoors and outdoors.
- Install tight-fitting door sweeps.
- Install tight-fitting screens in windows.
- Reduce other insects that serve as food.
- Use pest monitors to capture wandering spiders.
- Change exterior lighting to sodium vapor bulbs.



Classic wolf spider eye pattern (Opoterser, Wikimedia Commons)



Female wolf spider with egg sac (Wikimedia Commons)



Female wolf spider with babies on back (Circumjacence, Wikimedia Commons)

# Woodlouse Spider

*Dysdera crocata*

## Identification

- reddish head area with cream- to gray-colored abdomen
- mouthparts and fangs protrude directly in front of the head, giving a menacing appearance
- 6 eyes

## Nesting Habits

- under rocks, bark, trashcans, mulch, plants, wood piles, etc.
- prefer moist areas where isopods live

## Diet

- isopods (see pages 56-57)

## Significance

- appear menacing because of their large, forward projecting mouthparts and fangs
- not known to be a health hazard
- beneficial

## IPM Recommendations

- Minimize nesting habitat around property.
- Seal exterior cracks and crevices.
- Install tight-fitting door sweeps at the base of all exterior doors.
- Vacuum individuals that enter buildings.
- Step on or smash individual spiders that enter.
- Catch-and-release (with a glass jar) spiders found indoors.
- Change exterior lighting to sodium vapor bulbs.
- Use pest monitors to capture invading spiders, especially between August and October.
- Reduce moisture issues around buildings.
- Follow control methods for isopods (pgs. 56-57) to reduce or eliminate this spider's primary food source.



Adult woodlouse spider (Joseph Berger, Bugwood.org)



Adult woodlouse spider (Joseph Berger, Bugwood.org)



Adult woodlouse spider with food source (Joseph Berger, Bugwood.org)

# Baldfaced Hornet

*Dolichovespula maculata*

## Identification

- 5/8 - 3/4+ inch long
- black with yellowish-white face; no hairs

## Nesting Habits

- social
- colony dies off every fall; fertilized queens overwinter
- nest on building eaves, etc., or in plants/trees: aerial
- queens start new every spring; colonies grow throughout the summer months

## Diet

- insects
- nectar

## Significance

- nests pose a serious health risk to humans

## IPM Recommendations

- Monitor for nests from early summer - fall.
- Purchase and use a bee veil, suit and gloves.
- Minimize nesting habitat around property.
- Install tight-fitting screens in windows.
- Nest removal: wear protective bee veil, suit and gloves; at night using a ladder or bee pole, apply an aerosol wasp insecticide into the nest entrance hole, bag and remove the nest and place the bagged nest in a dumpster away from children and people.





Baldfaced hornet (Piccolo Namek, Wikimedia Commons)



Baldfaced hornet (Johnny N. Dell, Bugwood.org)



Baldfaced hornet nest (The High Fin Sperm Whale, Wikimedia Commons)

# Bumble Bees

*Bombus* spp.

## Identification

- 1/4 - 1 inch long; stout
- fuzzy/hairy in appearance
- black and yellow, some with white and orange markings

## Nesting Habits

- social
- colony dies off every fall; fertilized queens overwinter, usually underground
- nest in old rodent burrows, holes, grass clumps, etc.
- queens start new every spring; colonies grow throughout the summer months

## Diet

- nectar, honey, pollen

## Significance

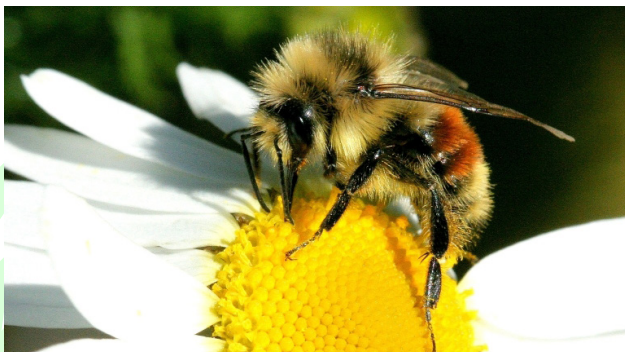
- nests pose a minimal health risk to humans
- can sting multiple times; sting is painful
- bumble bees are important pollinators

## IPM Recommendations

- Monitor for bumble bee nests early summer - fall.
- Purchase and use a bee veil, suit and gloves.
- Minimize nesting habitat around property by caving in old rodent burrows and sealing exterior cracks and crevices, holes in trees, wall voids, removal of grass clumps, etc.
- Never plug entrance holes to nests (if in a structural void)!
- Apply a non-repellent insecticidal dust in and 6 inches around entrance hole(s) at night.
- Because of honey pots in the nest, nests should be removed and voids filled or sealed to prevent reinfestation or the presence of other pests.



Bumble bees (Whitney Cranshaw, Colorado State University, Bugwood.org)



Bumble bee (David Cappaert, Michigan State University, Bugwood.org)



Bumble bee nest (Panoramedia, Wikimedia Commons)

# Honey Bee

*Apis mellifera*

## Identification

- 1/2 - 5/8 inch long
- yellow and black; hairy

## Nesting Habits

- social
- colony perennial, surviving the winter
- occasionally swarm

## Diet

- pollen, nectar, honey

## Significance

- nests and individual bees pose a health risk to humans, especially allergic individuals
- swarms can alarm people, but typically aren't dangerous
- genetic tests or precise morphological measurements are needed to distinguish between Africanized and European honey bees

## IPM Recommendations

- Monitor for bees season-long.
- Purchase and use a bee veil, suit and gloves.
- Minimize nesting habitat around property.
- Install tight-fitting screens in windows.
- Never plug entrance holes to nests!
- Bees are a valuable resource; consider contacting your local beekeepers association for hive or swarm extraction.

## Additional resources:

- <http://coloradobeekeepers.org>



Africanized honey bees look identical to European honey bees (Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org)



Protective bee suit (Timothy Haley, USDA Forest Service, Bugwood.org)

Honey bee swarm (Fir0002/  
Flagstaffotos, Wikimedia Commons)





# Mason, Potter, Mud-Dauber Wasps

Vespidae; Sphecidae

## Identification

- 3/8 - 1+ inches long
- various coloration: black and yellow; black; black with a bluish tinge
- often have an elongated segment between the middle and rear of insect

## Nesting Habits

- mud nests on sides of structures or under window sills, eaves, etc.
- nests can appear as clay pots, mud patches or mud tubes or pipes

## Diet

- insects, spiders
- nectar

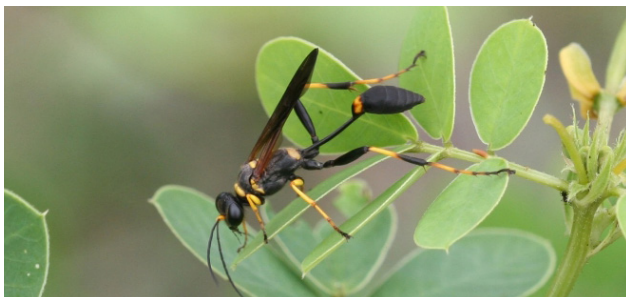
## Significance

- nests pose a slight health risk to humans
- not aggressive
- may be considered beneficial since they prey on many species of spiders

## IPM Recommendations

- Monitor for nests from early summer - fall.
- Purchase and use a bee veil, suit and gloves.
- Minimize nesting habitat around property.
- Install tight-fitting screens in windows.
- Nest removal: wear protective bee veil, suit and gloves; early in the morning, remove nest in a garbage bag or scrape from side of building or structure, then clean nest area with soap and water.





Yellow and black mud dauber (Johnny N. Dell, Bugwood.org)



Blue mud wasp (Show Ryu, Wikimedia Commons)

Potter wasp (Bruce Marlin, Wikimedia Commons)



A variety of mason, potter and mud-dauber nests.

Left: Pipe organ wasp (Wikimedia Commons)  
Center: Potter (Ogre Bot, Wikimedia Commons)  
Right: Mud dauber (Howard Ensign Evans, Colorado State University, Bugwood.org)

# Paper Wasps

*Polistes* spp.

## Identification

- 5/8 - 3/4 inch long
- black with yellowish-white face; no hairs
- long legs that hang in flight
- abdomen at anterior end gradually slopes
- appearing longer and more slender than yellowjackets

## Nesting Habits

- social
- colony dies off every fall; fertilized queens overwinter
- nest on building eaves, play equipment, benches, any hollow pipe, etc., or in plants/trees
- nest is open, umbrella shaped, with all wasps exposed
- queens start new every spring; colonies grow throughout the summer months

## Diet

- insects
- nectar

## Significance

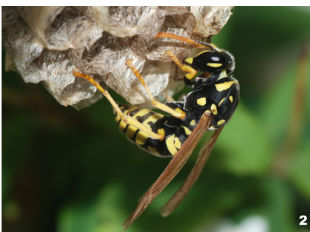
- nests pose a health risk to humans
- not as aggressive as yellowjackets or hornets

## IPM Recommendations

- Monitor for nests from early summer - fall.
- Purchase and use a bee veil, suit and gloves.
- Minimize nesting habitat around property.
- Install tight-fitting screens in windows.
- Nest removal: wear protective bee veil, suit and gloves; early in the morning, crush nest and remove it, then clean nest area with soap and water to remove pheromones.



1



2



3

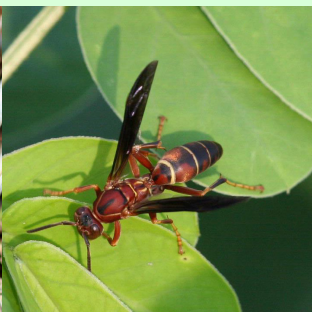


4

Paper wasp on nest (Alvesgaspar, Wikimedia Commons)



Paper wasp nest (Whitney Cranshaw, Colorado State University, Bugwood.org)



Left: Paper wasp (Whitney Cranshaw, Colorado State University, Bugwood.org)  
Right: Paper wasp (Johnny N. Dell, Bugwood.org)

# Sand Wasps/Cicada Killer

Crabronidae: Bembix spp.; Sphecius speciosus

## Identification

- 3/4 - 1 5/8 inches long
- black wasp with yellowish markings
- some have bright green eyes
- no hairs

## Nesting Habits

- solitary, but often nest together in favorable sandy sites in the ground (not in colonies)
- favorable sites are often areas of bare sandy areas

## Diet

- nectar, pollen

## Significance

- nests pose a minimal health risk to humans
- can give a painful sting but wasps are not aggressive

## IPM Recommendations

- Monitor for burrows or aggregations early summer - fall.
- Purchase and use a bee veil, suit and gloves.
- Eliminate nesting habitat by renovating bare soil areas with turf or other cover.
- Eliminate sandy areas.



Bembix sand wasp (Howard Ensign Evans, Colorado State University, Bugwood.org)



Cicada killer (Jessica Louque, Smithers Viscient, Bugwood.org)



Cicada killer with cicada (Ronald F. Billings, Texas Forest Service, Bugwood.org)

# Solitary/Ground Bees

Andrenidae (mining bees); Colletidae (plasterer bees);  
Halictidae (sweat bees)

## Identification

- 1/8 - 3/4 inch long
- coloration variable: brown to black to metallic green

## Nesting Habits

- solitary, but often nest together in favorable sites in the ground (not in colonies)
- favorable sites are often areas of bare soil

## Diet

- nectar, pollen

## Significance

- nests pose a minimal health risk to humans
- can sting, but sting is mild
- are important pollinators

## IPM Recommendations

- Monitor for nests early summer - fall.
- Purchase and use a bee veil, suit and gloves.
- Eliminate nesting habitat by proactively renovating bare soil areas with turf or other cover.
- Rope-off areas with these bees to keep individuals away from aggregations until they become inactive (then renovate nesting site).





Mining bee (Whitney Cranshaw, Colorado State University, Bugwood.org)



Plasterer bee (Michael Becker, Wikimedia Commons)



Sweat bee (Jon Sullivan, Wikimedia Commons)

# Western Yellowjacket

*Vespula pennsylvanica*

## Identification

- 3/8 - 5/8 inch long
- yellow and black; no hairs
- abdomen is blunt on the anterior side

## Nesting Habits

- social
- colony dies off every fall; fertilized queens overwinter
- nest in old rodent burrows, holes, structural voids, etc.
- queens start new every spring; colonies grow throughout the summer months

## Diet

- insects, nectar
- scavengers (meat, sugar, human food, etc.)

## Significance

- nests pose a serious health risk to humans
- scavenge in fall making outdoor events dangerous

## IPM Recommendations

- Monitor for yellowjacket nests early summer - fall.
- Purchase and use a bee veil, suit and gloves.
- Minimize nesting habitat around property by caving in old rodent burrows and sealing exterior cracks and crevices, holes in trees, wall voids, etc.
- Install tight-fitting screens in windows.
- Never plug entrance holes to nests!
- Use a wet-vac to vacuum yellowjackets, then dig up nest. This technique can be dangerous if not done properly. Research the proper technique and always wear protective gear. Do not attempt while people are present.
- Apply a non-repellent insecticidal dust in and immediately around entrance hole(s) at night.
- Consider outsourcing yellowjacket management.



Yellowjacket (Eugene Zelenko, Wikimedia Commons)



Yellowjacket nest (Whitney Cranshaw, Colorado State University, Bugwood.org)



Yellowjackets (Whitney Cranshaw, Colorado State University, Bugwood.org)

UGA5024100

# Bats

Chiroptera

## Identification

- wingspan ranges from a few inches to 17 inches
- many species present in Colorado

## Nesting Habits

- caves and mines, tree foliage, hollow trees, cracks in rock cliffs and buildings
- some live in Colorado year-round; some are migratory

## Diet

- insects

## Significance

- major disruptor to building occupants
- health hazard: could transmit histoplasmosis and rabies

## IPM Recommendations

- Do NOT kill bats; they are protected by law!
- Do NOT seal cracks and crevices when bats and their young are present (late May - late July).
- Exclude bats: seal exterior cracks, crevices and areas around pipes and electrical that enter through walls.
- Exclude bats: use netting that allows bats to leave structures but blocks them from re-entering the building.
- Construct bat boxes as an alternative roosting site.
- Keep all exterior doors and windows closed.
- Keep screens in good repair.
- Avoid leaving gaps in construction where bats can roost.
- Seal all cracks and crevices where bats may enter a building. This may take great effort and special equipment.
- Use the presence of guano (bat feces) and grease markings on siding, etc., to find openings that need exclusionary measures taken.
- Never handle bats with bare hands.



Big brown bats (USDA Forest Service Southern Research Station Archive, Bugwood.org)



Silver hair bat (Larisa Bishop-Boros, Wikimedia Commons)



Bat exclusion with mesh (M. D. Tuttle, UC Statewide IPM Project)



# Deer Mice

*Peromyscus* spp.

## Identification

- brown to gray colored body with a white belly, furry tail and ears smaller than that of a house mouse
- 6 inches long, including tail
- multiple species exist

## Nesting Habits

- prefer rural areas including fields, pastures and vegetative areas around buildings
- move indoors when it gets cold outside

## Diet

- seeds, fruits, vegetation, berries, nuts and insects

## Significance

- known carrier of Hantavirus Pulmonary Syndrome, a rare but potentially fatal lung disease

## IPM Recommendations

- Deer mice are only occasional invaders in buildings.
- Install tight-fitting door sweeps.
- Seal exterior cracks, crevices and areas around pipes and electrical that enter buildings through walls.
- Reduce clutter indoors and outdoors.
- Minimize nesting habitat around property.
- Keep all exterior doors closed.
- Store food in pest-proof containers.
- Use snap-traps placed with triggers toward the baseboards, especially in dark corners.
- Train kitchen and custodial staff to clean thoroughly.
- Clear high weeds that serve as food and shelter during warm weather.





Adult deer mouse (David Cappaert, Michigan State University, Bugwood.org)



Deer mouse (6th Happiness, Wikimedia Commons)



UC Statewide IPM Project  
© 2000 Regents, University of California  
Deer mouse (Jack Kelly Clark, UC Statewide IPM Project)

# House Mouse

## Identification

- brown to gray colored fur with a lighter colored belly and large ears
- tail is naked and about the same length as the head and body combined
- 5 to 8 inches long, including tail

## Nesting Habits

- prefer to nest in protected areas near a food supply and heat
- indoors: dark corners, especially behind appliances that produce heat

## Diet

- stored food products, human food, seeds

## Significance

- contaminate food, damage property, spread disease
- mouse urine is an asthma trigger

## IPM Recommendations

- Install tight-fitting door sweeps.
- Seal exterior cracks, crevices and areas around pipes and electrical that enter buildings through walls.
- Reduce clutter indoors and outdoors.
- Minimize nesting habitat around property.
- Move dumpsters at least 50 feet from buildings.
- Keep all exterior doors closed.
- Store food in pest-proof containers.
- Monitor with non-toxic bait blocks in tamper-resistant bait boxes. (Do not use rodenticides on school property.)
- Use snap-traps placed with triggers toward the baseboards, especially in dark corners.
- Use multiple baits: peanut butter, hotdogs, floss, etc.
- Train kitchen and custodial staff to clean thoroughly.



House mouse (Wikimedia Commons)



House mouse (Xocolatl, Wikimedia Commons)



UC Statewide IPM Project  
© 2000 Regents, University of California

House mouse (Jack Kelly Clark, UC Statewide IPM Project)

# Norway Rat

*Rattus norvegicus*

## Identification

- average length is 16 inches
- gray to reddish brown; typically grayish brown

## Nesting Habits

- nest in burrows in the ground
- like low-growing vegetation, rock piles, etc.
- very common under concrete slabs

## Diet

- highly varied: any food product, trash, carrion, etc.

## Significance

- can transmit disease; human health concern
- ruin stored food products
- nuisance in and around buildings

## IPM Recommendations

- Install tight-fitting door sweeps.
- Seal exterior cracks, crevices and areas around pipes and electrical that enter buildings through walls.
- Reduce clutter indoors and outdoors.
- Remove weeds and low-growing ornamentals/covers.
- Move dumpsters at least 50 feet from buildings.
- Keep all exterior doors closed.
- Store food in pest-proof containers.
- Use snap-traps placed with triggers toward the baseboards, especially in dark corners and behind objects, in drop ceilings, and areas with droppings, etc.
- Use multiple baits: peanut butter, meat, candy, etc.
- When trapping, put traps out with bait, but do not set the triggers. Desensitize the rats for a week before setting the triggers.
- Train kitchen and custodial staff to clean thoroughly.



Norway rat (National  
Park Service, Wikimedia  
Commons)



Norway rat (Tomas Cekanavicius, Wikimedia Commons)



Norway rat (David Shankbone, Wikimedia Commons)

# Rock Pigeon

*Columba livia*

## Identification

- variable in color, but most are bluish-gray with two black bands on the wings and a black tip to the tail
- most have rainbow-like throat feathers
- 12 - 15 inches tall

## Nesting Habits

- build nests out of twigs, grasses and sticks to form a crude platform
- nest on flat, covered surfaces such as sheltered cliff ledges, bridges and building surfaces

## Diet

- primarily grain and seeds
- garbage, livestock manure, insects or other food provided for them intentionally or unintentionally by people

## Significance

- pigeon droppings may pose a health hazard when allowed to accumulate

## IPM Recommendations

- Keep outdoor areas clean and eliminate water sources.
- Close building openings with wood, metal, glass or rust-proof iron mesh.
- Use deterrents such as spikes, coils, and sloped surfaces.





Rock pigeon (Diego Delso, Wikimedia Commons, License CC-BY-SA 3.0)



Rock pigeons (Lee Karney, US Fish and Wildlife Service, Bugwood.org)



Rock pigeon (Terry Spivey, USDA Forest Service, Bugwood.org)

# Voles

*Microtus* spp.

## Identification

- 3 - 6 inches long
- hairy tail with short hairs
- make runways/tunnels in turf, mulch, etc.

## Nesting Habits

- burrows in the ground along runways
- prefer areas of heavy ground cover

## Diet

- plants, tubers, bark

## Significance

- cause damage to turf and ornamental plantings
- occasionally enter buildings by accident, but do not become established indoors

## IPM Recommendations

- Install tight-fitting door sweeps.
- Seal exterior cracks, crevices and areas around pipes and electrical that enter buildings through walls.
- Reduce clutter indoors and outdoors.
- Keep all exterior doors closed.
- Use snap-traps placed with triggers in vole runways.
- Eliminate weeds, ground cover, mulch and dense ornamental plantings that provide food and shelter during warm weather.



Vole size comparison (Manuel R., Wikimedia Commons)



Vole damage in turf (Ryan Davis, Utah State University Extension)

## References

Colwell, C. and Pehlman, D. 2010. Common Pests Found in Schools and Day Care Centers, Midwest Region. State of Illinois Department of Public Health.

Mallis, A., Moreland, D. and Hedges, S. A. 2011. The Mallis Handbook of Pest Control, 10th ed. Cleveland: GIE Publications.

Ogg, C. L. and Bauer, E. 2012. Integrated Pest Management in Sensitive Environments: A How To Guide. University of Nebraska-Lincoln.

Smith, E. H. and Whitman, R. C. 2008. NPMA Field Guide to Structural Pests, 2nd Edition.

Young, D., Armenta, R. and Berry, G. 2012. Pest Identification Handbook for Colorado Schools, Childcare Settings & Public Buildings. Colorado State University Extension.

## Image References

[Antweb.org](http://Antweb.org)

[Bugwood.org](http://Bugwood.org)

[Colorado State University](http://Colorado State University)

[Discoverlife.org](http://Discoverlife.org)

[Utah State University](http://Utah State University)

[University of California Statewide IPM Program](http://University of California Statewide IPM Program)

[University of Nebraska](http://University of Nebraska)

[Wikimedia Commons](http://Wikimedia Commons)

The original version of this handbook was produced by Colorado State University Extension with funding provided by Colorado State University Extension, the Colorado Department of Agriculture, USDA NIFA and The IPM Institute of North America, Inc.

The updated version of this handbook was produced by Utah State University Extension and Colorado State University Extension with funding provided by Utah State University Extension and the Environmental Protection Agency.

For help with your pest-diagnostic needs, please contact the Colorado State University Plant Diagnostic Lab  
970-491-6950



Colorado State University  
Extension

COLORADO STATE UNIVERSITY IS AN EQUAL ACCESS AND EQUAL OPPORTUNITY UNIVERSITY

