

**K-STATE**  
Research and Extension

# Household Pests *of* Kansas

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## Table of Contents

<b>Introduction</b>	<b>4</b>	Multicolored Asian Lady Beetle	30
Taxonomy of Insects	4	Northern Mole Cricket	31
What is a Pest?	4	Pomace or Vinegar flies	32
When to Call a Pest Control Operator	5	Red Shouldered Bug	33
Arthropod Biology and Physiology	5	Silverfish	33
Integrated Pest Management (IPM)	7	Springtails	34
<b>Nuisance Insect Pests</b>	<b>9</b>	<b>Structural Insect Pests</b>	<b>36</b>
Ants	9	Carpenter Ants	36
Attic Flies	11	Carpenter Bee	37
Blow Flies	12	'Firewood Beetles'	39
Boxelder Bug	13	Powderpost Beetles	40
Camel or Cave Crickets	14	Anobiid Beetles	40
Cockroaches	15	Lyctid Powderpost Beetles	41
American Cockroach	17	Termites	42
Brown-Banded Cockroach	18	<b>Pantry Insect Pests</b>	<b>45</b>
German Cockroach	18	Booklice (Psocids)	45
Oriental Cockroach	19	Carpet Beetles or Dermestids	46
Wood Cockroaches	19	Cigarette Beetle	47
Drain Flies	20	Clothes Moths	48
Earwigs	21	Drugstore Beetle	49
False Chinch Bugs	21	Flour Beetle	50
Field Crickets	22	Indianmeal Moth	51
Firebrat	24	Saw-Toothed Grain Beetle	53
Flesh Flies	24	<b>Medical Insect Pests</b>	<b>54</b>
Fungus Gnats	25	Bat Bug	54
Ground Beetles	26	Bed Bug	55
Hackberry Nipplegall Maker	27	Bees and Wasps	57
House Cricket	28	Bees	58
House Fly	29	Bumble Bees	58
		Digger Bees	58
		Honey Bee	59
		Sweat Bees	60

Wasps	61
Baldface Hornet	61
Cicada Killer	62
Mud Daubers	63
Polistes or Paper Nest Wasps	64
Yellowjackets	65
Black Flies or Buffalo Gnats	65
Cat Flea	66
Fire Ants	68
Head Lice	69
Horse Flies and Deer Flies	70
Mosquitos	71
Pubic/Crab Lice	73
Stable Fly	74
Swallow Bug	75
Wheel Bug	76
<b>Arthropod (Non-Insect) Pests</b>	<b>77</b>
Bird and Rodent Mites	77
Centipedes	78
Chiggers	79
Clover Mites	80
Daddy Longlegs/Harvestmen	81
Millipedes	82
Oak Leaf Itch Mite	83
Pillbugs and Sowbugs	83
Striped Bark Scorpion	85
Spiders	86

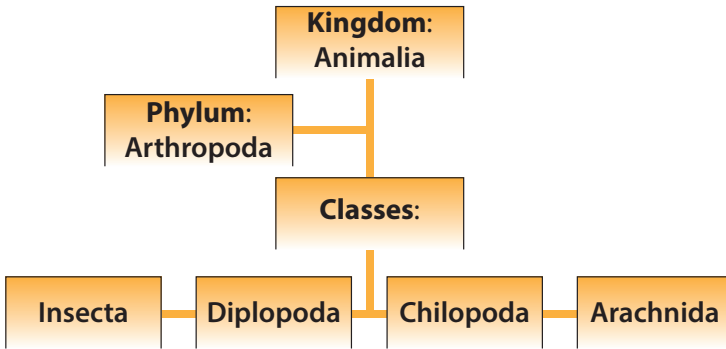
Indoor-Dwelling Spiders	86
Brown Recluse	87
Cobweb Spiders/Combfooted Spiders	89
Black Widow	90
Cellar Spiders	91
Outdoor Spiders (Occasional Invaders)	92
Golden Garden Spider	92
Ground Spiders	93
Funnelweavers/Grass Spiders	94
Jumping Spiders	95
Orbweaver Spiders	95
Wolf Spiders	96
Ticks	97
American Dog Tick	98
Black-Legged Tick	99
Brown Dog Tick	100
Lone Star Tick	101
Windscorpions	101
<b>References</b>	<b>103</b>
<b>Photo Credits</b>	<b>105</b>

# Introduction

Of all of the organisms on Earth, the number belonging to the phylum Arthropoda is greater than the number of organisms in all other classifications combined. In addition to insects, this phylum includes the arachnids (mites, ticks, and spiders), crustaceans (pillbugs, shrimp, and crabs), diplopods (millipedes), and chilopods (centipedes). Arthropods avoid contact with humans, but because they are so numerous, they are common in daily life and may be considered to be ‘pests’ when they show up in homes, offices, playgrounds, and other places where they are not wanted.

## Taxonomy of Insects

All of the organisms in the chart below are animals. As invertebrates, arthropods do not have backbones, but they are still considered animals. Although it is possible to find information on most of these pests, this book is a complete reference on arthropod pests found in and around Kansas homes. The photos and summaries can help residents identify, understand, appreciate, and manage specific pests.



## What is a Pest?

Everyone has different ideas about what they consider a pest. One person might be alarmed to find a spider inside their home, while another might keep a pet tarantula. Of the thousands of insect species in Kansas, only a few meet the definition of a true pest — an insect or other animal that attacks crops, food, livestock, or humans. Any insect or arthropod that negatively affects a person’s quality of life can be considered a pest. Even though an insect may not bite, sting, infest food products, or vector a disease, its mere presence may be distressing for certain individuals. This guide not only helps readers to identify

insects or arthropods around the home, but it also describes biology and control options.

Eliminating insects from the home can be costly and, in some cases, unwarranted. Before taking action, a pest should be properly identified to ensure it is not mistaken for a more significant household pest. For example, there have been cases where insects were misidentified as bed bugs, creating panic and leading to the destruction of furniture or expensive treatments. Measures required to eliminate one pest may be different from those for a different pest. Carpenter ants, for example, live in a different habitat and require different treatment than other ant species that may find their way into homes.

If it can be collected safely, take the insect or other arthropod to your local K-State Research and Extension office for proper identification. Avoid crushing, if possible, which makes identification difficult. If the insect is large enough to see with the naked eye, you can send digital photos to an insect specialist for proper identification. Images should be clear, taken from several angles, and include a coin or tip of a pen for size reference. You will need to collect a physical specimen if magnification is required for proper identification.

Most home and garden stores sell sticky traps or glue boards that can be used to monitor insect and arthropod populations within the home. Sticky traps should be placed out of reach of children and pets — along baseboards, under furniture, and other areas where pests move. Check traps weekly or biweekly. Be careful when collecting traps. Insects and spiders can be stuck but not dead.

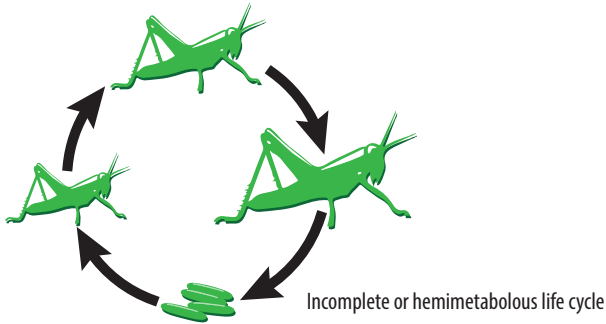
## **When to Call a Professional Pest Control Operator**

Homeowners do not have the equipment to effectively eliminate many of the insects that infest structures. Commercial pesticide applicators have access to pesticides that are not available to homeowners, and the equipment and knowledge to target particular pests. Many professional pest control companies offer free inspections and service warranties. It is a good idea to contact several licensed companies for estimates.

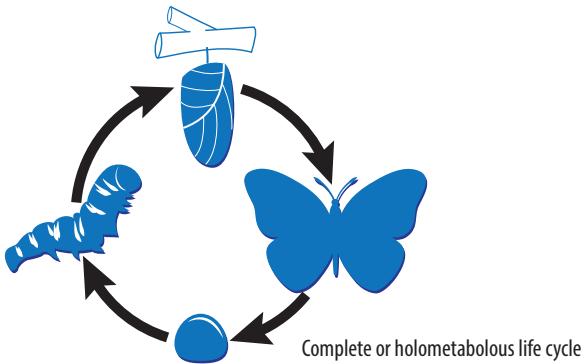
## **Arthropod Biology and Physiology**

Several aspects of arthropod biology are important when it comes to pest control. Insects and arthropods may have hemimetabolous (incomplete metamorphosis) or holometabolous (complete metamorphosis) for development. In the case of incomplete metamorphosis, the insect hatches from an egg laid by the female and the young, called a nymph, looks similar to the adult except

that it is smaller and lacks wings. The nymphs go through several molts or stages, called instars, in which they shed their exoskeleton to grow, before reaching adulthood and sexual maturity. Examples of hemimetabolous insects include boxelder bugs, grasshoppers, cockroaches, bed bugs, and lice.



The life cycle for complete metamorphosis consists of four stages: egg, larva, pupa, and adult. The larval stage (caterpillars and maggots) usually looks different from the adult. This life stage is often responsible for damage and when control is most effective. Examples of holometabolous insects include ants, bees, beetles, fleas, moths, butterflies, and flies. Usually, the egg and pupal stages are well protected and not as susceptible to control measures. Most arthropods do not molt again once they reach maturity.



Insects and arthropods are unable to control body temperature to the extent mammals do. Insects are poikilotherms, or 'cold blooded' animals that rely on environmental heat sources. When temperatures cool, insects slow down. The adults become less active and development slows down or may be halted completely in the



egg, larval, and pupal stages. In contrast, warm temperatures may speed development, decreasing the time to complete the life cycle. For this reason, pest populations that are outdoors or in uninsulated outbuildings develop at a different rate than the same species with year-round protection in a temperature-controlled dwelling. In addition, when outdoor temperatures begin to drop, insects and other arthropods may be more likely to wander indoors when they perceive the warmer indoor temperatures. During the fall it is common to find insects congregating on sunny sides of buildings.

## **Integrated Pest Management (IPM)**

People may notice an arthropod pest inside a dwelling and immediately think about spraying a pesticide. An integrated approach to pest management starts with proper identification and reviewing the literature for appropriate actions. In most cases, integrated pest management (IPM) offers effective, long-term control that cannot be obtained simply by spraying a pesticide. Achieving long-term control of a pest in the most effective, cost-efficient and safest way possible may involve multiple methods. In household pest control, sanitation is the key to eliminating a pest and keeping it from re-establishing. Excess clutter provides excellent habitat and hiding locations for numerous pests. Removing clutter in attics, basements, living areas, and pantries goes a long way in pest control.

Inspect stored items for insects and damage before placing them in sealed plastic containers. This helps prevent infestations from becoming established. Food attracts and sustains many insect species, including stored food pests, cockroaches, and ants. Promptly clean up leftovers and do not allow dirty dishes to remain on counters or in sinks. Pick up uneaten dog, cat, and other pet foods between meals and store in an airtight container. Even the cleanest houses may provide food for insect pests in the crumbs left on counters or foods spilled in cracks and crevices of pantries or baseboards.

Decaying materials in and around drains, the bottoms of trash bins, and even potted plants can provide habitat for certain pests. Arthropods must have water and are attracted to and thrive in areas that remain damp. Repair water leaks, remove and replace water-damaged materials, and run a dehumidifier in damp basements or crawl spaces.

Arthropods may wander into homes from outdoors, attracted by materials that provide ideal habitat for pests. Landscaping close to buildings, while aesthetically pleasing, may attract unwanted

inhabitants such as ants, pillbugs, and millipedes. Old tree stumps, landscaping timbers, and firewood can become infested with termites or carpenter ants. Excess clutter such as old cars, tarps, tubs, and pots can harbor spiders, bees, wasps, and other pests. Objects that collect water can lead to increased mosquito populations. Although rarely 100 percent effective, repairing torn screens, caulking small cracks in foundations, and sealing other small entry points to exclude arthropods will help with continued control of pests in the home.

An IPM program does not end with elimination of the pest. Arthropods are persistent and prolific. They are successful because of their huge numbers and because they never stop competing for food and habitat. Continue monitoring to detect arthropod populations early before they develop into a larger problem.

This field guide is intended to help homeowners identify common arthropods in Kansas. It provides information about biology, habitat, and damage associated with each pest and suggests IPM practices to help mitigate damage.

# Nuisance Insect Pests

Nuisance pests are just that — arthropods that are bothersome, for whatever reason. These are arthropods found in or around dwellings that may cause alarm, concern, or annoyance due to their presence, but do not bite, sting, or vector diseases. Pests can spread bacteria, fungi and other contaminants by picking them up while walking through garbage or fecal matter and transferring them to food that is left exposed. Pests can stain household goods and materials with feces, exuviae, and dead bodies.

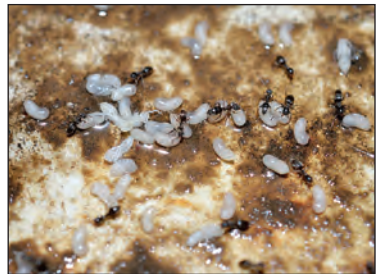
## Ants Family Formicidae

**Description:** Many species of ants are common in Kansas. They are scavengers that feed on almost anything consumed by humans, which makes them a household nuisance. Some ant species feed predominately on sweets, while others prefer meat and grease and are predators of other insects. Ants have chewing mouthparts with heavy mandibles (jaws) suitable for biting, cutting, and gnawing. They have elbowed antennae and a thin ‘waist’ that separates the thorax from the abdomen. Ants range in size with the smallest species being less than  $\frac{1}{16}$  inch long and the largest attaining a length of  $1\frac{1}{2}$  inches.

**Biology:** Periodically (commonly after a rain) an established colony produces winged reproductives that emerge in large swarms. These winged males and females mate. The males die shortly afterward, and mated females disperse in search of a place to begin a new colony. When a suitable location is found, the female discards her wings, digs a small nest, and produces a few eggs. She nourishes this first brood through the larval stage. Larvae are translucent, white, soft-bodied, and legless. Larvae pass through several growth stages, called instars, before pupation and adulthood. This first generation of young workers (foragers) then takes over the work of the colony. Worker ants forage

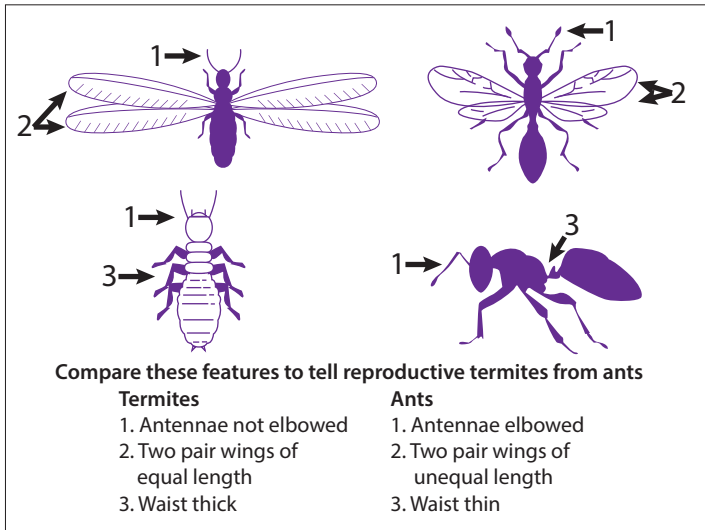


Ants feeding at a bait station



Adults tending larvae and pupae

for food, feed the queen, fight off enemies, construct a maze of tunnels to extend the colony, and care for the young. In many species, the foragers create a chemical or pheromone trail that helps the others find a source of food or water. Most ant species have only one queen per nest. She lays the eggs, maintaining or increasing the colony size. When the colony has matured, a special brood of winged males and females is again produced to disperse and establish new colonies. Winged adults are often mistaken for swarming termites. The illustration below distinguishes between the two. Winged ants have elbowed (bent) antennae and narrow 'waists' while winged termites have straight antennae and thick waists. The forewings of ants are larger than the hind wings and have comparatively few veins, whereas the two pairs of termite wings are similar in size and appearance, with many indistinct veins.



**Damage:** Most ant species nest outdoors and become a nuisance when foraging ants enter homes. If they find food, ants may bring in others, creating the characteristic trail of ants that can become a source of disgust and irritation for homeowners. However, with the exception of the carpenter ant and fire ant (see entries for these pests), ants are not a structural concern and vector no diseases. They are only a nuisance.

**Management:** Sanitation is the most important aspect of ant control inside buildings. Foraging worker ants easily find crumbs, grease, food scraps, and foods in open or partly open containers. Good sanitation

decreases the likelihood of significant infestations. Insecticides can reduce ant populations indoors but are seldom effective in eliminating colonies unless the nest is treated.

Household infestations can often be traced to the lawn, so a lawn treatment may solve the problem. In addition, a chemical barrier can be applied around the outside of the house as a temporary but effective treatment. It helps to find where ants are entering the building, or at least the direction they are coming from. Once the route is known, a pesticide spot treatment treating all points of entry will usually reduce or eliminate the problem.

Baits, which contain an attractant plus an insecticide, are a good option where ant colonies are not accessible to sprays. Workers feed and carry some bait back to the nest, sharing it with the rest of the colony. Baits act slowly and may take several weeks to eliminate the problem. Effectiveness varies depending on food preferences of the target species.

Mound-building ants build nests in the ground and form hills around the nest opening. The unsightly mounds can be difficult to mow over and may smother surrounding grass. In addition, some ant species weaken grass stands by destroying grass seeds and roots. A number of insecticides are labeled for ants on turf grass including several formulations labeled for use only by commercial and professional applicators. Mowing the lawn before treatment exposes mounds and minimizes the need to enter the treated area sooner than necessary.

## **Carpenter Ants – *Camponotus* spp. – Page 36.**

## **Fire Ants – *Solenopsis invicta* and *Solenopsis richteri* – Page 68.**

### **Attic Flies**

#### **Multiple species**

**Description:** ‘Attic flies’ is a term used collectively for a number of fly species including house flies, blow flies, face flies, and others that enter homes in the fall and become pests in the winter or spring.

**Biology:** When temperatures begin to cool in the fall, flies aggregate on the outside of homes. They enter attics through small cracks, vents, and other openings and may accumulate in the hundreds or thousands. Flies overwinter as adults and survive cold temperatures by producing and storing an antifreeze called glycerol in their bodies. On

warm, sunny winter days or in the spring, flies become active when ready to exit. Many enter living areas, congregate around windows and other exits, and may die off in large numbers, leaving behind carcasses.

**Damage:** Most attic flies do not bite, will not reproduce in the home, and do not feed during the winter months. However, the appearance of these flies in the spring can be messy and annoying. The overwintering survival rate of these flies has been estimated to be as low as 2 percent and therefore many dead bodies may accumulate in attics and wall voids, which may in turn attract carpet beetles and other pests. Attic flies usually continue to overwinter in the same site year after year.

**Management:** The best way to prevent the annoyance of attic flies is to prevent them from entering the home by sealing entry routes. This is not easy as flies can squeeze in through very small spaces. It may be necessary to use a barrier spray. In the fall, usually mid-October, watch for flies aggregating on the sides of the home. Spray walls with a labeled insecticide, treating around windows, beneath eaves, and above doorways and other possible entry points. In the home, flies can be killed with an aerosol spray and swept or vacuumed up.

## Blow Flies

### Family Calliphoridae

**Description:** Blow flies, also called green- or bluebottle flies are relatively large, and often have shiny blue, green, copper or black abdomens. Typically, they are more robust than house flies.

**Biology:** Blow flies have biology similar to house flies. (See house flies on page 29.) Adults are strong fliers and are less inclined to remain close to their larval habitat. Maggots feed and develop in cheese, eggs, meat, fish, dead animals, and dog feces.

**Damage:** In nature, blow flies play an important role in the decay process of animal carcasses and are typically the first insect to arrive, within minutes or hours after an animal



Blow fly adult



Blow flies on decaying fruit

dies. Blow flies are less likely to enter homes than house flies. But occasionally large numbers will suddenly appear inside a home. This may indicate an indoor source provided food for maggots and adults have emerged from pupae. This can be due to accumulated filth, such as a sewer pipe leak, but is most often caused by a dead animal, such as a rodent, bird, squirrel, or bat in an attic, wall void, or crawl space. Blow flies can spread the same pathogens as house flies but are not as likely to enter homes.

**Management:** In most cases, finding and removing the maggots' food source eliminates problems in the home. Blow flies deposit eggs in freshly dead animals, so it is unlikely that a continuing infestation will be produced from a single dead animal. Flies can be controlled in the same way as house flies.

## Boxelder Bug – *Boisea trivittata*

**Description:** Adult boxelder bugs are approximately ½ inch long and black with reddish-orange markings on the wings, pronotum (area between the head and wings), and mouthparts. The nymphs, or immatures are similar in shape to the adults but are smaller, reddish-orange all over, and lack developed wings. As they mature, they develop black wings.

**Biology:** Boxelder bugs produce two generations per year. Adult boxelder bugs emerge from protected overwintering sites in the spring, mate and lay small, rust colored eggs on various surfaces. In a few weeks, tiny nymphs emerge and begin feeding on a wide range of hosts including trees such as maple, ash, boxelder, as well as honeysuckle, iris, asparagus, and even some weeds like pigweed and crabgrass. Nymphs mature, mate, and produce a second generation that matures in the fall. When not feeding, boxelder bug nymphs and adults may be found congregated in protected areas such as under stones and boards. As temperatures cool, bugs seek protected areas to overwinter, including soffits, attics, or outbuildings. Or they enter homes through cracks and crevices. On warm winter days, they become active and move around in homes and become a nuisance.



Boxelder bug adult



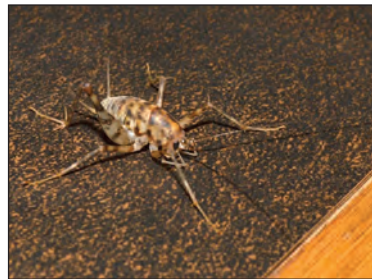
Boxelder bug nymphs

**Damage:** Feeding by nymphs and adult boxelder bugs is of little consequence to most host trees and plants. These bugs are mainly a nuisance in the fall when they find their way into homes and structures to overwinter. They may also seek out piles of leaves, yard waste, and lumber for protection. They become active on warm winter days and appear suddenly in the spring as large numbers leave their overwintering sites and begin seeking mates. Although they do not bite, sting, feed on indoor or structural materials, or vector diseases, they can produce a bad odor and leave a stain when crushed. Additionally, they are a nuisance as they crawl and/or fly around rooms and accumulate at light fixtures.

**Management:** One of the first steps in managing boxelder bugs is to eliminate overwintering sites. This includes removing yard waste and other materials around structures that provide bugs with protection. Although it is rarely possible to completely seal boxelder bugs out of a structure, caulking cracks and crevices, and replacing damaged screens to eliminate entry sites can help. Use a forceful stream of water to destroy nymphs while they are resting. When boxelder bugs begin to congregate and enter homes in the fall, a barrier insecticide treatment can be applied at potential entry points. These bugs, especially adults, are difficult to kill with contact insecticides unless sprayed directly. Additionally, several treatments may be needed as bugs may remain active late into the fall. Bugs that enter the home can be removed by vacuuming or sweeping. Take care not to smash bugs on indoor surfaces because they may leave a stain.

## Camel or Cave Crickets – *Ceuthophilus* spp.

**Description:** Camel (also called cave) crickets are not really crickets, but are more closely related to katydids and grasshoppers. They resemble house and field crickets because they have long, powerful jumping legs and long antennae. Females also possess a long ovipositor at the tip of the abdomen, which is sometimes mistaken for a stinger, but it is harmless. Unlike true crickets, they do not have wings and get their name ‘camel cricket’ because of their humped appearance. These insects are usually light tan to brown with darker bands on some segments.



Male camel cricket



**Biology:** Camel or cave crickets prefer cool, dark areas and tend to remain hidden during the day in underground burrows, under leaf litter, or other protected areas. They become active during the night but are not attracted to lights. Depending on the species, they may be predatory on other insects or herbivores feeding on various types of plant material.



Female camel cricket

Occasionally, these insects may find their way into basements or crawl spaces. Although they typically do not reproduce inside, large numbers have been reported from crawl spaces of buildings.

**Damage:** These insects may cause alarm to homeowners that come across them in basements, garages, or sheds. They are less likely to enter homes than true crickets and, when they do, they do not cause damage. Occasionally, if populations become large, burrowing may cause lumpy yards.

**Management:** To reduce camel cricket populations around buildings, minimize favorable habitats. Trim tall grasses and vegetation around foundations, remove logs, boards, loose bricks, and other materials, which may provide a protected site for crickets to live and feed. Insecticide treatments can be applied as a barrier in a 6-12 foot band around the home. Insecticides may be used to kill insects that have entered the home.

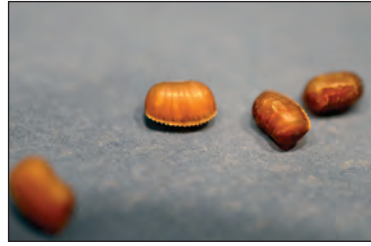
## Cockroaches

### Family Blattidae

There are an estimated 55 species of cockroaches in the United States. Of these, only five are common in homes and buildings in Kansas. They can become a pest after being passively introduced in homes in bags, cartons, or through plumbing fixtures connecting apartments, or actively by flying or crawling from the outside.

**Description:** In general, cockroaches have an oval, flattened body shape that allows them to enter small cracks and crevices. They are active at night and spend the day hidden in dark, warm areas with high humidity, near food handling areas such as under stoves, refrigerators, in cabinets, where pipes or electrical wiring pass through walls, and even behind door jams, or the undersides of tables and other furniture.

**Biology:** All cockroaches develop by incomplete metamorphosis with three life stages: egg, nymph, and adult. The female carries 12-40 eggs, depending on the species, in an egg casing called an ootheca attached to the tip of her abdomen. These egg cases are deposited in suitable habitats



Cockroach ootheca (egg casing)

where they hatch. Nymphs are very small, highly active, wingless, and often much lighter in color than adults. As they develop, they periodically shed their exoskeleton (skin) and appear white for a few hours until the exoskeleton hardens and darkens. Nymphs must molt anywhere from 2-18 times, depending on the species, before reaching maturity. This may take from around one month to several years, depending on environmental conditions. Adults and nymphs live in the same habitat and feed on a wide range of materials, including plant and animal products, meat and grease, starchy foods, sweets, pet food, wallpaper paste, and book bindings.

**Damage:** Cockroaches that become established in homes can cause a number of problems. These insects are repulsive and annoying and may mechanically transmit disease as they crawl across surfaces. For example, they have been known to transmit the bacterial pathogens *Salmonella* spp., *Streptococcus* spp., *Shigella* spp., and *Staphylococcus* spp. that cause food poisoning, diarrhea, or typhoid. They contaminate food, eating surfaces, and utensils with fecal material and salivary secretions. Cockroaches can cause allergies and trigger asthma attacks as their fecal matter and shed body parts become airborne.

**Management:** Eliminating a cockroach infestation is difficult and requires an integrated pest management approach combining several control strategies. It is very important to correctly identify the species of cockroach to accurately direct control efforts to their hiding places, which vary depending on the species.

One of the most important steps a homeowner can take to manage a cockroach infestation is sanitation. Although eliminating all food, water, and hiding places for these pests within the home is difficult, good housekeeping can help minimize favorable habitats. Do not leave food or dirty dishes out overnight; wipe surfaces to prevent accumulation of crumbs, food scraps, and grease. Keep all food, including pet food, in insect-proof containers, and all garbage closed in plastic containers and remove it from the dwelling on a frequent

basis. Removing clutter helps minimize habitat. Pick up paper, cardboard, firewood, and other debris in and around the home. To prevent cockroaches from re-entering, caulk around air conditioner units, pipes, and other openings. Reduce breeding habitats by repairing leaks, drying out any areas that accumulate moisture, and insulate pipes to prevent condensation. Vacuuming on a regular basis eliminates food scraps, and removes cockroaches, egg cases, shed skins, and excrement. Vacuum behind appliances, in cabinets and other cracks and crevices for this to be effective.

Insecticides can be effective when combined with sanitation efforts. Cockroach harborages are often near food storage and preparation areas. Read and follow label instructions carefully to prevent contamination. Insecticides used for cockroach control include sprays, dusts, baits, and aerosols. The effectiveness of insecticides relies on treating all areas where cockroaches hide such as in cabinets, under sinks and appliances, in corners, along baseboards, and in and around cracks and crevices. Insecticides will not kill cockroaches in egg cases. At least one additional application may be needed several weeks after the initial treatment to kill newly emerged nymphs.

## **American Cockroach – *Periplaneta americana***

This is the largest of the common roaches, reaching up to 2 inches in length. This species can live outdoors but may inhabit bathroom plumbing and storm drains as they prefer a dark, warm and moist habitat where they feed on decaying organic material. They are reddish brown with a light yellow band around the edge of the pronotum (head shield). Both males and females have wings, but seldom fly. The egg cases produced are relatively large,  $\frac{1}{3}$  inch in length, dark brown to black, and typically contain 12 eggs. Females drop egg cases or glue them to a protected surface approximately 24 hours after they are formed. Nymphs hatch in 50-55 days. They are grayish brown, becoming more reddish-brown as they molt 13-18 times to reach maturity.



American cockroach nymphs



American cockroach adult

## Brown-Banded Cockroach – *Supella longipalpa*

The brown-banded cockroach is golden to glossy brown and  $\frac{1}{2}$ - $\frac{5}{8}$  inch long. They may be found with German cockroaches but do well in a drier habitat and prefer starchy foods. They can be found throughout homes, high on walls, behind wallpaper, bookcases, or in warm electrical components such as televisions, radios, and refrigerators. As the name suggests, they have transverse yellow bands across the base of the wings and abdomen. These bands are typically easier to see on nymphs than adults. Males are winged with narrow bodies; females are broader and remain wingless. Females produce light-brown egg cases about  $\frac{1}{4}$  inch long and containing 13-18 eggs. A day or two after the egg case is formed, the female glues it to a protected surface where it hatches in 50-75 days. The nymphs molt 7-9 times before reaching maturity.



Brown-banded cockroach nymph



Brown-banded cockroach adult

## German Cockroach – *Blattella germanica*

The German cockroach is the most prevalent household roach in Kansas. They may be brought into homes unknowingly with grocery bags, corrugated cartons, dried pet food, and bags of onions, potatoes, and even furniture. Adults are  $\frac{1}{2}$ - $\frac{5}{8}$  inch long, light tan to light brown and can be distinguished by two dark stripes running lengthwise down the pronotum (head shield). This species tends to aggregate in dark shelters near moisture and food and are most readily found in cracks and crevices around cabinets, in and around refrigerators, dishwashers, stoves, water heaters, and washers and dryers. The female German cockroach differs from other species in that she carries her egg case around attached to the tip of her abdomen until the eggs are nearly



German cockroach adult

ready to hatch. Egg cases are light tan,  $\frac{1}{4}$  inch long, and contain 30-40 eggs that may develop in as little as two months. A single female German cockroach is capable of producing 35,300 offspring during her lifetime and thus, populations in a home can explode rapidly.

## **Oriental Cockroach – *Blatta orientalis***

The adult oriental cockroach is  $1\frac{1}{4}$  inches long and shiny black to dark brown. Both males and females are flightless as females never develop wings while wings of males only cover three-fourths of the body. They prefer damp, dark, cool habitats and are often found in basements, crawl spaces, garages, trash cans, wood piles, and indoor/outdoor drains. They will not be the same type of problem as German or brown-banded cockroaches. Egg cases are dark reddish brown,  $\frac{3}{8}$  inch long, and contain an average of 16 eggs, which the female glues to a protected surface within 24 hours after eggs are formed. Nymphs are light to dark brown with two transverse bands across the body and molt 7-10 times before maturing.



Oriental cockroach adult

## **Wood Cockroaches – *Parcoblatta* spp.**

Wood roaches are a group of outdoor roaches, measuring from  $\frac{1}{2}$ -1 inch long with bodies in various shades of brown to black. They do not breed indoors or become established in the home. They live outdoors in woodpiles, rotted logs, tree stumps, and similar areas. They are occasionally brought indoors on firewood or may wander in attracted by lights. The nymphs are secretive and seldom seen except in damp wood and under bark. The adults run and fly very quickly.



Wood cockroach nymph



Wood cockroach adult

## Drain Flies – *Psychoda* spp. and *Telmatoscopus* spp.

**Description:** Adult drain flies are small,  $\frac{1}{16}$ – $\frac{1}{8}$  inch long with a light gray to brownish body and light colored wings that come to a point at the tips and may be held roof-like over the body when at rest. Their bodies and wings are very hairy thus sometimes they are called moth flies.



Drain Fly

They have bulbous antennae also covered in hairs. They are weak fliers and may appear to be hopping or jumping. Larvae are rarely seen but are very small, pale-colored maggots. Adult drain flies suddenly appear in homes where they may initially be seen near sinks and floor drains. If populations continue to increase, flies may be found around lights and windows and become a general annoyance.

**Biology:** Adult drain flies are typically short lived, three to four days. However, if they can find nectar or a carbohydrate-rich liquid to consume, they may live several weeks. They mate at night and each female can produce around 100 eggs. Larvae feed on fungi, bacteria, algae, and other microorganisms, or may become cannibalistic. They are commonly found in the liquid or slime layers developing around drains, dirty garbage containers, septic tanks, and other areas with standing water. Larvae are quite hardy. They are not harmed by hot water, soap, or other materials that flow through drains. In as little as two weeks larvae may pupate and emerge as adults.

**Damage:** While the presence of drain flies in the home may be a source of annoyance or disgust, they do not bite, sting, or damage/infest household materials.

**Management:** Eliminating a drain fly infestation requires locating the source(s) of the larval habitat and drying, cleaning, or removing the source. Thorough cleaning of drain traps with drain cleaners and a long brush will remove trapped debris. Clean and disinfect garbage bins and drain pans. Removing decaying organic material destroys larval habitat. Chemical control is not recommended as insecticides should not be applied to drains or sewer systems unless specifically labeled for that purpose. In warmer months, adults may enter the home from nearby outdoor locations such as air conditioners, bird baths, or decorative water features.

## Earwigs

### Family Carcinophoridae

**Description:** Earwigs are elongated, dark-brown to blackish insects without wings. The most distinguishing characteristic is the forceps-like appendage on the last segment of the body. In males, forceps may be asymmetrical with the right one being more curved.



Earwigs

On females both appendages are straight. The most common, although not plentiful, species in Kansas is the ringlegged earwig, *Euborellia annulipes*. Adults measure about ½ inch in length. The body is nearly black, but the legs are light with dark spots. They have one to two white segments near the tip of the antennae.

**Biology:** Earwigs are outdoor insects found in damp areas such as in woodpiles, under mulch, dead leaves, or logs. They feed mostly on vegetable matter but will eat dead and living insects, including their own species. They have incomplete metamorphosis, so young look similar to adults, just smaller.

**Damage:** Earwigs live outdoors, but occasionally wander inside, especially in the fall and during prolonged dry periods. They are attracted to lights, which may lead them to doors and windows where they gain entrance. According to folklore, earwigs crawl into the ears of sleeping individuals and lay eggs in their brain. There is no truth to this and earwigs are quite harmless. They may release a foul odor if disturbed, or use the forceps at the end of the body to pinch, but this is not painful.

**Management:** In most cases, earwigs found in the home can simply be swept or vacuumed up. When they are a continuing nuisance, it may be necessary to modify the habitat around the dwelling. Remove piles of firewood, boards, and stones that provide good habitat. These insects prefer moisture. Eliminate habitat around faucets and channel water from gutters and rainspouts away from foundations.

## False Chinch Bugs – *Nysius* spp.

**Description:** Adult false chinch bugs are gray or brown, slender, and ⅛ - ⅓ inch long. The forewings are partially thickened and membranous. Immatures (nymphs) lack wings. They are small with

orange abdomens. As they grow, they become mottled brown with a darker head and thorax and orange spots on the abdomen.

**Biology:** False chinch bugs overwinter as eggs, nymphs, or adults around the base of host weeds or plant residue, although nymphs are the most frequently observed. They become active with warming temperatures in late winter or early spring. Nymphs develop into adults, mate, and deposit eggs around the base of weed hosts where large populations can build up relatively quickly. In Kansas, there may be three or more generations per year.

**Damage:** When natural host weeds are killed or dry up, false chinch bugs migrate in large numbers looking for food. Large, healthy landscape and garden plants can tolerate feeding, but significant feeding on seedling or stressed plants may reduce vigor. The number of bugs present during a migration is more problematic than their feeding on plants. The bugs can aggregate by the thousands on porches, sides of buildings, and in swimming pools. Because of their small size, they can enter homes and buildings creating a nuisance.

**Management:** There are few management options, but most years, none are needed. Keeping plants well watered allows them to tolerate bug feeding. Mass migrations usually last a week or less. If insecticide applications are deemed necessary, sprays applied early in the morning when bugs are most active provide best control. To prevent false chinch bugs from entering buildings, ensure that doors and windows have adequate seals. Bugs that enter homes can be vacuumed or swept up and discarded.



False chinch bug nymphs



False chinch bug adult

## Field Crickets – *Gryllus* spp.

**Description:** There are a number of field cricket species in Kansas ranging from ½-1 inch in length. Typically, the entire body is black or dark brown with reddish-brown highlights. Females are larger than males with three appendages at the tip of the abdomen, two styli, and a long, conspicuous ovipositor. They cannot sting with this ovipositor, just deposit eggs.



**Biology:** Field crickets live outdoors where they spend the summer feeding on plant and vegetable matter and occasionally become pests in gardens and field crops when present in large numbers. There is one generation a year. In the fall, females use their long ovipositor to lay eggs in the soil. Nymphs emerge the following spring and continue to feed and develop during the summer. They reach maturity in the fall, and then mate to begin the cycle again. As temperatures cool in the fall and food becomes scarce outdoors, field crickets wander indoors through structural cracks, crevices, and gaps where they detect warmer temperatures. Field crickets may live indoors for a few months before dying but do not reproduce in homes.



Male field cricket



Female field cricket

**Damage:** Field crickets feed on plant debris while outdoors, but once they enter homes they consume organic refuse, including dead insects. Crickets can contaminate food and stain fabrics by way of feces and salivary secretions. Males produce a loud chirp by rubbing their outer wings together to communicate for mating, fighting or as an alarm. This loud, incessant but inconsistent chirp can be distracting and may interfere with sleep.

**Management:** Eliminate cricket habitat adjacent to your home to minimize entry. Trim tall grasses around foundations, remove crushed stone, wood mulch, loose bricks, boards and other materials that provide habitat. Seal cracks and crevices with caulk and patch holes in screens to discourage crickets from entering in the fall. At night crickets may be attracted to lights. Insecticide treatments can be applied in a 6-12 foot band around the home to provide a barrier and reduce the chance of them entering. Insecticides can be used to kill crickets inside the home.

## Firebrat – *Thermobia domestica*

**Description:** Firebrats look and act similar to silverfish. Upon close inspection they are mottled in shades of gray, white, brown, and black.

**Biology:** As the name suggests, firebrats prefer extremely warm conditions and can be found in furnace rooms, fireplaces, and around ovens. They do not reproduce unless temperatures are above 90°F and thrive at 90-110°F. Females lay about 50 eggs during her lifetime of about 1-1½ years. Firebrats molt 40-60 times.

**Damage:** Firebrat damage is similar to that of silverfish. See silverfish for more information.

**Management:** See silverfish on page 33 for management information.



Firebrat

## Flesh Flies Family Sarcophagidae

**Description:** Flesh flies are medium to large and grayish with three black stripes on the thorax. The abdomen is reddish brown to yellowish at the tip. Larvae are yellowish maggots with a pointed head.

**Biology:** Flesh flies are a little different from other flies in that they do not lay eggs but give birth to larvae. The eggs develop in the body of the female. Young larvae are then deposited on the food source. Most larvae feed on decaying flesh or excrement, but a few species feed on eggs, nymphs, and larvae of other insects including other flies and grasshoppers. As the common name suggests, the maggots may be found in an open wound feeding on dead flesh. Maggots typically feed for 3-4 days before pupating. Mouthparts of adult flies are designed to lap up liquids, and flies do not bite.

**Damage:** A few cases of flesh fly maggots moving from dead tissue into the healthy flesh of livestock animals have been reported, but this is not common. Accidental consumption of maggots on stale meat may lead to a condition called pseudomyiasis.



Flesh fly

**Management:** Typically an outdoor nuisance, flesh flies rarely require chemical control. Removing larval food sources such as animal carcasses and animal waste quickly reduces populations. Timely treatment of wounds prevents harm to animals.

## Fungus Gnats

### Family Sciaridae

**Description:** Fungus gnats are small, ⅛-inch long, delicate, brown to black flies with long legs and antennae. The larvae are very small, wormlike and translucent with black head capsules. Larvae are rarely seen because they live in decaying vegetation or the growing medium of plants in homes and greenhouses.



Fungus gnat

**Biology:** Adult fungus gnats live 7-10 days. During this time, the female may deposit up to 200 eggs in the growing medium of houseplants. The larvae remain in the top 2-3 inches, feeding on fungi, algae, and decaying plant matter. They may also feed on roots and leaves resting on the soil surface. Within two to three weeks, larvae pupate in the same location. Adults emerge about a week later. They stay in the vicinity of the infested plant, flying in short, erratic patterns.

**Damage:** Fungus gnat larvae do not damage houseplants but may reproduce year-round on indoor plants, making the adults a consistent nuisance. Adults do not bite or consume household items or food.

**Management:** Control of fungus gnats can be achieved by allowing the top 1-2 inches of growing medium to dry out between waterings. This makes plants less attractive for females to deposit eggs and decreases survival of eggs and larvae already present in the growing medium. Repotting plants helps get rid of medium that contains a large amount of decaying plant matter, which provides a good food source for larvae. If fungus gnat populations persist several weeks after watering has been reduced, pesticides may be warranted. These may be applied to the growing medium and target adults as they emerge from pupae. Eggs and larvae in the medium will not be affected by treatments. Several treatments may be needed to successfully break the reproduction cycle.

## Ground Beetles

### Family Carabidae

**Description:** Ground beetles make up a large family that comes in a range of colors and sizes. Species that enter homes are usually brown to black in color and  $\frac{1}{4}$ - $\frac{3}{4}$  inch long. They tend to have flattened bodies with large, prominent mandibles (jaws), heads that are smaller than the pronotum (neck), and moderately long antennae consisting of 11



Pennsylvania ground beetle

segments. Ground beetles are active hunters. They have long, slender legs and are fast runners. The Pennsylvania ground beetle, *Harpalus pensylvanicus* (pictured) is often found in Kansas homes, especially in late summer and fall. It is  $\frac{5}{8}$  inch long, dark brown to solid black, with light brown legs.

**Biology:** Ground beetle biology is different for each species. However, all have complete metamorphosis. Larvae appear caterpillar-like but often have hardened bodies. Most ground beetle species are predacious both as larvae and adults. Larvae spend most of their time in the soil and do not enter homes. Adults hide during the day under rocks, leaves, loose bark, and mulch. As their name suggests, ground beetles are not strong fliers, but tend to run along the ground if disturbed.

**Damage:** Ground beetles are attracted to lights, and thus may be found around outdoor lights. Beetles can be a nuisance when they enter homes but are not damaging and die within a few weeks. They do not reproduce or become established indoors. They may use their large mandibles to pinch if handled. Many species prey on other insects and arthropods and thus are considered largely beneficial.

**Management:** Typically ground beetles do not enter homes in large numbers, and the few that do can be removed by sweeping or vacuuming. If large numbers are entering, reduce outdoor lighting or switch from white to yellow light which is less attractive. Remove hiding places such as mulch, tall grasses, firewood, and other large debris in lawns. Seal entry points such as torn screens, large foundation cracks, and gaps around doors. In severe cases or public buildings, a border pesticide treatment may be applied around the exterior.

## Hackberry Nipplegall Maker (Psyllids) – *Pachypsylla celtidismamma*

**Description:** Hackberry nipplegall makers, also commonly called psyllids or jumping plant lice, look like very small cicadas. Adults are around  $\frac{1}{8}$  inch long and hold their wings roof-like over their dark-brown bodies. The common name comes from the nipplegalls they cause to form on the undersides of hackberry leaf surfaces.



Adult psyllids (up close)

**Biology:** Hackberry nipplegalls overwinter as adults in protected areas such as under tree bark, leaf litter, stacked firewood or lumber around homes or other structures. In spring, females deposit eggs on the undersides of new foliage. Eggs hatch in about a week and nymphs begin feeding, which stimulates abnormal growth in the leaf tissue, causing gall formations that house nymphs and allow them to continue feeding and developing throughout the summer. In the fall, mature nymphs emerge from galls, drop to the ground, and go through one more molt before becoming adults.



Adult psyllids on window screen

**Damage:** In the fall, adults may emerge in incredibly large numbers and begin looking for a protected site to overwinter. They may swarm screens and porch lights. As they are so small, it is possible for them to enter homes through the smallest of cracks and crevices. These insects do not bite, sting, or feed on household goods. They are a nuisance only when large numbers get indoors in the fall, and overwintering adults become active again and try to get back outdoors in the spring.



Galls created by nymphal feeding

The biggest concern is the unsightly galls they create on hackberry trees. Heavily infested leaves may drop prematurely, however, galls do not have a significant impact on overall tree health. In most cases fallen leaves are replaced with new foliage, which is not affected by galls because adults have already died.

**Management:** In some cases the best way to get rid of recurring hackberry nipplegall populations is to remove infested hackberry trees. If there are numerous trees in the vicinity, this may not end the problem. To prevent nipplegall makers from entering homes, reduce access. Repair screens, install weather stripping around doors and windows, and caulk foundation cracks. Adjust lighting at night if possible. Sweep or vacuum up insects that enter the home. Insecticides can be used to treat trees in the spring, but timing is very important. Treat when nymphs have emerged from eggs but before the protective gall has formed. Good coverage is needed to reduce or eliminate the population.

## House Cricket – *Acheta domesticus*

**Description:** Adult house crickets are about  $\frac{3}{4}$ - $\frac{7}{8}$  inch long and tan to yellowish-brown to dark brown. They have long back legs for jumping. Females have three appendages at the tip of the abdomen, two styli, and a conspicuous ovipositor (pictured). This is used to deposit eggs in cracks and crevices but cannot be used as a stinger.



Female house cricket

**Biology:** House crickets typically live and reproduce outdoors during the summer. As temperatures cool in the fall and outdoor food sources become scarce, crickets readily wander indoors through structural cracks, crevices, and gaps where they detect warmer temperatures. Unlike other cricket species and their relatives, house crickets can continue to reproduce inside year around. Females may deposit 40-170 eggs in cracks and crevices in darkened areas of the home, often in basements or crawl spaces. House crickets are also produced commercially and sold in bait shops and pet stores.

**Damage:** House crickets are scavengers that feed on a wide variety of materials, including houseplants, pet food, meat and vegetable matter, and even boxes, bags, woolens, furs, silks and dead insects. Additionally crickets may contaminate food and stain fabrics with fecal pellets and salivary secretions. Male crickets communicate by rubbing their outer pair of wings together to produce a chirping sound. This noise, which is used for mating, fighting, and as an alarm, can be incessant and annoying.

**Management:** The first step in managing indoor cricket populations is to reduce the number of crickets that come indoors. To control crickets around the outside of the home, minimize habitat. Trim tall grasses around foundations, remove crushed stone, wood mulch, loose bricks, boards and other materials that provide dark, protective areas for crickets to live and feed. At night, crickets are attracted to lights. Sealing cracks and crevices and replacing damaged screens will minimize cricket entrance in the fall. Outdoor insecticide treatments can be applied as a barrier in a 6-12 foot band around the home. To maximize the effectiveness, apply these treatments in the fall when crickets are most likely to enter structures. Insecticides may be used to kill crickets that have entered the home, along with sticky traps placed in strategic locations where crickets may hide.

## House Fly – *Musca domestica*

**Description:** The house fly is the most common fly entering homes in Kansas. This gray fly is  $\frac{1}{4}$ - $\frac{5}{16}$  inch long with four dark stripes of equal width running longitudinally down the thorax. The sponge-like mouthparts are specialized for a liquid diet. Creamy white maggots are pointed at one end and about  $\frac{1}{2}$  inch long at maturity. Pupae are contained in a reddish-brown puparium.

**Biology:** House flies are prolific with each female producing several large egg masses in her lifetime. Females deposit eggs in human and animal waste, garbage, and just about any available decaying plant or animal matter. Under favorable conditions, eggs hatch in as little as 24 hours, and larvae feed on soluble materials directly from the substrate in which eggs were laid, as well as the microflora and fauna living in it. The larval stage lasts 3-24 days, and the pupal stage 3-5 days, depending on temperatures. Adults are good fliers but typically remain within a mile or two of where they matured.



House fly



House fly maggots and pupae

Adults feed on similar material as maggots and use repeated salivation, ingestion, and regurgitation to aid in predigestion. Flies rest on just about any surface, including walls, plants and trees, as well as humans and animals.

**Damage:** House flies do not bite but are a considerable nuisance. They may spread a wide range of microbial pathogens with their bodies and regurgitations as they move from feeding sites to humans, animals, and food.

**Management:** Sanitation plays the key role in managing fly populations. Destroy breeding sites by keeping pet waste picked up in lawns, placing garbage in cans with tight fitting lids and removing it to landfills regularly. It can be difficult to keep adult flies out of structures, especially when people and pets are entering and exiting. Make sure doors and windows have good, tight-fitting screens without holes. Fly paper, insect electrocuters, and light traps may control adults in a structure but will not significantly impact overall populations, especially if fly breeding sites remain nearby. Flies have acquired resistance to many insecticides as a result of their frequent use to destroy larval breeding habitats, so maggot control should focus on sanitation. Adults that enter homes can be controlled using 'knock down' aerosols. Outdoor control of adult flies is very difficult. Fly baits may help when food is scarce. Residual sprays can be used around trash cans and on other surfaces where flies rest. It may help to place resin strips impregnated with insecticides inside garbage cans, but it is difficult to achieve appreciable control of adult flies.

## Multicolored Asian Lady Beetle – *Harmonia axyridis*

**Description:** The multicolored Asian lady beetle (MALB) is a relatively large lady beetle, ¼ inch long. The coloration and number of spots present on the wings varies greatly between individuals. They range in color from red to orange to yellow and may have zero to nine spots on each wing. The best characteristic for identifying the adults is the black 'W' on the thorax, just behind the head. These beetles have gained notoriety with home owners because of their tendency to enter homes in the fall in large numbers to overwinter.



Multicolored Asian lady beetles



**Biology:** This insect is native to Asia and was introduced by the USDA from 1977 to 1981 to control scale and aphid pests. Both the larval and adult life stages are predatory and feed voraciously on these pests. As days shorten, temperatures cool, and food becomes scarce, multicolored Asian lady beetles search for protected overwintering sites such as homes, garages, and other outbuildings and aggregate on the west and southwest side of buildings.



Black 'W' on thorax

**Damage:** Beetles can be a nuisance when they invade homes. While they tend to remain in attics, wall voids, or other out-of-the-way places, on warm winter days they may become active and move around in living spaces. Beetles excrete a foul-smelling yellow liquid when disturbed that may stain household materials. MALBs have strong mandibles (jaws) and deliver a painful pinch when they bite. Beetles have been reported to cause allergic reactions when excrement and small fragments of dead beetles become airborne.

**Management:** The best way to prevent this pest from becoming a problem is to exclude them from structures. Repair torn screens, add weather stripping around doors and windows, and seal any gaps around soffits, eaves, or other entry points. Residual insecticide sprays used as a barrier treatment for other common household pests may also help to suppress beetle populations. Sprays must be applied before beetles aggregate and begin entering structures and, depending on weather conditions, may need to be applied more than once to prevent beetles from entering during the course of a warm, mild fall. Once indoors, beetles can be vacuumed or swept up and removed.

## Northern Mole Cricket – *Neocurtilla hexadactyla*

**Description:** Mole crickets are not really crickets, but belong to their own taxonomic group. They have a unique, mole-like appearance with enlarged front legs (fossorial), large heads and stout bodies. They are typically 1¼-1½ inch in length and brownish to brownish-black in color. Unlike true crickets, mole crickets do



Northern mole cricket

not use their back legs to jump, but rather to push themselves through the soil they loosened with well-developed front legs.

**Biology:** Mole crickets spend most of their lives underground where they burrow and feed on plant roots, tubers, and root crops. They prefer loose, damp soils.

**Damage:** Although mole crickets are not rare in Kansas, they are not often seen because of their secretive lifestyle. Occasionally, mole crickets may be encountered under boards, stones, and other protected, damp areas, including basements, and sheds. Although they may cause alarm, they are harmless. Occasionally, large populations may damage grass roots, or garden root and tuber crops.

**Management:** Mole crickets do not typically require management. They can simply be removed if found indoors.

## Pomace or Vinegar Flies

### Family Drosophilidae

**Description:** Pomace flies, also known as vinegar flies and often referred to as fruit flies, include a large family of small ( $\frac{1}{16}$  inch) yellow to brown flies, frequently with red eyes. They are sometimes found in kitchens because they are attracted to overripe fruits and vegetables.

**Biology:** Pomace fly eggs may be brought in unknowingly on fresh produce or other materials. They can reproduce anywhere there is decaying or fermenting organic matter and constant moisture. Females lay eggs around cracks and wounds in fruits or around slow-moving or seldom used drains with accumulations of fermenting organic matter. Larvae (tiny, cream colored maggots) feed on yeast produced from decaying vegetation, pupate and emerge as adults. The life cycle takes 1-2 weeks to complete, depending on temperatures.

**Damage:** These flies are a nuisance and their presence on and around fruits and vegetables can be repulsive. Their activity around cracks and wounds in fruit can speed the rate of decay.

**Management:** In most cases, removing aging fruit and vegetables, eliminates pomace fly infestations. When bringing home new fruits and vegetables, store them in the refrigerator to prevent adult flies still present from laying eggs and beginning a new generation. Do not



Pomace fly adults around wound on fruit

leave fruit, pits, and peels in trash cans or compost bins for extended periods. Persistent presence of adults suggests that flies have begun to reproduce in the home. During warmer months, pomace flies may be entering from a nearby location. While it can be difficult to find the source, attempts should focus on slow-moving or seldom-used drains, garbage containers, under dripping pipes, refrigerators, and other moist areas with accumulations of fermenting organic matter. Clean and dry these locations. Outdoors, remove and destroy any fruits and vegetables that have fallen to the ground that may provide a breeding reservoir for these flies.

## Red Shouldered Bug – *Jadera haematoloma*

**Description:** Red shouldered bugs look similar to boxelder bugs but have a single red line on each ‘shoulder’ rather than red markings on the wings. The nymphs, or immatures, are similar in shape to the adults but are smaller and reddish-orange all over, and lack developed wings. They develop black wings as they mature.



Red shouldered bug adult

**Biology:** The biology of red shouldered bugs is similar to boxelder bugs but their host range appears to be considerably smaller. They feed mainly on goldenrain trees.

**Damage:** Like boxelder bugs, red shouldered bugs are a nuisance when they enter homes and structures.

**Management:** Management tactics for red shouldered bugs are the same as boxelder bugs. See boxelder bugs on page 13 for more information.

## Silverfish Family Lepismatidae

**Description:** Full grown silverfish are ¼-½ inch long and silver to gray with scale-covered bodies. The young look similar to the adults but smaller. Both young and adults are wingless. Their bodies are thick at the front and taper to a point at the end with three tail-like appendages. The head features



Silverfish

long antennae and small compound eyes that are widely separated. Silverfish are active at night and move in characteristically quick, short movements, stopping for short intervals before moving on.

**Biology:** Several species of silverfish are common in Kansas. Some species prefer cool, damp places such as basements, beneath or behind cabinets, and in bathrooms. Others can be found throughout the house and in dry areas such as attics. All species prefer moderate temperatures (75–85°F). Silverfish have relatively long lifespans (up to seven years) and may not reach maturity for several years. Over a lifetime, females lay 50–100 eggs in cracks and crevices, either singly or in small groups.

**Damage:** Silverfish and firebrats are typically noticed when they fall into bathtubs or sinks and cannot escape or when boxes or furniture are moved around and they scatter in search of a new hiding place. They feed on a wide range of materials including starchy materials like paper and glue, as well as fabrics, dried cereals, dried meats, and vegetable matter. Feeding may cause damage, especially to books or other documents, and may leave yellow stains on linens.

**Management:** Sanitation is the best strategy for controlling silverfish and firebrat infestations. Remove old stacks of newspaper, magazines, fabrics, and foodstuffs. Reducing humidity within the home or at least in problematic areas will help with some silverfish, as will increasing lighting in infested areas. For example, a chair or bookcase pushed against a wall provides a dark environment with a readily available food source. Pulling the furniture away a few inches will increase air flow and lighting, making it a far less favorable environment. In many cases pesticides may be used along with sanitation. Treatments should be applied to all hiding places such as cracks, crevices, baseboards, closets, and pipes.

## Springtails – Collembola

**Description:** Springtails are tiny ( $\frac{1}{16}$  inch long) and live in areas of high humidity. Many species exist in Kansas, ranging in color from white to bluish purple or gray to black. Bodies may be long and thin or globular, and hairy or smooth. These tiny hexapods get their name from a projection on their abdomen, called a furcula, which allows them to propel



Smooth springtail

themselves through the air. Springtails require moist habitats and desiccate and die quickly without enough moisture. A few can tolerate lower humidity and survive in buildings and on the tops of flowers. There are also a few types of springtails, commonly called snow fleas, which may be found on the surface of snow on warm days in the winter.

**Biology:** Springtails are common in the soil and other areas that remain moist, feeding on decaying organic matter, other soil organisms, or plant material although they usually do not cause noticeable damage. Springtails play an important role in many ecosystems because they break organic matter down into small pieces, creating larger areas for fungi and bacteria to attack, speeding up the rate at which nutrients can be recycled.



Water springtail

**Damage:** Sometimes, when habitats become unfavorable — too wet (after a heavy rain), too dry, or otherwise, they move into homes, often showing up suddenly in the hundreds or thousands. In many cases, these invasions are temporary, and springtails die off quickly as they desiccate. If they begin to reproduce in the home, they can be found in dark, moist areas in basements, crawlspaces, around drains or leaky pipes, in well-watered plants, or around sinks or bathtubs. While they can be a nuisance, they will not damage any household materials and do not bite or sting.

**Management:** While their sudden appearance, often in large numbers, may be alarming, in most cases springtails do not require control and populations diminish quickly. Springtail populations may become established in mulches around homes or in areas that are watered frequently. In these cases control efforts should focus on caulking or otherwise reducing entry sites as well as changing watering schedules or reducing moisture near entry sites. If indoor populations develop, they may be controlled by removing their habitat, i.e., replacing wet, rotting wood, cleaning drains, fixing leaking pipes, or running a dehumidifier in basements. Chemical control is generally not recommended for springtails and will only provide temporary relief unless the habitat is modified to be less suitable. If desired, foundations can be treated with a labeled insecticide as a barrier treatment to prevent entry of springtails into homes.

## Stable Fly – *Stomoxys calcitrans* - Page 74.

## Structural Insect Pests

Structural pests are insects that attack wood, using it as a home or food source. These insects may infest a structure long before they are noticed. It is important to properly identify wood-destroying pests because they require different control methods, some of which can be very expensive.

### Carpenter Ants – *Camponotus* spp.

**Description:** Carpenter ants include the largest species of ants found in Kansas. Adults vary in length from  $\frac{1}{4}$  inch for small workers to  $\frac{3}{4}$  inch for a queen, with size varying greatly from one species to another. The body is reddish-brown to black, and in some cases the front of the body is red and the rear is black. Carpenter ants have waists, or petioles, consisting of a single node, and smooth abdomens without spines or spikes. The most characteristic feature of carpenter ants is the ring of tiny hairs at the tip of the abdomen.

**Biology:** Carpenter ant biology is similar to other ants. See Ants on page 9.

**Damage:** Carpenter ants seek soft, moist wood in which to establish nests, particularly weathered wood that has begun to decay. Although ants usually start building the nest in soft wood, they may excavate into perfectly sound, dry lumber in porch columns and roofs, window sills, hollow core doors, firewood, and telephone poles. Carpenter ants do not eat wood like termites do, but excavate galleries in the wood in which to rear young. Galleries are formed without regard for the grain and follow the softer portions of the wood. They are kept smooth and clean with a sandpapered appearance. Carpenter ants eject coarse sawdust from the galleries. These characteristic sawdust piles indicate the nest's location. When carpenter ants are found within a structure, the colony is either nesting within the building or the ants are nesting outside and entering the home to forage for food. Houses near



Carpenter ants - side view



Carpenter ants - top view

wooded areas are particularly vulnerable to invasion. These ants utilize a wide variety of foods including honeydew excreted by aphids, plant and fruit juices, other insects, animal remains, and household food scraps, including sweets, eggs, meats, cakes, pet foods, and grease.

**Management:** The key to controlling carpenter ants is to locate the nest, which can be difficult. If found, there is an excellent chance of controlling this pest. Carpenter ants are usually associated with moist conditions. When looking for the nest, carefully inspect wood affected by water seepage (window sills, roofs, porch floors, posts, and columns). Look for nearby stumps, logs, and trees that might contain nests. Trees with overhanging branches touching the roof may offer a colony direct access to the structure. Non-chemical prevention methods include sanitation measures such as removing and destroying logs and stumps that harbor nests, trimming vegetation, and eliminating moisture problems, replacing any damaged or weathered wood. If insecticides are used, they should be applied directly to the nesting area to eliminate the parent colony. In addition, it helps to apply an insecticide spray around the perimeter of buildings or at the base of trees harboring nests. Spot treatments should be applied at possible entry points and known foraging trails of carpenter ants.

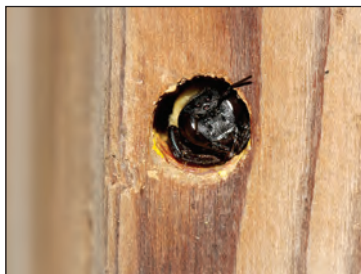
## Carpenter Bee – *Xylocopa virginica*

**Description:** Carpenter bees are heavy-bodied, large bees ( $\frac{3}{4}$ – $\frac{7}{8}$  inch long), but are typically a little smaller than bumblebees with which they are often confused. The carpenter bee has a thorax covered in dense, yellow hair, but a bald, shiny abdomen. They have large, well-developed mandibles, or jaws, used to excavate through wood. Males and females are relatively easy to tell apart. This is important because females can, though rarely do, sting. Males do not have this ability. The female's face is totally black, but the male bee has a whitish or golden triangle shape under the eyes, which is often referred to as a bald face.

**Biology:** Carpenter bees earn their name from their wood-boring



Carpenter bee (left) and bumble bee (right)



Female carpenter bee with black face

behavior. Adult females excavate tunnels and cells through soft and weathered wood. They do not feed on this wood but forage for pollen and nectar like other bees. These bees are solitary but may build up in large numbers in suitable wooden structures.

There is one generation a year and a new generation is initiated when adults emerge in late May to early June. Males generally emerge first and hover in the area, waiting for females to emerge and the chance to mate. Males become territorial and competitive during this time and may 'dive bomb' anything that moves through the area. After mating, females begin to construct nests by refurbishing and expanding old nests or excavating new ones. They chew through wood, creating ½-inch diameter tunnels that are smooth on the inside and consist of a main tunnel with 6-12 brood cells extending off the main tunnel. The female collects pollen and nectar, mixes it in her gut, and then regurgitates it into each brood cell. She deposits a single egg and seals the chamber, dying shortly after this intense work is done. Larvae develop throughout the summer, feeding on food provided by the female. They pupate and become adults in late summer. Occasionally, young adults chew through the seal seeking pollen and nectar, but they usually remain in the cell over the winter, resuming the cycle the following May.

**Damage:** Carpenter bees cause more concern than damage. Male's territorial behavior, loud buzzing and 'dive bombing' of intruders is a nuisance. Although unnerving, it is harmless. Females can sting, but do so only if provoked. The large holes created by the females are often stained yellow or brown. The piles of coarse sawdust beneath them can be unsightly, reducing the aesthetic value of a structure. Female bees



Male carpenter bee with 'bald face'



Carpenter bee tunnel opening.



Showing sawdust and staining



prefer to reuse and extend existing tunnels, instead of creating new ones. While this can mean fewer overall holes, tunnels that are reused may be up to 10 feet long with many brood cells. In some cases, these extensive tunnels may result in structural damage.

**Management:** Prevention is the best management tactic for carpenter bees. They need older, soft, untreated, unpainted wood. Keep all exposed wooden surfaces well painted with a polyurethane or oil-based paint. Older wood may be covered or replaced with vinyl siding or aluminum that bees will not bother. If wood is already infested, entrance holes should be treated with an insecticide. Apply a dust or liquid formulation to holes when bees become active in the spring. As bees come and go, they will come in contact with the treatment. Apply treatments at night to avoid disturbing the bees. Once treatments have been applied, plug holes with a caulking bees cannot chew through to prevent future infestations. Painting is not sufficient as bees may excavate through new paint and continue to use the gallery.

## 'Firewood Beetles' – Cerambycidae and Buprestidae

**Description:** There are several species of wood-boring beetles brought into homes in firewood. These beetles are often bright and colorful and range in size from ½-1½ inches long, depending on the species. Longhorned beetles, family Cerambycidae, have antennae as long or longer than their slender bodies, and often have long legs. Metallic wood-boring beetles, family Buprestidae, have short antennae, bullet-shaped bodies, and are shiny and metallic in color.

**Biology:** Adult beetles often lay eggs on trees that are in decline. Larvae emerge from eggs, bore into the wood, and begin to feed and develop. When trees that are in poor health are cut down for firewood, larvae may be brought into the home. Homeowners may be alarmed by the sound of larvae chewing on the wood. In time, larvae will pupate and emerge as adults. These beetles may be strong fliers and are often seen around lights and windows.



Longhorned beetles, Cerambycidae

**Damage/Management:** Although alarming, the chance of these wood-boring beetles emerging from firewood and infesting a structure is extremely remote. Adults can be handpicked, vacuumed, or sprayed with indoor aerosol if difficult to catch. Avoid leaving firewood indoors for long periods. Store wood outdoors and bring it inside as needed.



Metallic woodboring beetle, Buprestidae

## Powderpost Beetles – Order Coleoptera

The term ‘powderpost beetle’ includes two families of small beetles that can become household pests when the larvae bore through wood. Typically, these pests are only discovered with the appearance of small ‘shothole’ exit openings in wood. These are the exit holes made by adults after completing development. Further investigation into the interior of this wood shows small, meandering galleries packed with a powder, produced by the grub-like larvae. When adults emerge, they mate and lay eggs on or just below the surface of unfinished wood. Once eggs hatch, the tiny larvae begin boring into wood where they feed and develop for the next 1-5 years, depending on temperature and species.

### Anobiid Beetles Family Anobiidae

**Description:** This group includes the furniture powderpost beetle and the deathwatch beetle. The adults are red to brown to black and slightly less than  $\frac{1}{2}$  inch long. Anobiids may attack a wide range of woods, including both hard and softwoods as well as older, seasoned woods. They need dampness and tend to prefer the sapwood of softwoods. Consequently, anobiid infestations often begin in moist, poorly ventilated areas such as crawl spaces and basements.



Anobiid powderpost beetle

**Biology:** Female anobiid beetles deposit eggs in cracks and crevices of seasoned hardwoods and softwoods. Larvae contain a gut enzyme that allows them to digest cellulose, so the frass they produce is coarse, gritty and in the form of bun-shaped pellets.



Anobiid powderpost beetle and damage

## Lyctid Powderpost Beetles Family Bostrichidae

**Description:** Considered the ‘true’ powderpost beetle, the lyctid adult is reddish-brown to black, about  $\frac{1}{8}$ - $\frac{1}{4}$  inch long, slender, and flattened. Lyctids only attack hardwoods such as oaks, ash, walnut, and hickory, and typically infest wood less than five years old. They are most commonly encountered in wood paneling, molding, picture frames, door frames, window frames, and furniture. These beetles may be found in newer homes where wood infested with eggs and larvae was used in construction.



Lyctid powderpost beetle and damage (below)

**Biology:** Female lyctid beetles deposit eggs in the pores of hardwoods and larvae feed on sapwood as it contains the starch



needed in their diet. These beetles are unable to digest cellulose and therefore the majority of the wood they feed on passes through the larva and is left behind as the very fine, powdery frass that characterizes these insects. This fine powder is easily dislodged from tunnels and may be found in small piles around areas where infestations are active.

**Damage/Management:** Powderpost beetles are difficult to detect and often go unnoticed until ‘shotholes’ created by emerging adults appear. While feeding activity rarely causes significant structural damage, beetles can reduce the aesthetic value of infested wood. Control is difficult. But because beetles only lay eggs on bare, unfinished wood, painting, varnishing, or finishing wood in some way will prevent an infestation. Note that larvae already in the wood may

still emerge as adults. An infestation in a small, contained area such as a piece of furniture, a window or door frame, can be dealt with by removing the wood and replacing it. Smaller infested items can be placed in a freezer for 24-48 hours to kill all life stages. A surface insecticide treatment only kills adults as they exit the holes or land on the wood surface to deposit eggs. For large-scale infestations, a contact commercial pesticide applicator.

## Termites – *Reticulitermes* spp.

**Description:** Termites have a complex biology, including a caste system in which individuals with different roles have different appearances. Subterranean termites, *Reticulitermes* spp., are the most common type of termite in Kansas. They are known to have at least three different, easily distinguishable castes: workers, soldiers, and winged reproductives or swarmers.

Workers, the most numerous members of the colony, are creamy white, soft-bodied, wingless, and eyeless. They desiccate easily and therefore are not found outside the colony. Workers do all the labor such as providing food, feeding soldiers and reproductives, and building new tunnels. The workers feed on the soft grain of the wood, which can eventually lead to structural damage.

Soldiers protect the colony and are built for defense with large, elongated, brownish heads and two large mandibles (jaws). The soldier's head is hard, but the rest of the body is creamy white and soft like the workers. When soldiers perceive a threat by predators such as ants, large numbers congregate quickly to defend the colony. Jaw clicking can be audible and is often mistaken for the sound of workers feeding on the wood, which is inaudible.

Winged reproductives, often called 'swarmers', have dark brown to black bodies, large eyes, and two pairs of long, narrow, whitish, semi-transparent wings of equal length. Fragile wings are held flat over the body and break off easily after a short, fluttery flight. Large swarms of



Worker subterranean termite



Soldier subterranean termite

termites contain both winged and non-winged individuals. Swarms are most common in the spring after the first warm rains. Winged reproductives look similar to winged ants. It is imperative to correctly distinguish ants from termites because control measures for the two insects are completely different. See page 10 for more on proper identification of ants versus termites.

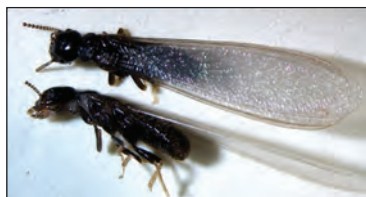
**Biology:** As previously mentioned, termites have a complex biology. A colony's continued survival and growth depends on a single queen termite that is responsible for producing the young. She becomes grotesquely swollen with eggs soon after the initial mating and is mostly immobile and incapable of caring for herself. She stays deep within the colony where she is cared for by workers. Subterranean termites are soft-bodied and require moisture to survive. Therefore, colonies are located 1-30 feet below the soil surface and typically follow a chemical or moisture gradient to locate a new food source. Workers build mud tunnels to allow them to move across exposed areas to wood several feet above the soil. Termites contain symbiotic protozoa in their digestive tracts that allow them to convert cellulose found in wood, paper, and fiberboard into food.

**Damage:** The idea of a termite infestation often causes panic. Although these insects can become quite destructive, the structural damage caused by termites happens slowly. A mature termite colony only eats about one fifth of an ounce of wood per day. If termites are suspected or found, take the time to find the right treatment plan for the situation.

**Detection:** There are multiple signs that indicate a structure may have a termite infestation. This includes the sudden emergence of winged reproductives or swarmers, which can be seen crawling or fluttering around a mature colony. If the swarmers emerge inside,



Swarm of reproductive termites



Reproductive termites (up close)



Termite damage

they will be attracted to brighter areas including windows and lights. Spring swarming begins as the day warms, usually around 10 a.m. The presence of one or two winged reproductives indoors may suggest they fluttered in from outdoors. Another sign is the presence of mud tunnels connecting the soil to wood, found in crawl spaces, on foundations, and around holes where pipes or utilities enter. In an active colony, these tunnels are filled with workers. Although termite-damaged wood often goes unnoticed, prodding with an ice pick or screwdriver may reveal wood that is soft, easily punctured, and/or full of galleries. Unless live workers are found, it is difficult to determine the age of termite damage or whether the colony is still active.

**Management:** Steps can be taken in the construction of buildings to protect against termites, and proper maintenance helps keep termites away. Do not allow wood such as firewood or old logs to remain near or in contact with structures, which makes it relatively easy for a colony to move indoors. In most cases, once a termite infestation is established, a professional pest control company should be contacted to eliminate the colony. The average homeowner does not have the training, experience, or equipment needed to successfully gain long-term control.

## Pantry Insect Pests

Pantry pests are arthropods that feed on and infest products found in home pantries and other storage places. Many of these pests can be found feeding on various grain-based products, but several feed on fungus and molds growing in stored grains or soiled areas of stored garments. Some pests are fairly specific in what they eat, while others feed on a wide range of items, including grains, carpets, furs, hides, and other organic materials.

### Booklice (Psocids) – *Liposcelis* spp.

**Description:** Booklice, or psocids, are very small,  $\frac{1}{32}$ – $\frac{1}{36}$  inch long, nearly transparent, soft-bodied insects that typically lack wings. The head and abdomen are relatively large with a narrow thorax between the two. Eyes are located on the sides of the head, and booklice have long thread-like antennae. These insects tend to remain hidden but run in a halting manner if exposed.



Psocid adult

**Biology:** Booklice reproduce by parthenogenesis, meaning they are all females that deposit unfertilized eggs which produce genetically identical offspring. Each female produces an average of 60 eggs during her life. Eggs are oval, white, and laid in clusters near a food source where the young nymphs, which look like smaller versions of the mother, hatch and feed on molds, mildews, and other fungi. They thrive in warm, humid environments that favor the growth of their food source. These insects are frequently found under old wallpaper, in books, stored papers, around stored cereals and grains, bird nests, and household plants. There may be 7-8 generations a year.

**Damage:** Booklice do not bite, sting, spread disease, or damage household goods. However, in favorable habitats, large populations can build up and become a nuisance. Their body remnants and frass can contaminate materials, including stored foods, and cause allergies.

**Management:** The best method to reduce booklice populations is to eliminate favorable habitats. When possible, reduce humidity to below 50 percent. Keep books and papers off the floor, and repair plumbing leaks or standing water issues in basements or crawl spaces. Household cleaning products can be used to control mold and mildew, which provide food for booklice.

## Carpet Beetles or Dermestids Family Dermestidae

**Description:** Three species of carpet beetles are commonly found throughout Kansas. The black carpet beetle, *Attagenus megatoma*, is a 1/8-inch long, shiny black beetle with brown legs. The larvae are up to 1/2 inch long, light brown to black, and carrot-shaped with tufts of long hairs at the end of their bodies. The varied carpet beetle, *Anthrenus verbasci*, and the common carpet beetle, *Anthrenus scrophulariae*, are difficult to tell apart. They are smaller and rounder than the black carpet beetle, and mottled with brown, yellow, and white coloration. Larvae are 1/4 inch long, light to dark brown and hairy, but lack the carrot shape and long hairs at the end of the body.

**Biology:** Frequently, a carpet beetle infestation is not detected until the tiny adults are noted flying around windows, or cast skins are found in window wells, cabinets, and closets, but it is the larvae that cause damage. They feed on woolens, carpets, rugs, silk, furs, hides, museum specimens, and similar organic materials as well as stored food products such as cereals, flours, and baking mixes. Larvae prefer dark, protected areas to feed and develop. Females deposit eggs on a larval food source. Eggs hatch in several weeks, depending on temperature and species, and larvae feed from several months to more than a year. To pupate, larvae may burrow deep into the food source or wander and burrow someplace else. Adults feed on pollen or nectar and live 2-8 weeks.



Black carpet beetle



*Attagenus* sp. larva



Varied carpet beetle



*Anthrenus* sp. larva



**Damage:** Carpet beetle larvae can damage a wide range of organic materials. Many of these items may be stored in dark, out-of-the-way places where considerable larval populations may build up and significant damage occurs before an infestation is detected. Beetles can stain or contaminate synthetic materials and food products with fecal material and cast skins, which can cause allergies.

**Management:** The most important, and often the most difficult step in eliminating a carpet beetle infestation is to locate the source. Begin by checking the room where adults or cast skins were first detected. Infestations occur in a wide range of locations — from fur coats and clothing, to insect or animal collections, to bird and wasp nests in the attic. Once an infestation is located, infested materials should be removed and disposed of or cleaned. Insecticides are available for treating empty closets and cabinet surfaces to prevent infestations, but it is important to follow label directions to avoid damaging clothing or contaminating food. Bedding, coats, and clothing stored for a period of time should be inspected, cleaned, and placed in sealable plastic containers to prevent infestation. Mothballs can help protect these materials, as well as museum specimens. Place stored food products in airtight containers to prevent infestation or keep an infestation from spreading. Inspect all materials periodically to detect a beetle infestation before significant damage is done. Sanitation is the best way to prevent an infestation from becoming established. Thoroughly and frequently vacuum, especially in out-of-the-way places where lint, hair, and dead insects accumulate. Keep closets and pantries clean. Seal cracks and crevices with wood putty or caulk to eliminate insect hiding places and places where food and lint accumulate.

## Cigarette Beetle – *Lasioderma serricorne*

**Description and biology:** The cigarette beetle is approximately  $\frac{1}{10}$  inch long, reddish-brown, and covered with fine hairs. It appears humpbacked when viewed from the side. Females lay 10-100 eggs on a food source. Larvae are yellow-white grubs, up to  $\frac{1}{8}$  inch long, and covered in silky hairs. After feeding for 5-8 weeks and depending on the temperature, they pupate in a closed cell constructed from small particles of whatever type of material they are infesting, gluing it



Cigarette beetle

together with larval secretions. Cigarette beetles prefer dark, protected areas. They become active at dusk and continue through the night. It can be difficult to tell this species apart from the drugstore beetle, *Stegobium paniceum*, except that the antennae of cigarette beetles are serrated, while the antennae of drugstore beetles end in a three-segment club. Cigarette beetle larvae look similar to drugstore beetle larvae, but due to similar habitats and biologies, identification is not essential for their elimination.

**Damage:** The common name comes from the beetle's reputation as a major pest of cured tobacco, although the larvae readily feed on a wide range of materials, including dried herbs, spices, cereals, flours, dried fruits, seeds, dried fish, meats, nuts, hair, wool, and other animal products. Adults do not feed but may consume nectar or other liquids.

**Management:** For information on management of these pantry pests, see Flour Beetle on page 50.

## Clothes Moths

### Family Tineidae

**Description:** Two species of clothes moths are common in Kansas, the casemaking clothes moth, *Tinea pellionella*, and the webbing clothes moth, *Tineola bisselliella*. Adults of both species are similar in appearance — small, golden to yellowish moths with a wingspan of  $\frac{1}{2}$  inch or less, and approximately  $\frac{1}{4}$  inch long.

Indianmeal moths are often mistaken for clothes moths; however, clothes moths are rarely seen because they remain hidden in dark closets and are not attracted to light as are Indianmeal moths. The casemaking clothes moth larvae are around  $\frac{1}{2}$  inch long at maturity and have dark heads and a dark thoracic segment. As the name implies, the larvae construct and live in a silk case, which they carry with them. The webbing clothes moth larvae are similar in size, but they are nearly transparent to off-white with light-brown heads. These larvae are often found



Clothes moth



Casemaking clothes moth larva

in patches of silk webbing they spin, but are not portable like the casemaking clothes moth.

**Damage:** Larvae are the damaging stage as adults do not have functional mouthparts. Larvae feed on woolen clothing, felt, rugs, carpets, furs, or other organic materials that contain keratin. They may also damage cotton, silk, synthetic fibers, and even paper soiled with sweat, urine, or beverages such as milk, beer, or juice. Young larvae need the nutrients found in such soilage to survive.



Webbing clothes moth larva

**Management:** Sanitation is the best prevention for clothes moths. Make sure clothing is clean before storing. Washing and ironing eliminates any eggs and larvae and the soilage larvae feed on. Clothes stored in tight-sealing cedar chests or boxes can be protected with moth balls or flakes containing paradichlorobenzene (PDB) or naphthalene. A labeled household insecticide can be applied in cracks, along baseboards, and other areas where insects crawl or hide. If an infestation is discovered, discard badly infested articles and use a combination of sanitation practices and insecticides to eliminate the infestation and prevent moths from attacking additional materials.

## Drugstore Beetle – *Stegobium paniceum*

### Description and Biology:

Drugstore beetles are approximately  $\frac{1}{10}$ – $\frac{1}{7}$  inch long, light brown, covered in fine hairs, and cylindrical in shape. Females lay up to 75 eggs on a food source. Larvae are yellow-white grubs that reach up to  $\frac{1}{8}$  inch in length and are covered in silky hairs. After feeding 4–20 weeks, depending



Drugstore beetle

on the temperature, they pupate in a closed cell constructed from small particles of infested materials, which has been glued together with larval secretions. It is difficult to tell this species apart from the cigarette beetle, *Lasioderma serricorne*, but the drugstore beetle's antennae end in a three-segmented club, while the cigarette beetle's are serrated. Because they share similar habitats and biologies, identifying the species is not essential to their elimination.

**Damage:** The drugstore beetle gets its common name from a propensity for feeding on almost all drugs found in pharmacies. Larvae are general feeders and infest an extensive list of materials including pet food, seeds, flours, mixes, and spices. It is said they “eat anything except cast iron.” Adults do not feed but consume nectar or other liquids and are attracted to lights.

**Management:** Prevention, sanitation, and exclusion are the most important steps for avoiding or eliminating a drugstore beetle infestation. To prevent infestation, avoid storing susceptible foods for long periods, or store them in tightly sealing containers or in the refrigerator or freezer. Keep storage areas very clean. Do not let food crumbs accumulate and clean spills thoroughly using a vacuum cleaner with a wand. Even a small amount of food left in cracks and crevices can attract mobile adults. If an infestation is detected, remove all infested materials from the home. This can be difficult as eggs and small larvae are difficult to see, especially those hidden in flours and stored foods. For additional management information, see Flour Beetles below.

## Flour Beetle – *Tribolium* spp.

**Description:** The confused and red flour beetles are two closely related species that are difficult to distinguish. They have similar habits and respond to the same control measures. They are small,  $\frac{1}{7}$  inch long, reddish-brown, shiny beetles that are flattened and oval. With magnification, it is possible to see that the head and upper parts of the prothorax are covered with minute punctures and wing covers have lengthwise ridges with punctures between the ridges. Larvae are white with a yellowish tinge, slender, worm-like, and  $\frac{3}{8}$  inch long at maturity.

**Biology:** Adult female flour beetles deposit up to 450 eggs in their year-long lifetime, typically on fine flour dusts, broken kernels, and other foodstuffs. Eggs are covered in a sticky secretion that causes them to quickly become covered in flour or meal and adhere to the sides of



Confused flour beetle



Red flour beetle

boxes, sacks, and other containers. Larvae emerge from eggs, feed and develop for 1-4 months, form naked pupae that gradually turn from white to brown, and then into adult beetles.

**Damage:** Both larval and adult flour beetles feed on cereals and cereal products but also may infest other pantry materials containing grains. In addition to feeding damage, the cast skins and fecal pellets contaminate pantry products.

**Management:** The best way to manage an infestation of any kind of pantry pest is to avoid it in the first place. Seldom-used flours and grains should be purchased in small quantities. Store all grain-based products in tightly sealing containers or keep them in the refrigerator or freezer. Carefully examine products at the time of purchase to ensure freshness and look for tears, holes, or signs of insect damage. In addition, keep all food storage areas clean. Vacuum using a wand to remove small bits of flour and other foods that may have accumulated in cracks and crevices, which can attract adult pests.

Once an infestation is detected, it is very important to locate the source(s). Remove and destroy infested materials as well as surrounding foods that may be contaminated. Anything suspected of being infested can be heat- or cold-treated. Although this kills all life stages and eliminates the pest, products may still be contaminated with eggs, dead larvae and adults, as well as fecal material. Cold-treat flours, cake mixes, and spices at 0°F for 3-7 days, making sure that the cold penetrates the material. Heat-treat beans, nuts, and whole grains by spreading them in a shallow pan and placing them in a 150°F oven for 15-20 minutes.

Insecticides can be used to treat empty pantries and food storage areas but should never be applied to food, food containers, or utensils. Such treatments will not stop an infestation within a food product, but can help to prevent a reinfestation along with proper sanitation. Cleaning and treatments may need to be repeated at two-week and four-week intervals to destroy larvae emerging from eggs left behind.

## **Indianmeal Moth – *Plodia interpunctella***

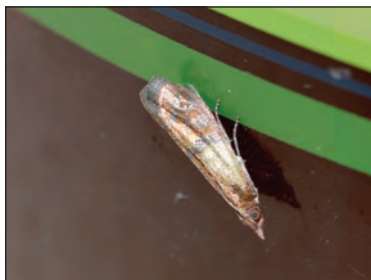
**Description:** The Indianmeal moth is probably the most common stored food pest found in homes throughout Kansas. It is a potential pest of many products, from raw grain at a storage elevator to the retail outlet selling the finished product. The adult is a small,  $\frac{3}{8}$  inch long moth with a wingspan of nearly  $\frac{3}{4}$  inch. It can be readily identified by the characteristic markings on the wings. The outer half to two-thirds is a rusty brown to bronze color and the upper portion

near the body is a dirty gray. The larvae or caterpillars are typically cream-colored although they may take on greenish or pinkish shades. Larvae have a dark brown head capsule and reach a length of  $\frac{2}{3}$  inch. They leave a silken thread wherever they go, forming a web and eventually a cocoon. This webbing is a telltale sign of an infestation.

**Biology:** Adult Indianmeal moths are often seen fluttering around lights in homes. They are short-lived (7-10 days) and do not feed. After mating, females fly around depositing 100-300 eggs, individually, on or near potential larval food sources. Adults are attracted to cereals, stored grains, dried fruits, chocolate, and nuts. Larvae are able to chew through paper wrappings, plastic bags, and thin cardboard to gain access to food. When they are ready to pupate they wander away from the food source and spin a loose cocoon in cracks or confined spaces. There may be 3-4 generations a year.

**Damage:** Indianmeal moth larvae feed and develop in a wide range of stored goods including dried herbs, dried fruits, nuts, chocolate, pet foods, bird seed, and even ornamental items made of dried flowers or seeds. This feeding, along with the frass and webbing they leave behind, makes infested materials unfit for cooking and/or eating.

**Management:** Sanitation and exclusion are the most important steps for avoiding an infestation. To prevent an infestation, examine packaging before purchasing. Do not buy damaged packages as larvae can easily enter these items, or they may already contain eggs. Look for signs such as the presence of webbing or silken threads near seams. Once home, avoid storing susceptible foods for long periods, or store them in tightly sealed containers or in the refrigerator or freezer. If an



Indianmeal moth adult



Indianmeal moth larvae and webbing



Indianmeal moth larva and pupa

infestation is detected, remove all infested materials from the home. Eggs and small larvae are difficult to see. For more information on management, see Flour Beetle, page 50.

## Saw-Toothed Grain Beetle – *Oryzaephilus surinamensis*

**Description:** This small, brown,  $\frac{1}{10}$  inch long beetle gets its common name from the six saw-like teeth projecting from each side of the prothorax (the section between the head and wing covers). They do not fly, are not attracted to light, and prefer humid conditions. Larvae are yellowish-white with a brown head, about  $\frac{1}{8}$  inch long, and difficult to distinguish from the larval stage of other stored product pests.



Saw-toothed grain beetle

**Biology:** Females deposit eggs in and/or around a potential larval food source. Adults live an average of 6-10 months and females may produce 40 to nearly 300 eggs during their lifetime. Larvae emerge from eggs and feed and develop for approximately 50 days. There are several generations a year.

**Damage:** Adult and larval stages of the saw-toothed grain beetle attack all foods of vegetable origin, especially grain products, including flours, meals, pet foods, breakfast food, bakery mixes, nutmeats, candies, dried milk, and dried fruits.

**Management:** See Flour Beetle on page 50.

## Medical Insect Pests

Insects are considered medical pests if they bite, sting, or can vector disease to humans. Although these insects can cause pain and discomfort, reactions vary depending on the health of the individual, location of the bite or sting, and amount of venom delivered.

### Bat Bug – *Cimex pilosellus*

**Description:** The adult bat bug looks similar to the bed bug and the swallow bug. In fact, they are nearly impossible to distinguish with the naked eye. (See bed bug, page 55.) It is important to determine the species before implementing control measures as these are very different. Take the suspected bed bug, bat bug, or swallow bug to your local extension office for proper identification.



Adult bat bug

**Biology:** Female bat bugs deposit eggs on rough surfaces and in cracks and crevices in areas where bats roost. They have a life cycle similar to bed bugs and must have a blood meal between each molt. Bats are the primary host but the bugs also feed on birds, rodents, and even humans. However, without bats, they cannot reproduce, and populations eventually die out.

**Damage:** Bat bugs feed while the host is sleeping. The bat bug's bite is reported to be more painful than the bed bug's, although most individuals are not aware of bites until symptoms develop. Reactions are similar to bed bug bites and vary from person to person. Like bed bugs, bat bugs do not transmit human pathogens although secondary infections from scratching are possible.

**Management:** Bat bugs prefer bats and typically move into homes and feed on people when bats live in close proximity, such as attics and wall voids, or when bats have been eliminated from a location and the bugs find themselves in need of a food source. Bats are considered non-game wildlife and cannot be killed legally. Bat bugs can be eliminated by excluding bats from a structure and using a residual insecticide around harborage areas. Exclude bats by locating the entrance and exit opening at dusk when bats are leaving. Place a piece of mesh fabric over these holes, attaching it at the top but leaving the



bottom open. This allows bats inside the structure to find their way out but keeps them from re-entering. Locate and seal all cracks and crevices to keep bats from entering. Do not do this when young bats are unable to leave the roost. The odor of dead bats may attract other insect pests.

## Bed Bug – *Cimex lectularius*

**Description:** Adult bed bugs are small, oval, wingless, flattened insects about  $\frac{1}{4}$  inch long. They range in color from a light tan to a dark, rusty red depending on when they consumed their last blood meal. Bed bugs have four segmented antennae and small compound eyes on the side of their heads. Nymphs look similar to adults but smaller and grow a little with each molt. The eggs are very small, oblong, and white, and covered in a glue-like substance that enables placement in a wide range of locations. Empty egg cases may remain long after nymphs have emerged. Adult bed bugs look similar to adult bat bugs and swallow bugs. It is important to determine which species is in the home as effective control is very different for these species. Take the bed bug, bat bug, or swallow bug to your local extension office for proper identification.

**Biology:** A mature female bed bug produces 200-500 eggs in her lifetime, depositing them in clusters of 10-50. The sticky eggs are often laid around the tufts, seams, and folds on regularly used mattresses or furniture. Newly hatched nymphs are about the size of a pinhead and grow larger after each of five molts. Nymphs require a blood meal between each molt, although both nymphs and adults can live for months without feeding. Although



Adult bed bug



Eggs, nymph, and adult bed bug



Molted skins and dried blood excrement

they prefer human hosts, they also feed on warm-blooded animals such as dogs, cats, and rodents. They cannot reproduce in the absence of a human blood meal. The bed bug life cycle can be completed in as little as five weeks under ideal conditions (70<sup>o</sup>-82<sup>o</sup>F with ample blood supply), and adults can live approximately 10 months. Cooler temperatures or lack of food slow development time.

**Damage:** Bed bugs feed at night while people are sleeping, but bites may not be noticed until later. They can consume up to six times their weight in blood, and it typically takes between 3-10 minutes to complete feeding. They feed by piercing the skin with two elongated stylets — one carrying saliva from the bed bug to the wound, and the other carrying blood from the host to the bed bug. This saliva may cause swelling and itching although reactions vary among individuals. Reactions may occur a few hours to a few days after the bite or not at all, but typically present as bites that are itchy and red with a darker red center. Bites may be arranged in a line just outside the hem of fitted clothing or clustered together on exposed skin on the face, neck, arms, hands, or ankles. Distinguishing bed bug bites from flea, mosquito or spider bites is difficult and a bed bug needs to be found to confirm the cause. While bed bugs may reduce the quality of life due to sleeplessness, discomfort, or anxiety, they are not known to transmit disease. Scratching bites can lead to secondary skin infections.

**Detection:** Bed bugs may be carried to new locations in suitcases, purses, and backpacks. Early infestations are extremely difficult to detect because bugs remain hidden during the day and feed at night. Bed bugs are most commonly found in or near beds or sleeping areas so inspections should begin by examining the mattress, bed frame, headboard, and cushions. As the infestation increases in number, bugs may move away from the bed to other furniture, hiding in cracks and crevices along floorboards, under switch plates and outlets, and even inside electronics such as clocks, televisions, and smoke detectors. Their small size and flattened bodies allow them seemingly infinite hiding locations. Bed bugs do not live in colonies, but do tend to congregate around good hiding areas. These locations are evident because they are stained with dark red to blackish spots (dried bug excrement), contain eggs or empty egg casings, and molted skins from the growing bugs.

**Management:** Prevention is the best, but often the most difficult way to manage bed bugs. Infestations begin when bugs are introduced on luggage, clothing, and furniture. Do not bring discarded mattresses and other furniture into the home. When traveling, avoid leaving

clothing on hotel floors or beds, and elevate luggage on the rack provided. Wash clothes separately in hot water after returning home.

Eliminating bed bugs is difficult and requires an integrated approach. In most cases it is necessary for a homeowner to hire a professional pest control service. To make insecticide or steam treatments more efficacious, it helps to remove excess clutter in homes, which provides hiding places that protect bed bugs from treatments. Bedding, clothing, and stuffed animals should not be treated with insecticides. These items can be treated by heating for at least 30 minutes on the hot cycle of most tumble dryers or freezing at 0°F for at least 2 hours. These temperatures must penetrate all materials and remain consistent for the required time to successfully eliminate all bed bug life stages. Ideally, infested mattresses and other furniture should be discarded. But mattress encasements are available that are designed to trap bed bugs inside the mattress where they will eventually die and prevent new bugs from reinfesting. Nonchemical methods can aid in removing bed bugs but rarely eliminate an infestation. Vacuum and steam clean regularly, using a wand to reach cracks and crevices. This will remove nymphs and adults but will not dislodge all of the sticky eggs. Seal potential hiding places, such as cracks and crevices in walls and other surfaces, to reduce the number of hard-to-treat areas. If an infestation is suspected, call a pest control operator with training in bed bug management before the problem spreads.

## **Bees and Wasps**

### **Order Hymenoptera**

Bees and wasps are largely beneficial insects. Many bee species play important roles in pollinating wildflowers and fruit crops. Honey bees provide honey and wax used in many products. Most wasps attack, feed on, or parasitize other insects, including many damaging flies and caterpillars. Despite these attributes, bees and wasps can become a nuisance when they enter dwellings or nest in areas frequented by humans. In addition, bees and wasps may aggressively defend their homes, leading to dangerous encounters.

Only female bees and wasps are capable of stinging. Stingers are modified ovipositors, or egg-laying structures. The sting includes venom designed to kill or paralyze prey but also may be used defensively when individuals or a colony is threatened. Reactions to bee and wasp stings vary from person to person and occasionally

may cause life-threatening anaphylactic shock. While many bee and wasp species exist in Kansas, the following information focuses on those most commonly encountered in and near dwellings, which may require control.

## Bees

### Bumble Bees – *Bombus* spp.

**Description:** Several species of bumble bees are found in Kansas. In general, these bees are large with heavy bodies and hairy abdomens. Legs typically are black but can be covered in yellow to orange pollen, while the thorax and abdomen are black with orange to brown to bright yellow markings, depending on the species.



Bumble bees

**Damage/Management:** Bumble bees are social insects that typically nest in the ground in old rodent burrows. Although a colony will thrive from spring to fall, the colony (except a few overwintering females) will be killed off by cold weather. Bumble bees typically do not return to the same location year after year. If a colony is not located where people are at risk, it is best to leave it alone. Bumble bees may become a concern when a nest becomes established near buildings, play areas, or occasionally, in insulation material. When nests are disturbed, bees defend their colony aggressively. If needed, entrances should be treated with a residual insecticide at night when bees are less active. As bumble bees enter and exit the nest they come into contact with the insecticide. Control may take time, and reapplication may be needed to kill young, emerging bees.

### Carpenter Bee – *Xylocopa virginica* – Page 37.

### Digger Bees – *Melissodes* spp.

**Description:** Several species of ‘digger’ bees are found in Kansas. In general, they are stout-bodied and hairy, ranging in color from gray to brown to yellow. They are marked with other colors, and a few species are metallic. They are  $\frac{1}{4}$ - $\frac{1}{2}$  inch long.

**Biology:** Digger bees are solitary. The female digs a tunnel each spring and deposits eggs and provisions each chamber with pollen for the larvae, which develop over the summer and winter, then pupate and emerge the following spring. These bees are restricted to areas with the correct soil type and drainage, so an ideal area may contain large numbers of these bees. While females are busy digging tunnels, male bees buzz around and rest on nearby vegetation, looking for an opportunity to mate.



Digger bee

**Damage/Management:** Digger bees are not aggressive and females only sting if they become trapped on the skin. The sting is milder than a honey bee or wasp sting. When large numbers of digger bees are present, they may interfere with outdoor activities or affect lawn appearance. While the application of insecticides can eliminate a digger bee problem temporarily, the best long-term solution for bee infestations requires changing soil conditions to make it less favorable for nesting.

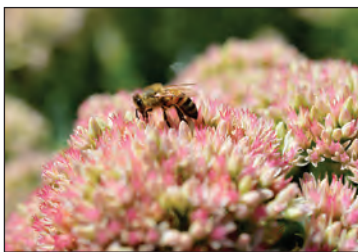
## Honey Bee – *Apis mellifera*

**Description:** The honey bee worker is about ½ inch long with a yellow abdomen containing four brown to black bands. Honey bees have barbed stingers. Females only sting once, but the stinger remains in the skin and should be removed by scraping the skin from the side rather than squeezing, which may force more venom under the skin.



Honey bee workers

**Biology:** Honey bees are social insects that live in colonies where labor is divided according to a caste system. A colony has a queen that produces all the young. The queen and young are cared for by worker bees. Workers are all female, non-reproducing bees that are also responsible for foraging for pollen and protecting the hive.



Honey bee worker

**Damage/Management:** If a hive location becomes uninhabitable or a colony outgrows its current hive, bees swarm. In many cases, about half the worker bees leave, often taking the queen with them. These bees cluster on a tree, fence post, or other structure while a few scout bees search for a suitable location for a new hive, such as a tree hollow or wall void. Swarms are temporary and should be left alone. In cases where swarming bees could put the public at risk, a beekeeper or pesticide company should be contacted to remove the swarm.

Occasionally, a swarm may establish itself inside a building where they begin to build honeycombs and rear young right away. Removing established hives from structures is difficult and requires an experienced beekeeper. Once bees are in walls, the most realistic control option may be to kill the hive. Bees can become aggressive. Consider contacting a professional pesticide company to treat hives. Dust or liquid insecticide formulations can be placed in voids around hives. Apply treatments at dusk or at night when bees are less active, taking precautions to protect people from bees that may become extremely aggressive when the hive is under attack. Treat entrance and exit holes and additional holes if necessary to ensure sufficient exposure to the pesticide. After treatment, seal all holes bees use to enter or exit the hive. If necessary, reapply in 7-10 days to kill young bees emerging from pupae. After hive activity has ceased, open walls and remove all dead bees, wax, and honey. Left in the wall, these materials can develop a bad odor, and melt, rot, stain and attract insect and rodent pests. Wax and honey removed from a treated hive should be destroyed.

## **Sweat Bees – *Augochlora* spp. and *Agapostemon* spp.**

**Description:** Several species of bees in Kansas are commonly referred to as sweat bees. They measure  $\frac{3}{8}$ - $\frac{1}{4}$  inch in length. The thorax is covered in tiny pits and the abdomen may be shiny, metallic green, or black and yellow striped. The entire body is covered in fine gray hairs.



Sweat bee

**Damage/Management:** They earn their common name because they are attracted to sweat. They may become trapped against the skin and sting, but this sting is neither overly painful nor long lasting. These

bees may nest in rotting wood, in the soil, or other locations where the female can dig burrows to deposit pollen for developing larvae. Sweat bees are solitary. Contact with these bees is irregular, and although they can be a persistent nuisance, treatments are not needed.

## Wasps

### Baldface Hornet – *Dolichovespula maculata*

**Description:** The baldface hornet is stout-bodied, black with light yellow to ivory colored markings and about  $\frac{3}{4}$  inch long. The markings consist of five spots on the front of the head, colored jaws, a wishbone-shaped spot in front of the wings, and paired spots on the top of the last five abdominal segments and the bottom of the last six abdominal segments. The front legs are mostly ivory to yellow.



Baldface hornet

**Biology:** Baldface hornets are social insects, starting a new nest each spring that grows throughout the season. The nests are large, gray, papery and may resemble a football. They are usually located in trees and shrubs. The papery material is made from the salivary secretions of female wasps. By fall, the nest is at its maximum size and empty by winter, with the exception of the queen, which overwinters and begins a new colony the following year. The nests are destroyed by birds and other animals that feed on any larvae left in the nests. Therefore, a nest will not be repaired or reused the following year.

**Damage/Management:** Baldface hornets usually build their nests in trees and shrubs away from human dwellings. Occasionally, the location of a nest may cause them to become a nuisance. Hornets defend the nest aggressively and great care should be taken if control is to be attempted. In these cases, nests may be treated with an insecticide designed to propel the chemical 10-20 feet. In the evening when wasps are less active, spray the nest at the bottom where the entrance is located, and proceed cautiously as wasps fall out of the bottom when sprayed. Then thoroughly spray the rest of the nest. This may need to be repeated for several days. When activity ceases, remove and destroy the nest.

## Cicada Killer – *Sphecius speciosus*

**Description:** The cicada killer is one of the largest wasps in Kansas, reaching lengths of 1 inch or more. The abdomen is black with three incomplete bands of yellow. The legs and wings are brownish to brownish-red.

**Biology:** Cicada killers nest in the ground where females dig extensive tunnels and may displace several pounds of soil in the process. These tunnels contain multiple egg chambers, each of which is provisioned with 1-3 paralyzed cicadas and one cicada killer egg. Eggs hatch in 2-3 days and the grub-like larvae feed on the cicadas for approximately 10 days. In the fall, larvae spin silken cases to overwinter.

Development resumes the following spring and adults emerge in the summer to begin the cycle again. These insects are univoltine (one generation per year) and solitary; however, large concentrations of cicada killers can build up over time in favorable habitats. These adults emerge in coordination with cicada adult emergence, which they utilize as a larval food supply.

**Damage:** Cicada killers select areas with well-drained, sandy soils to build their tunnels (nest). The extensive tunneling by the female creates a distinct, U-shaped pile of loose soil around the opening and these tunnels may range from 30-70 inches long and 12-15 inches deep. This may create unsightly holes in lawns and golf courses. In some cases tunneling may cause patio stones laid on sand to become unstable or may disrupt the root systems in vegetable gardens or flower beds. The most significant concern created by cicada killers is undoubtedly caused by the males. As females work to create tunnels, males hang around the entrance holes and may be very territorial. This 'dive bombing' and buzzing can be disconcerting to people and domestic pets. Only females can sting, but they are usually docile. It is mainly the size and behavior of male wasps that causes problems, not the actual damage or sting of the female.



Cicada killer



Cicada



**Management:** Many cases do not require management. To prevent cicada killers from nesting, make the habitat less favorable by covering sandy areas with paving stones, mulch or similar materials, or keep areas damp during the 1-2 weeks they are especially active. Occasionally, cicada killers may become numerous in public places such as parks or golf courses. In such cases, nesting areas can be treated with an insecticide, which the wasps will contact as they enter and exit holes. However, this will not control eggs and pupae inside nests thus control may be needed again the following year when new adults emerge.

## Mud Daubers Family Sphecidae

**Description:** There are multiple species of wasps referred to as mud daubers in Kansas. In general, they are large, slender wasps, around 1 inch in length, with a stem-like waist and long legs. They are often black in color and may have some yellow, orange, or red markings. A few species are metallic blue, purple, or green.

**Biology:** Mud daubers are solitary wasps. Each spring, new adults emerge from mud cells where they overwintered. After mating, females construct the mud nests for which they are named. The female constructs a cell and then hunts for spiders, crickets, grasshoppers, or caterpillars, which she stings to paralyze and brings back to the cell as provisions. Females lay a single egg in each cell and cap it off with mud. They build 6-20 cells per nest, occasionally constructing a second nest. After sealing off a cell, the female does not return to provide any further care. Larvae hatch from the eggs and feed on the paralyzed prey,



Blue mud dauber



Black and yellow mud dauber



Mud dauber nest

pupate, and emerge as adults within a few weeks. There may be several generations a year.

**Damage/Management:** Mud daubers become a nuisance to humans when they adhere their mud nests to items stored in sheds, garages, or outdoors. The wasps themselves are fairly docile and do not sting unless harassed. Because they do not remain with a nest for an extended period of time, mud daubers can be difficult to control. Exclusion is the most effective control method, but mud nests can be picked off and destroyed. Females must have mud to construct nests, so eliminating nearby sources helps.

## Polistes or Paper Nest Wasps – *Polistes* spp.

**Description:** Polistes wasps are social wasps commonly encountered in Kansas and include a number of species. They are long-legged and slender with spindle-shaped abdomens. Reddish to brown in color, they may have yellow or black markings. Nests are easily recognizable as the ‘paper nests’ that look like a honeycomb section with a layer of cells facing downward and attached to a structure by a single point.

**Biology:** Like other social wasps in Kansas, the colony dies out each winter, with a single queen surviving. The following spring the female finds a location and builds a nest that consists of only a few cells where she cares for young. The colony grows quickly throughout the season with female workers helping to expand the papery nest and provide food. Wasps feed on caterpillars, including many pest species, and are considered beneficial insects. Adults are often seen feeding on decaying fruit.

**Damage/Management:** Polistes wasps are usually not aggressive unless they are defending their nest and therefore should not be disturbed unless the location of the nest becomes a nuisance or threat to public safety. Eliminate the nest by spraying it after dark with an insecticide that propels the chemical 10-20 feet. When adult activity has ceased, remove and destroy the nest.



Paper nest wasp



Paper nest wasp and nest

## Yellowjackets – *Vespula* spp.

**Description:** Flying yellowjackets can be mistaken for bees. On closer inspection, these wasps are longer bodied ( $\frac{1}{2}$  inch long) and black with distinct yellow bands on the abdomen and two pairs of spots between the wings. They are not as hairy as bees.

**Biology:** Yellowjackets are social wasps that build papery nests similar in appearance to those of baldface hornets. However, nests are located a few inches to a foot underground. Female worker wasps hunt down prey, including caterpillars and other insects, biting them into smaller pieces which can be carried back to the nest and fed to larvae. Wasps are attracted to sweet liquids in watermelon or any open, cut, or decaying fruit, and carbonated beverages.

**Damage/Management:** Yellowjacket nests are often discovered when they are disturbed while mowing or trimming weeds, leading wasps to defend the nest in large numbers. Female wasps, unlike honey bees, are capable of stinging multiple times. Because they are attracted to sweet liquids, wasps may become a nuisance at picnics but tend to be less aggressive in these situations. Eliminate the nest by locating the entrance and treating it with an insecticide at night when wasps are less active. After treating, cover the hole to prevent wasps from leaving the nest.



Yellowjacket on fruit

## Black Flies or Buffalo Gnats Family Simuliidae

**Description:** Black fly adults are small flies,  $\frac{1}{16}$ – $\frac{3}{16}$  inch long, typically velvety grey to black with broad, clear wings and short, 11 segmented antennae. They are commonly known as the buffalo gnat because of their strongly convex thoraxes and humpbacked appearance. Found only in running water, larvae are brown to black, club-shaped, and attach to stones or other objects using a sucker-like disc on the end of the abdomen.



Buffalo gnat

**Biology:** Black fly females deposit 150-400 eggs in running water of streams and rivers. Larvae feed on detritus and small organisms, pupate, and emerge from the water as adults. Both males and females feed on nectar, but the female also feeds on blood, which is needed for egg development. In many cases, black flies mate in swarms close to where they emerge as adults, but they may travel several miles or more in search of suitable egg-laying habitat or a blood source. There may be several generations a year, but fly larvae need a continual source of running water for survival and preferably, cool water temperatures. Larval populations decline considerably when water temperatures reach 75-80°F, so these flies are a pest mainly in the spring in Kansas.

**Damage:** Female flies are vicious and persistent biters. During the spring, black flies can drive away any outdoor enthusiasts such as fishermen, campers, and hikers. While bite discomfort and severity varies from one individual to another, reactions can range from minor pain and itching to significant swelling around the bite, headaches, nausea, and fever. In North America, these flies are not known to transmit any diseases to humans. But they can be a serious pest to livestock, leading to death as a result of anaphylactic shock, suffocation due to inhalation of flies, and weakness due to blood loss.

**Management:** There are not many control options for black fly populations. Because larvae live in running water, it is impossible to remove or treat their habitat. Avoiding areas with black flies during the spring and early summer is the best way to keep from being bitten. Use of a repellent containing DEET, along with protective clothing covering all exposed skin, can help to reduce fly bites.

## Cat Flea – *Ctenocephalides felis*

**Description:** Several flea species are found in Kansas, but the cat flea is the most common pest of cats and dogs in and around homes. The adult flea is a small,  $\frac{1}{8}$ - $\frac{3}{16}$  inch long parasite that is brown and wingless with a laterally compressed body that allows for rapid movement between hairs on the host. They have small heads with piercing, sucking mouthparts and well-developed legs that enable them to jump great distances and as high as 13 inches. The maggot-like larvae are only  $\frac{1}{12}$ - $\frac{1}{8}$  inch long and yellowish.



Adult cat flea

**Biology:** Fleas have complete metamorphosis, consisting of four life stages. An adult female must consume a blood meal to produce fertile eggs. Approximately 24 hours after feeding, the female begins laying individual eggs, 40 or 50 per day and as many as 2,000 during her lifetime. The tiny, pearly white eggs are about the size of a grain of sand and are typically deposited in the hair of the host animal. Eggs are not sticky. They fall off the host and hatch where they land. This occurs in 1-10 days depending on the temperature. Larvae are not parasitic and do not live on a host. They move deep into carpets, bedding, or underneath organic matter to avoid direct light and feed on organic debris, dried blood, and skin. Larvae feed and develop for 5-11 days, and spin a silk-like cocoon to pupate. The oval, whitish cocoon is sticky and picks up surrounding debris that make it well camouflaged. Under ideal conditions, the pupal stage lasts about eight days, but can survive in the cocoon for up to six months.

The adult's emergence from the cocoon is triggered by vibrations, warmth, changes in light intensity, and carbon dioxide exhaled by the host. Newly emerged adults can survive for several weeks without feeding, giving them plenty of time to find a suitable host on which to begin the reproductive cycle again. Feeding adults excrete large amounts of partially digested blood that appears as dark red to black 'flea dirt' against the animal's skin. Under typical household conditions, the flea life cycle takes 3-6 weeks, which allows populations to build rapidly. During the summer, fleas develop outdoors in areas frequented by infested animals. Pets spending time in these areas may become infested.

**Damage:** Fleas are the most common ectoparasites of dogs and cats in Kansas. Infestations readily take place indoors. The constant irritation of fleas on pets can lead to skin problems, anxiety, and reduces an animal's overall well-being. When flea populations become large enough, or when a preferred host is not available, adult fleas will bite humans. While feeding, fleas inject saliva containing proteins that trigger an allergic skin reaction and cause red, itchy bites. The cat flea can transmit a common tapeworm to dogs and cats, murine typhus to humans, and the bacterium that causes cat scratch disease between cats.

**Management:** Eliminating fleas requires an integrated approach. Animals should be treated by a veterinarian. Sanitation and chemical treatments should be applied in and around the home. Destroy or wash all pet bedding, thoroughly vacuum floors, carpets, furniture, and baseboards where larvae or pupae may be located. Vacuuming will not destroy all eggs, larvae, or pupae. Contents of the vacuum

bag should be destroyed or placed in an airtight bag immediately to prevent reinfestation. Veterinarians can provide topical treatments to help control adult fleas and prevent flea reproduction on the animal. In severe cases, residual insecticides and growth regulators should be applied to infested areas. During warm months treat outdoor areas where fleas develop.

## Chiggers

Family Trombiculidae – Page 79.

## Fire Ants – Red Fire Ant – *Solenopsis invicta* Black Imported Fire Ant – *Solenopsis richteri*

**Description:** Fire ants are small ( $\frac{1}{8}$ - $\frac{1}{4}$  inch long) and live in large colonies. They attack prey and intruders aggressively in large numbers. The painful sting can cause a small, round, white blister.

**Biology:** The two species described here do not overwinter in Kansas at this time but are pests of regulatory importance. The black imported fire ant, *Solenopsis richteri*, was introduced in 1918 near Mobile, Alabama, from a source in South America, but has spread very little since that time. In contrast, the red imported fire ant, *Solenopsis invicta*, which was introduced to the Mobile area in the 1930s, spread rapidly. At the time of this publication, it was known to be established in part or all of 13 southern states from North Carolina to California. These ants cannot tolerate temperatures below 10°F and are not expected to become established much further north than southern Oklahoma. Occasionally, fire ant nests are brought into Kansas in the soil of nursery stock. When detected, these colonies are quickly quarantined and destroyed by the Kansas Department of Agriculture.



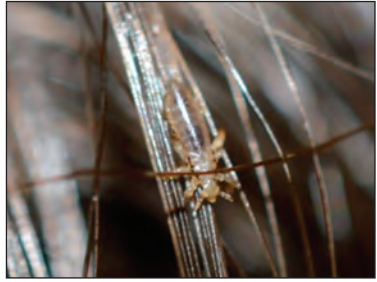
Red imported fire ant, *Solenopsis invicta*



Blisters resulting from fire ant stings

## Head Lice – *Pediculus humanus*

**Description:** The human head louse is a small insect, about  $\frac{1}{16}$ – $\frac{1}{8}$  inch long, pale tan to dirty white or grayish black. Lice are flattened, lack wings, and have short, stout legs, each ending in a claw used for grasping hair. They do not fly or jump, and human blood is their only food source. Lice are spread from one host to another by sharing infested



Adult head louse

clothing such as hats and scarves, combs, hair clips or bands, head gear, towels, and bedding. The eggs, or nits, are cylindrical and about  $\frac{1}{30}$  inch long. They are yellow to white in color darkening to coffee brown just before hatching. Each egg is attached to a single hair close to the scalp with a waterproof, glue-like substance.

**Biology:** A female louse lays 4-6 eggs each day and up to 150 during her lifetime. Within 5-10 days, transparent nymphs emerge but become darker as they feed. Nymphs feed several times a day and develop into adults in 8-9 days. Males and females mate within 10 hours of reaching maturity. In another day or two the female is ready to begin laying eggs. The lifecycle from egg to mature adult is completed in 15-21 days. Adults live 3-4 weeks.

**Damage:** Human head lice live as ectoparasites on human beings and do not leave voluntarily unless the host's body temperature changes drastically due to death or high fever. Lice penetrate the skin with piercing-sucking mouthparts. They inject saliva that irritates skin and can cause itching, but head lice do not transmit disease. Although a head lice infestation often causes embarrassment, these insects are quite common, especially in younger school-aged children and are not associated with 'dirty people' or poor hygiene. Head lice are host-specific and will not survive on pets. Once they are removed from the host, lice only survive for a few days.

**Management:** A lice infestation can be difficult to eliminate but is possible using an integrated approach. There is no need to panic or overreact. Carefully inspect all individuals within the home and inform others who may be at risk for infestation (i.e., school nurses and daycare providers). Lice should be eliminated on people and within the environment at the same time. Over-the-counter medicated shampoos and treatments containing a pediculicide

are available but should always be used in accordance to the label directions. Used properly, these treatments kill nymphs and adults but not eggs. Therefore, it is important to comb through hair with a special nit comb, concentrating close to the scalp where eggs containing live embryos are most likely to be found. Before hatching, eggs become dark brown, making them difficult to see in many shades of hair. To kill all eggs, nymphs, and adults, soak combs, brushes and other hair care items for 10 minutes in water heated to 130°F. Machine wash all coats, scarves, bedding, towels, and stuffed animals in hot water (130°F) or have them dry cleaned. Items that cannot be washed can be frozen for two to three days. Vacuum to remove lice from couches, mattresses, rugs, and other furniture. Inspect infested individuals daily for several days after treatment to make sure no lice or eggs are present. Retreat if you notice eggs that were not removed from the hair or adults that were able to re-infest from the environment.

## Horse Flies and Deer Flies

### Family Tabanidae

**Description:** At least 42 species of horse and deer flies are found in Kansas. They are relatively large, ¼-1 inch long, stout-bodied flies that are grey to black in color.

**Biology:** Female flies deposit eggs in muddy areas along ponds, stream banks, and wetlands. Larvae remain in the muddy semi-aquatic habitat and feed on worms, snails, other insect larvae, and/or decaying plant matter. Most species overwinter as larvae, pupate, and emerge the following spring or summer. Males feed on nectar, while females have blade-like mouthparts used to slice into flesh and sponge up the resulting blood.

**Damage:** Bites from female horse and deer flies are quite painful and may elicit an allergic reaction leading to swelling and itching that can last several days. Although flies are not known to transmit disease in humans, they may mechanically carry bacteria from one host to another. They are strong



Deer fly



Black horse fly



fliers and move from host to host. Flies feed on domestic animals and harm the health of many livestock species. They can transmit diseases among animals, but this is not commonly reported in Kansas.

**Management:** In Kansas, various species of horse and deer flies may be active from May to September, but the most bothersome and damaging species are most common in July and early August. Protection is the best way to manage these flies. The use of a repellent containing DEET as well as protective clothing can be used to help prevent fly bites.

## Mosquitoes

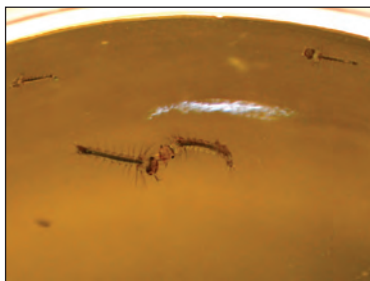
### Family Culicidae

**Description:** In Kansas, there are approximately 50 different species of mosquitos, and most are difficult to differentiate. In general, mosquitoes are small, midge-like flies with gray, brown, or black scaly bodies and a single pair of wings. Females are ectoparasites. They use their long proboscis to pierce the skin and feed on blood. Males have large, bushy antennae and do not take blood meals. Both males and females feed on nectar.

**Biology:** A female mosquito must ingest a blood meal to produce eggs. While each species is a little different, in general, females deposit eggs on the surface of standing water, either singly, in a raft, or attached to aquatic vegetation or other structures. A single female can lay 100-300 eggs in her lifetime. Eggs hatch into larvae with well-developed heads but no legs which are often called 'wigglers'. Breathing through spiracles or siphons located on the eighth abdominal segment, they spend a great deal of time beneath the surface of the water with siphons in the air, appearing to bounce around. Larvae feed on aquatic microorganisms and dissolved organic matter by filter feeding, progressing through several life stages (instars) to develop into non-feeding, dark colored, but mobile, comma-shaped pupae. Adults emerge from the pupal stage at the surface of the water and live for several weeks.



Mosquito adult



Mosquito larvae

Development time from egg to adult depends on water temperature and the species of mosquito, but it can take as little as seven days or up to several weeks. Adult female mosquitoes locate hosts by sensing carbon dioxide from breath and skin, host odor, temperature, color, and movement.

**Damage:** Mosquitoes are considered a nuisance because of the itchy bumps left on the body after the female feeds. More importantly, various mosquito species vector diseases. In Kansas, the most well-known mosquito-vectored virus is the West Nile Virus (WNV). An estimated 26 species of mosquitoes in Kansas are capable of vectoring WNV, but the virus has most commonly been detected in the genus *Culex*. Transmission occurs when the mosquito feeds on an infected bird host. The virus multiplies in the mosquito's gut and is transmitted when the mosquito feeds on a mammal. Not all mosquito bites result in WNV transmission, and most people who are infected show no signs of the disease.

Symptoms of WNV include fever, headache, muscle weakness, skin rash, and swollen lymph glands. Most symptoms last a few days and are rarely identified. In severe cases, symptoms may develop into neck stiffness, tremors, nausea, and convulsions. Horses also may be affected by WNV, although most other species of mammals do not show signs of infection. Humans and other mammals are considered dead-end hosts because the virus does not multiply enough in their bodies to be infectious to other mosquitoes. Mosquitoes that feed on an infected human do not become vectors as a result of feeding. After infection, human victims are thought to be immune to future infection.

The Zika virus is another mosquito-vectored virus, transmitted primarily through infected *Aedes* spp. mosquitoes. *Aedes* mosquitoes lay eggs in stagnant water held in buckets, tires, and animal dishes, and are often found near human dwellings. Mosquitoes can become vectors by feeding on an infected individual, and are capable of spreading it to other individuals.

The Zika virus can be transmitted from mother to fetus during pregnancy or by a man to his sexual partners. The most common symptoms are fever, joint pain, and conjunctivitis (red eyes). Symptoms are typically mild, lasting from a few days to a week after the bite. In many cases, people do not realize they have been infected. Zika virus infection during pregnancy can lead to a birth defect known as microcephaly, as well as several other fetal brain defects. A person who has been infected may be protected from future Zika infections.

Although several species of *Aedes* mosquitoes could be found in Kansas at the time of this publication, no Zika virus was known to be present in Kansas mosquito populations. The World Health Organization expects the Zika virus to spread to new areas, but it is not known if or when it will arrive in Kansas.

**Management:** Reducing the chance of a mosquito bite requires an integrated approach, which includes personal protection and reducing mosquito breeding sites. Wear long-sleeved shirts and pants when outdoors and limit activity at dusk and dawn when mosquitoes are most active. Apply an insect repellent containing DEET, and follow label directions carefully, especially for children. While there are many products for mosquito control, many provide little protection. Research shows that ‘bug zappers,’ carbon dioxide and ultrasound traps do not lead to a significant decline in mosquito numbers.

To prevent mosquitoes from entering homes, make sure screens and doors fit tightly and are free of holes. Control larvae by eliminating habitat. A generation of mosquitoes can develop quickly in a small amount of standing water. Empty pots, buckets, and old tires at least once a week. Inspect rain gutters and drains to make sure they do not hold water, and make sure pooled water does not remain on plastic lids and tarps. Clean birdbaths and animal water bowls once a week. Stock decorative ponds with mosquito-eating fish such as minnows or goldfish. Several products can be applied safely to standing water to disrupt the mosquito life cycle with little effect on nontarget organisms.

## **Oak Leaf Itch Mite – *Pyemotes herfsi* – Page 83.**

### **Pubic/Crab Lice – *Pthirus pubis***

**Description:** The human pubic louse is small, about  $\frac{1}{16}$  inch long. It has a crab-like appearance with enlarged second and third legs, each with a claw for grasping hair. They may be pale tan to dirty white or grayish black. Like head lice, they are flattened and lack wings. They do not fly or jump, and human blood is their only food source. Pubic lice are commonly spread through intimate contact, but also may be spread through contact with bedding or clothing that have been used within the past few hours.



Adult crab louse

**Biology:** A female pubic louse deposits about three eggs each day and up to 26 in her lifetime. Within 6–8 days, nymphs emerge and begin to feed. Nymphs tend to settle in one spot and feed intermittently for hours or days without moving to a new location. Nymphs develop into adults in 15–17 days. The entire life cycle, from egg to mature adult is completed in 34–41 days, and adults can live for approximately one month.

**Damage:** Pubic, or crab lice, spend their entire lives as ectoparasites on humans and do not leave the host voluntarily unless the body temperature changes drastically due to high fever or death. Lice feed by penetrating skin with piercing-sucking mouthparts, injecting saliva that irritates skin which may cause itching. Pubic lice do not transmit disease.

**Management:** A pubic lice infestation can be eliminated using the integrated approach recommended for head lice. (See page 69.)

## Spiders, multiple species – Page 86.

### Stable Fly – *Stomoxys calcitrans*

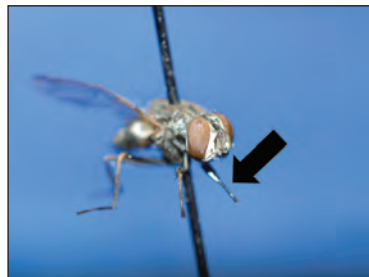
**Description:** Stable flies are about the same length as house flies,  $\frac{5}{16}$ – $\frac{3}{8}$  inch, but have stouter bodies. They are powdery gray with a checkered abdomen caused by two or three pairs of black dots. Unlike house flies, stable flies have slender, black, piercing mouthparts.

**Biology:** Stable flies are most commonly pests of livestock. Females oviposit (lay eggs) in fermenting grass clippings, compost piles, old manure, and hay or bedding contaminated with urine and manure. Maggots feed on microflora and fauna, pupate and emerge as adults within 3–4 weeks. Adults may travel long distances to locate a food source.

**Damage:** Stable fly adults feed on blood and, while they tend to feed on livestock and other animals such as dogs, they do bite people. They prefer to rest in areas out of the



Adult stable fly



Piercing mouthparts

wind, within three feet of the ground. These flies take several blood meals a day and tend to bite legs and feet of most animals (including humans) and ears of swine and dogs. The persistent and painful bite can make outdoor activities miserable.

**Management:** Where possible, destroy larval habitats by removing compost, grass clippings, and old animal hay. Because adults are strong fliers, they may be a pest even when breeding sites are not close by. Insect repellents may help, as will keeping exposed skin to a minimum when adult stable flies are active.

## **Swallow Bug – *Oeciacus vicarius***

**Description:** The adult swallow bug looks similar to bed and bat bugs (see Bed Bug, page 55) and is nearly impossible to distinguish with the naked eye. Humans are less likely to come into contact with swallow bugs than bat bugs. It is important to determine the species because effective control is different for each. A suspected bed bug, bat bug, or swallow bug should be taken to your local county extension office to be properly identified before control measures are taken.

**Biology:** Female swallow bugs deposit eggs on rough surfaces in cracks and crevices around swallow nests. They have a life cycle similar to bed bugs and must have a blood meal between each molt. Unlike bed and bat bugs, swallow bugs are dormant from the time nests are abandoned in the summer until swallows return the following spring. Most human bites occur in the late winter to early spring when swallow bugs emerge from dormancy. Sudden abandonment of a nest mid-season may cause swallow bugs to seek an alternate food source.

**Damage:** Reactions to swallow bug bites are similar to bed bug bites and vary from person to person. Swallow bugs do not transmit any human pathogens although secondary infections from scratching are possible.

**Management:** Swallow bugs can be managed by removing nests on and around structures during the winter months when birds are not actively nesting and bugs are dormant. Swallows are protected under federal law, and nests cannot be removed once eggs have been laid until chicks have hatched and left the nest. The application of a residual insecticide around harborage areas may be needed the following spring as swallow bugs left in cracks and crevices around nests become active.

### Wheel Bug – *Arilus cristatus*

**Description:** Wheel bugs are relatively large, stout-bodied true bugs, 1¼ inch long, with a grayish-black body and long, thin reddish-brown antennae. They are named for the prominent spiny ‘wheel’ on the thorax, just behind the head. While fairly common, these insects are slow-moving and shy. Wheel bugs are nonaggressive. When they do bite, it is extremely painful and results in localized swelling.

**Biology:** In fall, female wheel bugs deposit 40–200 brown eggs in clusters in shrubs or trees before dying. Eggs overwinter, and the following spring, tiny nymphs emerge which have bright orange to red abdomens and lack the characteristic wheel. Nymphs develop throughout the summer,

going through five molts, becoming grayer each time. When they reach adulthood, the ‘wheel’ becomes a defining feature. Wheel bugs are voracious predators, feeding on insects found in shrubs and trees, especially soft-bodied caterpillars. They ambush prey, driving their needle-like mouthparts into soft parts of the body and secreting saliva that contains a paralytic substance and enzymes to dissolve their prey’s internal tissues, which wheel bugs then suck out.

**Damage:** Wheel bugs are considered a beneficial predator in gardens, orchards, and wooded areas but can inflict a painful bite if handled. These insects are shy and usually do not bite unless provoked. The bite is reported to be more painful than a hornet sting and is often accompanied by redness and swelling in the bite area. Pain and swelling may last from several minutes to several weeks, and it may take up to several months for all symptoms to disappear.

**Management:** To avoid painful wheel bug bites, wear gloves, long sleeves, and other protective clothing when working in the garden or wooded areas. Occasionally, bugs may wander or be brought into homes on materials. If seen, they should be carefully removed or destroyed.



Wheel bug eggs and nymphs



Wheel bug adult

## Arthropod (Non-Insect) Pests

The arthropods covered in this section are not insects but are closely related. For a detailed description, see the introduction. These arthropods may be considered a nuisance, or they may be considered a medical pest because they can bite or sting.

### Bird and Rodent Mites – Order Acari, several species

**Description:** Bird and rodent mites include many species that feed and reproduce on birds (bird mites) or on mice, rats, and other rodents (rodent mites). Mites are very small, about  $\frac{1}{32}$  inch in length, have eight legs, and do not have wings or antennae. Although it is possible to see these mites with the naked eye, to see details magnification is required.



Northern fowl mite, *Ornithonyssus sylviarum*,  
under magnification

**Biology:** Bird and rodent mites rely on a host to live and reproduce and rarely leave a food source. When the host dies or young leave a nest, mites move in search of a new host. Mites cannot fly. Because of their small size they cannot travel great distances in search of a new host. Using gravity to travel, they drop from bird and rodent nests in attics, porches, and other high places. Many species of mites can go 10 days to two weeks without feeding.

**Damage:** Bird and rodent mites bite, 'taste testing' humans looking for a suitable host. Bites cause discomfort and can develop into red, itchy bumps that persist for several days. Although bites may itch and be uncomfortable, mites do not vector disease or infest humans. Bites may be difficult to diagnose because mites are hard to see.

**Management:** The best method for controlling bird and rodent mites is to remove the source or the host. Find and remove dead birds and rodents in and around homes. Remove empty bird nests, keeping in mind that many song birds are federally protected and should not be disturbed if nesting. Eliminate active rodent infestations. Once rodent populations are controlled, prevent reinfestation by sealing cracks, crevices, broken windows, and torn screens that allow entry. Remove mites in the home by vacuuming and using a wand to

clean cracks and crevices. Remove vacuumed materials right away. Surviving mites can crawl out of bags and containers. Glue boards trap mites on the move. Once hosts are gone, bird and rodent mite populations will die off within several weeks.

## Centipedes – Class Chilopoda

**Description:** Many species of centipedes can be found in Kansas, ranging in size from 1 inch to more than 6 inches with long, segmented, flattened bodies. Each body segment contains one pair of legs. Centipedes have a distinct head with long antennae. The jaws on the first body segment behind the head are used to inject toxin into small organisms consumed as food. The house centipede, *Scutigera coleoptrata*, is the only species that lives and reproduces indoors. Its long legs give it a spidery appearance that can be disconcerting.

**Biology:** Centipedes prefer dark, moist outdoor habitats and hide under logs and rocks. The adults overwinter and lay eggs in the spring and summer. Most centipede species develop slowly and live for up to six years. They are predaceous, active hunters that kill prey by using their jaws to inject a toxin.

**Damage:** Most centipedes remain outdoors but may accidentally enter structures. The house centipede, *Scutigera coleoptrata*, is found in areas that remain consistently damp and dark. They search for insects and other prey at night. Centipedes can bite, but rarely do unless handled. The bite is not likely to cause more than temporary, localized pain. Centipedes are beneficial because they feed on other arthropod pests such as spiders and cockroaches. Despite this, many people have an aversion to finding them in the home.

**Management:** While the use of contact or aerosol sprays directly on centipedes indoors can provide quick ‘knock-down’ control, it will not last. If large numbers of centipedes are found inside the home, locate the source outside begin by removing logs, boards, rocks and



House centipede, *Scutigera coleoptrata*



Scolopendridae centipede



other debris that provide habitat for centipedes. Create a 5-10 foot barrier around the structure using a pesticide labeled for centipedes. Treatments should cover foundation walls, steps, porches, windows, doorways, and other openings. Centipedes must come into contact with the pesticide and may still enter structures before they die. Indoors, apply residual treatments to baseboards, cracks, and other hiding places.

## Chiggers

### Family Trombiculidae

**Description:** There are numerous chigger species in Kansas, but the species *Eutrombicula alfreddugesi* most commonly comes into contact with humans. Adult chiggers are red and approximately  $\frac{1}{20}$  inch in length with eight legs. They may be visible on the surface of the soil. The eggs and tiny six-legged larvae are nearly impossible to see without magnification and are only  $\frac{1}{160}$ - $\frac{1}{120}$  inch long.



Adult chigger

**Biology:** Chiggers overwinter as adults and begin laying eggs when temperatures consistently reach above 60°F during the day. After eggs hatch, the tiny larvae crawl up blades of grass or any other object nearby to more easily reach a passing host. Once they climb onto a host, larvae feed for several days, drop back to the ground, molt, and become nymphs. The nymphs and adults are predatory, but not parasitic and complete their life cycle in 7-10 weeks. Although chiggers prefer cooler, damp weather, populations can persist throughout the spring and summer, especially in areas with tall grasses or other vegetation that creates a shady, moist environment.

**Damage:** The larvae of chiggers are the only stage that is parasitic on other organisms, including humans. The larvae climb onto a host, attach their mouthparts to the skin surface, in many cases in a hair follicle or pore, and secrete saliva that digests skin cells, on which they feed. Larval chiggers remain attached for several days but do not burrow into the skin or suck blood. Typically, itching begins 3-6 hours after feeding begins. Reactions vary, some people develop red pimple-like eruptions at 10-16 hours and experience itching that lasts from days to weeks. Bites can usually be diagnosed by their location on

the body and typically occur where clothing fits tightly such as waist bands, socks, wrists, armpits, behind knees, and around the groin area.

**Management:** To reduce chigger populations around the home, keep lawns mowed and remove brush and other overgrown plants that create excess shade. The best method for preventing chigger bites is to avoid sitting or lying in areas most likely to be infested — tall grass or weeds where little sunlight reaches the soil surface, or even short grasses where there is plenty of shade and moisture. If you plan to be in these areas, protect your skin with high boots and pants made of tightly woven fabric tucked into the boots. A repellent registered for chiggers can be applied around cuffs, waists, and other such areas. After leaving an area with chiggers, shower using soap to scrub down the skin and wash clothes before wearing them again. The itching and discomfort caused by chiggers can be relieved by various ointments recommended by a dermatologist or pharmacist.

## Clover Mites – *Bryobia praetiosa*

**Description:** Clover mites are tiny ( $\frac{1}{30}$  inch) soft-bodied mites with eight legs. The front legs are as long as the body and nearly twice as long as the other legs. Their bodies are reddish-green to reddish-brown.

**Biology:** Clover mites are cool weather arthropods and thrive in temperatures between 40 and 70°F. Therefore, they are typically a nuisance in the fall and spring. Clover mites produce bright red eggs parthenogenetically (without mating) that hatch when temperatures are between 70 and 80°F. Temperatures above 85°F force eggs into summer dormancy and below 40°F into winter dormancy, and usually kill adult mites. Mites typically live only a few weeks, but there may be 5-6 generations a year and populations can build up quickly. All life stages feed on grasses, trees, flowers, and agricultural crops.

**Damage:** Clover mites may invade homes in the spring or fall when their food source/host plants become scarce, because of population overload, or if plants die off due to human intervention. These mites are often concentrated on the south and southwest foundations of buildings, and wandering mites may enter structures through access points such as windows and cracks, and are most often observed on south walls. They do not survive indoors for long and do not



Adult clover mite under magnification

bite, sting, or transmit disease. They do not feed on stored products, structures, or other household items such as clothing, upholstery, or carpet. When crushed, mites leave a reddish stain that may be difficult to remove from some surfaces.

**Management:** Because clover mites are so small, it is not realistic to expect that exclusionary tactics will be 100 percent successful. But creating a barrier between feeding areas and structures may prevent them from entering. Mites have a difficult time traversing bare soil, especially if rough. Creating an 18–24 inch strip of bare soil around the home reduces mites' ability to enter. Once in the home, be careful not to crush mites as this creates stains. Vacuum to remove mites during the spring and fall. Active mites can be killed before they enter structures by applying a miticide to a 15–20 foot strip around the perimeter. Eggs will not be affected so you may have to treat the structure several times while clover mites are active.

## Daddy Longlegs/Harvestmen Order Opiliones

**Description:** Often mistaken for spiders, opilionids, commonly known as daddy longlegs or harvestmen, are related to spiders, ticks, and mites and are actually in a taxonomic order of their own. They have tan to brown to black globular bodies with two eyes and eight thread-like legs, which may be long or short.



Daddy longlegs

**Biology:** Opilionids are often found under logs, rocks, and in other dark, protected areas. These scavengers are most commonly encountered in the fall, feeding on dead insects or decaying vegetable and animal matter.

**Damage:** A common myth is that these opilionids are one of the most venomous arthropods in Kansas, but their fangs are too short to bite humans. Opilionids do not have venom glands or fangs and do not harm humans. They do not possess silk glands and are not found in webs, unless they are a spider's meal. Cellar spiders are sometimes referred to as daddy longlegs. See the spider section for more information.

**Management:** No management is recommended. If opilionids are encountered in a dwelling, simply remove them.

# Millipedes

## Class Diplopoda

**Description:** There are multiple species of millipedes in Kansas. In general, millipedes appear ‘wormlike’ with rounded bodies and heads with short antennae. Each body segment contains two pairs of legs. Millipedes vary in length from less than 1 inch to more than 3 inches, but most are 1-1½ inches long. They are light brown to black in color.

**Biology:** Millipedes can be found outdoors in dark, moist areas where they feed on decaying wood, vegetable matter, tender plant roots, and green leaves. They overwinter in the soil and in the spring lay 20-300 eggs which hatch in several weeks. Depending on the species, they may live 2-5 years.

**Damage:** Millipedes occasionally damage seedling plants but cause the greatest concern to homeowners in the fall when they may enter homes in large numbers, presumably as they are seeking safe sites to overwinter. Millipedes are not dangerous as they do not bite, sting, or transmit disease. They defend themselves by excreting a foul-smelling fluid. It can be irritating and may stain fabrics, including light-colored rugs.

**Management:** Millipede infestations usually are short-lived and can be controlled by handpicking and removing or vacuuming them up. Contact or indoor aerosol sprays will control millipedes temporarily but do not provide a long-term solution. Long-term control begins outdoors at the source by removing plant mulch, boards, compost, and other debris that provides habitat. Create a 5-10 foot barrier around the structure using a pesticide labeled for this purpose. Treatments should cover foundation walls, steps, porches, windows, doorways, and other openings. Millipedes must come into contact with the pesticide and may enter structures before they die. Indoors, residual treatments can be applied to baseboards, cracks, and other hiding places.



Millipede



Showing two pair of legs per segment

## Oak Leaf Itch Mite – *Pyemotes herfsi*

**Description:** The oak leaf itch mite is tiny, around  $\frac{1}{25}$  inch long, and barely visible to the naked eye. It is most commonly identified by the red, itchy blisters raised by its bite.



Oak leaf with galls on leaf margins

**Biology:** Females are predators of the insects that cause plants to form galls. In Kansas, they commonly found feeding on midge larvae that form galls on the margins of oak leaves. Once they find a food source, females may produce up to 200 offspring that mature in seven days. Because of the large number of offspring and fast generation time, populations can explode rapidly. Throughout the Midwest, oak leaf itch mites usually emerge in late July and continue throughout the summer. Bites do not become common until fall when mite-infested leaves are handled.

**Damage:** Oak leaf itch mites are predators that attempt to feed when they come into contact with people or pets. Bites become noticeable when they start to itch and can become painful 10-16 hours after exposure. Bites appear as raised, red areas with a small blister in the center. They are often located on the upper body as the mites usually drop from tree canopies onto the victim below. When mites are encountered during lawn work, bites may be found on hands and arms.

**Management:** Little is known about how to eliminate these mites from the landscape. They are well-protected inside plant galls where insecticide sprays cannot reach them. DEET-based repellents offer some relief but not complete bite protection. Some repellents containing permethrin have been developed that may offer some protection when applied to clothing. Avoid spending time under mite-infested trees. If exposed, bathe and wash clothing and other materials as soon as possible.

## Pillbugs and Sowbugs Order Isopoda

**Description:** Pillbugs and sowbugs are crustaceans and therefore are more closely related to shrimp and crayfish than insects. They are grayish to black and around  $\frac{3}{8}$  inch long at maturity. They have segmented bodies with seven pairs of legs. Pillbugs often roll up in a

ball when disturbed. Sowbugs are incapable of rolling into a ball but have two tail-like appendages at the end of the body that pillbugs lack. Pillbugs and sowbugs must remain in moist habitats to survive. They are often found under old boards and stones, in leaf piles or grass clippings, or other vegetation, They prefer humid locations and feed mostly on decaying vegetable matter.

**Biology:** Pillbugs and sowbugs overwinter as adults and become active and mate in the spring. Females carry from 7-200 eggs in a brood pouch under their body. When the eggs hatch in 3-7 weeks the female continues to carry the tiny, white young in her brood pouch for another 6-8 weeks. There may be 1-2 generations per year, and individuals may live up to three years.

**Damage:** Pillbugs and sowbugs may feed on young, tender vegetation in gardens and occasionally cause damage to fruit, beans, lettuce, and other crops. They can become a nuisance when they enter homes and may become quite numerous in damp basements and crawl spaces.

**Management:** Pillbugs and sowbugs do not bite, sting, or infest household goods, but they may be a nuisance if present in the home. Household infestations usually occur when outdoor populations are large. Good control of indoor populations will be difficult if outdoor pillbugs and sowbugs are not controlled. These crustaceans need moisture to survive. Eliminate habitat by removing excess mulch, landscaping timbers, and clippings from around the foundation of the home, sealing potential entry points to keep them from entering. A pesticide barrier can be applied. Extend it 5-10 feet around structure and make sure to include foundation walls, steps, porches, around shrubbery and other plants, window wells, and sidewalks. In gardens, manage pillbugs and sowbugs by removing excess mulch or soil residue. Planting-time pesticides can be used to protect seedling plants and baits are available to protect fruits and vegetables later in the season. It can be difficult to treat areas beneath debris where pillbugs and sowbugs spend most of their time.



Sowbug



Pillbug

## Striped Bark Scorpion – *Centruroides vittatus*

**Description:** Only one species of scorpion is known to occur naturally throughout Kansas — *Centruroides vittatus*, commonly called the striped bark scorpion. This species grows up to 2½ inches in length, is pale yellow to tan with two dark brown to blackish stripes running down the body, and a dark triangular mark on the front of the head behind the eyes.



Adult scorpion

**Biology:** Striped bark scorpions mate in the fall. The female keeps developing offspring within her body, providing nourishment through a placental connection. The young climb onto the mother's back the following spring and remain with her until after the first molt when they disperse to live independently. Scorpions hide during the day, but come out at night to actively hunt for food and mate. They feed mostly on spiders and other arthropods. Grabbing prey with their pincers, they use the stinger at the tip of the tail to inject venom, paralyzing the victim. Scorpions chew immobilized prey into a semi-liquid state, sipping it into their tiny mouths.

**Damage:** The striped bark scorpion is most commonly found indoors in Kansas from mid-August through October. They can deliver a painful sting when disturbed, which is comparable to that of a wasp. Their venom is low in toxicity to humans. In most cases, the sting site swells leading to a burning sensation in that area. Individuals react differently, and some people may have an intense reaction, including agitation, slurred speech, high temperature, and tightening of the throat. In this case, the victim should seek medical help immediately.

**Management:** Outdoors, scorpions spend the day hidden in damp, cool areas such as under rocks, boards, mulch or other dead vegetation. They readily enter structures during the night when wandering. Prevent scorpions from entering homes by caulking potential entry sites such as around pipes, cracks in foundations, or around doors and windows. Sanitation inside and outside of the home helps to eliminate places for scorpions to hide during the day. Clean up lawns and remove boxes, garbage, and clutter. The striped bark scorpion is not a good climber and cannot move up smooth surfaces. They may be able to crawl up drapes, bedding, or clothing and hide in shoes so

use caution when handling these items. These arthropods are active at night, so using a black-light or ultraviolet light, which causes scorpions to glow in the dark, makes them easier to find and control.

## **Spiders**

### **Class Arachnida**

Homeowners may be alarmed to find a spider crawling around in their home, but most species of spiders found in Kansas are not considered dangerous. Many invade accidentally and do not become established or reproduce indoors. In general, spiders are fairly secretive. Some groups of spiders build webs and wait for prey, while others are active hunters that roam and capture prey. Species that build webs often do so in corners and out-of-the way places while active hunters tend to be active at night and stay hidden during the day. All spiders are predatory, feeding on insects, pillbugs, centipedes, millipedes, and other spiders. Some larger spiders may feed on small vertebrates.

Although each spider species may have a little different biology and habits, there are general steps a homeowner can take to keep spiders from entering and discouraging them from staying around. Seal cracks and crevices that spiders and their prey use to gain access to structures. This includes repairing holes in screens and caulking cracks in foundations. Eliminate insects and other arthropods from crawl spaces. Removal of food sources from homes will decrease spider activity. Without food, spiders will move to a new location. Glue traps are good for monitoring and providing some control of spiders and their prey. Traps are relatively inexpensive and available at most home and garden stores. Place traps around the home in areas where spiders are likely to travel, for example, under furniture and along walls, in attics, and closets. Monitor traps weekly to determine population levels and whether or not control measures are needed or effective. Use caution when collecting or checking sticky traps as spiders and other insects may be alive even though trapped on the sticky board.

## **Indoor-Dwelling Spiders**

Several families of spiders may live and reproduce indoors in Kansas. Once these spiders become established in a home, populations can continue to increase as long as food is available and no control measures are taken.



## Brown Recluse - *Loxosceles reclusa*

**Description:** Brown recluse spiders are medium sized and may reach  $\frac{1}{4}$  inch in length as adults, not including the legs. With the long, thin legs included, spiders span an area the size of a quarter to a half-dollar. Leg and abdomen color vary. Younger spiders legs tend to be straw-colored, while older spiders are more cocoa-colored. The abdomen lacks markings and is covered in short hairs. It can range from light yellowish-brown to pinkish gray to dark brown or more slate gray as the spider grows older. Most spiders have eight eyes, but the brown recluse has only six, arranged in a semicircle of three pairs, which may not be visible without magnification. The most distinguishing characteristic of the brown recluse, regardless of the spider's age or gender, is the dark brown 'violin-shaped' marking on the top of the body above the legs. The neck of the 'violin' points toward the abdomen (or rear). This marking can be difficult to distinguish on a very small or dark-colored spider.

**Biology:** The brown recluse is a relatively durable, long-lived spider that requires 8-15 months, depending on temperatures, to develop from egg to adult. After reaching adulthood, spiders may live another 2-3 years. Females construct up to five egg sacs total, although 2-3 is more common. Each sac contains 20-50 eggs. Egg sacs are composed of webbing and are attached to walls, furniture, boxes, plants, etc. Spiderlings emerge in 3-5 weeks but remain in the web with the mother for 2-3 molts (shedding the skin), before dispersing to find suitable habitats. Spiderlings molt six or seven times before becoming adults. Brown recluse spiders are typically inactive from late fall to early spring (October through March) even in controlled structures with relatively



'Violin' marking on top of the body



Adult brown recluse with quarter



Brown recluse molts

constant lighting and temperature. As insect prey becomes scarce during these months, spiders do not waste energy hunting and can live without food or water for up to 10 months.

Like other spiders, the brown recluse feeds on insects and other arthropods, including other spiders. In addition, the brown recluse is a scavenger that can feed on prey that is already dead. The brown recluse produces webbing that it uses as a retreat during the day. It is an irregular, messy looking web built into corners or other undisturbed areas. These webs often take on a white cobweb appearance as they are built up over time and accumulate dust.

True to their name, brown recluse spiders hide in dark, undisturbed areas, coming out at night to roam in search of food. As daylight approaches, spiders look for dark areas to hide and may find their way into shoes, toys, piles of clothing, or anything lying on the floor. They can also be found outdoors, living under rocks, behind the bark of trees, and other protected, mostly dark cracks and crevices.

**Damage:** It is important to note that these spiders are very reclusive and rarely aggressive. Only when a spider is threatened and becomes trapped, is it likely to bite the unknowing victim. The venom contains a hemotoxin, which causes different reactions depending on the health of the victim, size and age of the spider, location of the bite, and how much venom is injected.

The area around the bite may develop into a necrotic lesion. Breakdown of tissues creates a slow-healing wound that can result in significant scarring. In rare cases, the spider's venom leads to a life-threatening systemic illness. Even when the bite itself is not a serious health issue, secondary infections may cause additional pain and suffering. The bite can be painless and many individuals are not aware they have been bitten until the wound becomes visible. The bite often develops a pimple progressing into a red, swollen area within 6-12 hours. A blister and an area of dying skin may develop.

If you suspect you have been bitten by a brown recluse, apply ice to the wound and contact your health provider immediately. While treatment methods may vary, medical professionals agree that early diagnosis and treatment is important. If possible, carefully capture the spider that caused the bite so it can be positively identified.

**Management:** Eliminating brown recluse spiders from a structure is difficult and requires an integrated approach. Begin by eliminating clutter, especially in low-traffic areas such as basements, attics, and upper rooms. Clean these areas frequently, using a vacuum with a wand to reach between items to eliminate spiders, egg sacs,

and potential food sources before spiders emerge and reproduce. If possible, store household items in tight sealing plastic storage containers to exclude spiders. Avoid placing them close together or against walls. Seal cracks and crevices on the home's interior and exterior to keep spiders and insect prey from moving into the home.

In a home infested with brown recluse spiders, take practical steps to reduce the chance of being bitten. Shake out shoes and clothing before putting them on, hang clothes in closets, and keep bed sheets and bed skirts from touching the floor.

Pesticides labeled for brown recluse will kill the spiders but may not be practical because sprays must come into contact with spiders. Insecticides are useful for eliminating other arthropod prey, depleting resources available for long-term survival. The spider population may slowly decline and eventually be eliminated. Homeowners should continue to watch for spiders, which can reinfest from different sources. Cohabitation can be drastically reduced or eliminated with vigilance and integrated management.

## Cobweb Spiders/Combfooted Spiders Family Theridiidae

**Description:** Cobweb spiders are common inhabitants in dark corners of homes and outbuildings where they build messy, irregular webs with sticky threads. In undisturbed areas, webbing can become extensive, gathering gather dust and taking on a white 'cobweb' appearance. These spiders are typically about  $\frac{1}{3}$  inch long with round, bulbous abdomens and short, spindly legs. Cobweb spiders come in a variety of colors, usually shades of brown and gray. They rarely leave the web but hang upside down and bounce if disturbed. Females deposit eggs in white to brown, papery sacs that remain in the web. One of the most common species in Kansas is the common or American house spider, *Parasteatoda tepidariorum*.



American house spider



American house spider with egg sacs

**Danger:** Most cobweb spiders, with the exception of hourglass or widow spiders, *Latrodectus* spp. (see below), are not aggressive and their bite is not considered dangerous to humans. Secondary bacterial infections related to spider bites are always possible, although rare.

**Management:** Elimination of these spiders can be difficult. Remove or destroy spiders and egg sacs frequently. In addition, sealing cracks and crevices within and outside the home reduces spider and prey movement into the home.

## **Black Widow – *Latrodectus mactans*, *L. hesperus*, and *L. variolus***

**Description:** The mature female black widow is easy to distinguish. The body is approximately  $\frac{1}{2}$  inch long with a large, bulbous abdomen that is shiny black. Orange to red markings on the ventral or underside of the body appear as two triangles, forming an hourglass shape. Depending on the species, the triangles may touch or have a small gap between them. There may be other red markings on her body. Black widows have long, thin, black legs that are around  $1\frac{1}{2}$  inch long when extended.

The males and immature spiders have a much different appearance. Males are much smaller, with slender bodies about half of the size of females. They have four pairs of red and white stripes on the abdomen. The newly hatched spiderlings are usually white to yellow gradually acquiring more black and red markings with each successive molt. But even the last instar spiderling can be brown, so it is not recognized as a black widow. Males and juveniles do not produce toxic venom.



Ventral (bottom)



Dorsal (top)



Juvenile black widow spider

**Biology:** Female widows construct loose, messy looking webs in undisturbed areas such as cellars, crawl spaces, outbuildings, garages, or other infrequently cleaned areas of homes. They can be found outdoors in hollow logs, firewood piles, electrical or water meter and control boxes, or in other hollow areas in various types of debris. The mature female widow produces a round, off-white, tough, silken egg sac containing 200–250 eggs. She remains in the web, hanging upside down guarding the eggs. These spiders tend to be shy and nocturnal. They are not considered overly aggressive and will reportedly withstand considerable agitation without attempting to bite. If the female’s egg sac is disturbed or if the spider becomes trapped, she may rush out and attack.

**Danger:** The black widow’s venom contains a neurotoxin, and the bite typically causes a sharp pain followed by a lasting burning sensation, swelling, and redness. Individual reactions to the bite vary, depending on a victim’s health, age, sensitivity, and other factors. Many people report pain that increases in intensity for several hours and lasts several days. Less commonly, people may experience cramps in the abdomen and other areas of the body. Abdominal muscles may become rigid. Other symptoms include headache, nausea, tremors, weakness, salivation, trouble talking, swollen eyelids, difficulty breathing, and fever. If you suspect a person has been bitten by a black widow, contact a healthcare provider or visit an emergency room immediately. Although some bite victims may need to be hospitalized, fatalities are uncommon. Healthy individuals usually recover quickly.

**Management:** Black widows are less common in homes than brown recluse spiders, but control measures are much the same. Outdoors, keep debris that provides good habitat for black widow spiders from piling up. Keep firewood neatly stacked, remove brush piles, and use caution when moving outdoor furniture, machinery, or other items that have been undisturbed for periods of time. Look for and carefully destroy webbing found in out-of-the-way places.

## Cellar Spiders

### Family Pholcidae

**Description:** True to their name, cellar spiders are most commonly found in basements, crawlspaces and in the corners of garages and other outbuildings. These spiders can be easily identified by their extremely long, almost translucent spindly legs with bodies that are typically brown, beige, gray, to yellowish and white. One species of

cellar spider has a long, thin body measuring  $\frac{1}{3}$  inch long while the round-bodied cellar spider is smaller with a round abdomen measuring  $\frac{3}{16}$  inch. With legs spread, they can be more than 2 inches long.

**Biology:** Cellar spiders build large, irregular webs and rest upside down, shaking and bouncing around in the webbing when disturbed. Cellar spiders develop continuously in controlled climates or may overwinter as eggs, immatures or adults in areas that provide some shelter. They cannot survive outdoors in cold climates without protection. This group of spiders is often referred to as daddy longlegs, although this leads to confusion with harvestmen and daddy longlegs in the Order Opiliones, which are not spiders.

**Danger:** There is a common myth that these spiders and/or daddy-longlegs (Order Opiliones) are extremely venomous, which is not true. The bite of cellar spiders is not reported to be painful, nor is their venom toxic to humans. The most common complaint regarding these spiders is that they produce large amounts of webbing, which makes trips into basements and other infrequently entered places repulsive.

**Management:** Elimination of these spiders can be difficult. Remove or destroy spiders and egg sacs frequently. In addition, sealing cracks and crevices within and outside the home will reduce spider and prey movement into the home.



Longbodied spider

## Outdoor Spiders (Occasional Invaders)

Most spiders do not live and reproduce in homes and structures but instead tend to wander indoors while actively hunting for prey or mates. These types of spiders may build webs they can return to during daylight hours when inactive, or use to protect their egg sacs. These spiders enter homes more frequently as weather becomes unfavorable in the fall, as households tend to offer mild temperatures, and often, plenty of food. Since these spiders do not reproduce in the home, killing or relocating intruding individuals is usually all that is needed for control.

### Golden Garden Spider – *Argiope aurantia*

**Description:** The golden garden spider is a type of orb weaver. These large, showy spiders are common in bushes, flowerbeds and gardens especially in the late summer into fall. The females may be  $\frac{3}{4}$ -1 $\frac{1}{8}$  inches

long while males are smaller, reaching only about  $\frac{1}{4}$  inch. They have long, black, shiny legs and egg-shaped abdomens with black, yellow, and silvery white markings.

**Biology:** Like other orb weaving spiders, the female golden garden spider constructs a large web, often in sunny, out of the way places where she hangs upside down in the center with her legs held in pairs so that it looks like she only has four. Webs often contain heavy zig-zagging patterns down the center. Although the purpose of this heavy webbing is



Golden garden spider

not known, it is thought it may play a role in attracting prey, providing web stability, or preventing birds from flying into webbing. Garden spiders are most active during the day and do not leave their web to hide as do many other orb spiders. Web construction and repair is often completed at night. Males wander in search of mates and will spin a smaller web near a female where he courts her by plucking and vibrating her web. After mating, females produce 1-3 papery eggs sacs which are attached to the side of the web. While the eggs may hatch in the fall, the spiderlings remain dormant in the egg sac until the following spring.

**Danger:** Golden garden spiders are considered beneficial and therefore should not be destroyed. When harassed they will vibrate their webs, and if that does not work, will often drop to the ground and hide. Although bites are not common, they are reported to be like a bee sting.

## Ground Spiders

### Family Gnaphosidae

**Description:** Ground spiders may be easily confused with wolf spiders and/or funnelweaver spiders. Their elongated bodies are typically  $\frac{1}{2}$  inch long or longer. But unlike the funnelweaver and wolf spider, ground spiders have shorter legs that are about the same length as their bodies.



Ground spider

The legs and cephalothorax (head) may appear glossy or velvety and spiders are black or brown. Some species have light markings.

**Biology:** Ground spiders actively hunt for prey at night and rest during the day under rocks, logs, or other debris. Females attach egg sacs to surfaces in these hidden resting sites. Like other active hunting spiders, they may wander indoors where they become trapped. They often hide in dark, quiet places during the day and may go totally unnoticed.

**Danger:** These spiders are shy and are not aggressive. They will not bite unless provoked. Most bites happen when a homeowner accidentally encounters a spider tucked away in a shoe or clothing. The bite is reported to be similar to a pinprick or a bee sting but the venom is not dangerous to humans. Secondary bacterial infections related to spider bites are always possible.

## Funnelweavers/Grass Spiders

### Family Agelenidae

**Description:** Funnel weavers, also called grass spiders, are a common outdoor spider that spins a triangular sheet-like web containing a funnel where they retreat and often remain hidden during the day. These spiders come out onto the sheet part of their webs at dusk. These webs are often constructed close to building foundations, around steps, window wells, low shrubs and tall grasses and are most noticeable in early mornings when covered with dew. These spiders range from  $\frac{1}{2}$ - $\frac{3}{4}$  inch long, and are occasionally confused with wolf spiders or brown recluses. These yellowish-tan to brown spiders have elongated abdomens containing long spinnerets and long, fuzzy looking and spiny legs. They lack the dark colored violin shape on the cephalothroax (head) that characterizes the brown recluse spider.

**Biology:** Occasionally, their webs may be found indoors in corners of garages, basements, and crawlspaces. Because of the close proximity of their webs to homes, females in search of a new place to build a web or males in search of a mate may wander indoors, especially in the late summer to fall.



Funnel weaver



Funnel webbing



**Danger:** These s fast-moving spiders, while alarming to homeowners, are shy and will not bite unless provoked. The bite is reported to be similar to a pinprick or bee sting. Secondary bacterial infections from spider bites are always possible.

## Jumping Spiders Family Salticidae

**Description:** Jumping spiders may be noticed on walls, ceilings, and around windows or other sunny areas of homes, causing homeowners alarm. These fast moving spiders are active hunters that earn their name by their ability to pounce on prey. These spiders have good vision and may see prey 6-8 inches away. They range in size from  $\frac{1}{8}$ - $\frac{3}{4}$  inch, appear



Jumping spider

hairy, have round abdomens and are compact looking, often with the front legs larger than the other legs. They have four large eyes on the front of their head, with the middle eyes being the largest, and four small eyes on the top of their heads. Jumping spiders are often darkly colored with bright markings and tend to move in jerky motions moving sideways and backwards.

**Biology:** Jumping spiders spin webs to leave silk trails, cover egg sacs, and build temporary shelters, often under rocks, logs, or in other protected areas. These spiders may overwinter as adults, immatures or eggs. Because these spiders are common on exterior walls and window screens, they may wander into homes through small cracks and crevices or may hitchhike on peoples' clothing or pets.

**Danger:** Jumping spiders are not aggressive and their bite is not considered dangerous to humans. Secondary bacterial infections related to spider bites are always possible. In most cases these spiders can simply be captured and placed outdoors.

## Orbweaver Spiders Family Araneidae

**Description:** Orbweaver spiders get their name from the round, or orb-shaped web that they spin, often on porches, near lights, and other locations near homes and dwellings. While they vary in size and color, depending on the species, the orb spiders most common around homes in Kansas are  $\frac{1}{3}$ - $\frac{1}{2}$  inch in length, gray or brown in color, with

banded legs, and often with mottling or patterns on their bulbous abdomens.

**Biology:** Orb spiders remain hidden in cracks and crevices during daylight hours and become active at dusk when they emerge, and either repair webbing left from the previous night, or spin a new web. Some species consume any damaged webbing before rebuilding. Webs are constructed with several ‘anchor lines’ followed by many radii of a non-sticky webbing. Finally, spirals of sticky silk are added to aid in the capture of prey. The spider often hangs upside down in the middle of the web and is inactive until something becomes entangled. The spider then races to bite the captured prey, injecting a paralytic venom that breaks down tissues. The spider wraps it in silk and may retreat, waiting for prey to stop struggling before feeding.



Orbweaver spider

**Danger:** Walking through a sticky web at night or first thing in the morning can be distressing, but these spiders are not aggressive and will not bite unless handled or provoked. Their venom is not dangerous to humans. Spider activity peaks in late summer and continues into the fall, dropping off after the first heavy frost. These spiders are considered beneficial because they capture and feed on many pest insects.

## Wolf Spiders

### Family Lycosidae

**Description:** Wolf spiders are commonly found in a variety of outdoor habitats around homes — under rocks and logs, in flower beds, lawns, and gardens. Wolf spiders range from  $\frac{1}{4}$ - $1\frac{1}{3}$  inches long. They are tan to dark brown with darker brown to black markings. They have long, fuzzy legs that may appear spiny and/or banded.



Rabid wolf spider – *Rabidosia rabida*

**Biology:** Wolf spiders actively hunt during the day, occasionally entering homes, especially during the fall when temperatures begin to cool, or during the mating season when males wander in search of females.

**Danger:** Although these large, fast-moving spiders can be quite alarming, they are shy and do not bite unless provoked. The bite is reported to be similar to a pinprick or a bee sting, but the venom is not dangerous to humans. Secondary bacterial infections related to spider bites are possible.

## Ticks

### Family Ixodidae

**Description:** Ticks are slow-moving, wingless, external parasites that feed on animal blood, including humans. They lack antennae, are flattened, with a pear shaped, unsegmented bodies and mouthparts located at the narrow end. After feeding, female ticks become engorged with blood and may become so distended they appear egg-shaped, pale tan or brown in color and the mouth parts and legs become clustered together on the underside of the front of the body.

**Biology:** Ticks develop through four life stages: egg, larva, nymph, and adult. Medically important tick species found in Kansas are three-host ticks, meaning that each life stage feeds on a separate host. A tick feeds only three times during its life, although it may take up to several years to complete the life cycle. Ticks cannot fly and do not travel long distances in search of a host. They rely on an ‘ambush’ technique, crawling onto low vegetation to wait for a suitable host. When a host brushes by, ticks let go and crawl onto the host where they find a place to attach and begin feeding. Ticks do not jump or drop from trees.

Adult ticks mate on the host and the female remains to feed. Once engorged, she drops off the host and deposits eggs, numbering in the thousands, in the environment, then dies. The six-legged larvae that emerge from the eggs remain on the ground or climb onto low vegetation to wait for a host to pass, usually a small rodent or bird. Larvae feed for a few days, and then drop from the host and molt into the eight-legged nymph stage that will again find a host such as a larger rodent, rabbit, raccoon, or skunk and feed for a few days to a week. After dropping from the host, nymphs molt into the eight-legged adult stage to find the third and final host.

**Damage:** After ticks quit feeding, the itchy, red bite areas may persist for a long time. The largest concern with ticks is the various diseases they may transmit to humans and pets. Because different species of ticks are capable of vectoring different pathogens, correctly identifying the tick is important. Once a tick is properly removed by using forceps or tweezers to grasp as close to the skin as possible, pulling straight away from the skin using consistent pressure, place the tick in a container of rubbing alcohol or in the freezer to preserve it. If the person bitten develops flu-like symptoms or a rash within 10-14 days of the tick removal, contact your doctor and take the tick for proper identification.

**Management:** In general, the best way to avoid ticks is by avoiding tall grass, weeds, and brushy areas, and keeping pets out of these areas as well. Wear light-colored clothing, which makes it easier to see ticks climbing before they become attached. Apply a repellent containing DEET or permethrin to keep ticks away. After visiting areas that may be infested, inspect skin thoroughly and immediately remove ticks from humans and animals. Removing ticks within several hours of attachment decreases the risk of them transmitting pathogens.

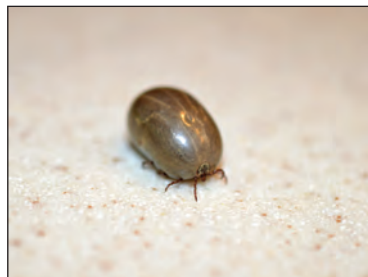
## American Dog Tick – *Dermacentor variabilis*

The American dog tick, also known as the wood tick, is probably the most common tick species found in Kansas. The unengorged adult is about  $\frac{1}{8}$  inch long, brown to tan, with white mottled markings on the back. Male ticks feed sparingly, but females engorge and increase significantly in size, up to  $\frac{3}{4}$  inch. The larval and nymphal stages prefer smaller hosts such as rodents, foxes, cats, and raccoons. Adults are more likely to be found on larger hosts such as dogs, cattle, horses, humans, and other large animals.

American dog ticks are encountered in grasslands and along forest edges from March through September in Kansas. These ticks are important

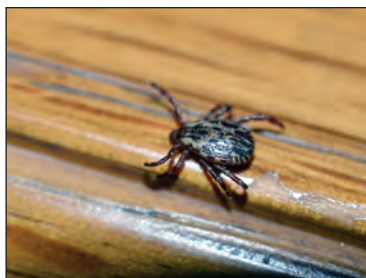


Female American dog tick



Engorged female American dog tick

because they transmit Rocky Mountain Spotted Fever, *Rickettsia reckettsii*, to dogs, cats, and humans, and Cytauxzoonosis, *Cytauxzoon felis*, to cats. This species can cause tick paralysis, a condition caused by toxic saliva of some ticks after three or more days of engorgement.



Male American dog tick

## Black-Legged Tick – *Ixodes scapularis*

The black-legged tick is also known as the deer tick because its distribution is linked to the distribution and abundance of its primary host, the white-tailed deer. This species is encountered mainly in eastern Kansas and tends to thrive in humid habitats near woodlands, streams, and ponds. The black-legged tick is small, with larvae the size of a pinhead that are nearly translucent. Nymphs are  $\frac{1}{32}$  inch long, about the size of a sesame seed.



Female black-legged tick

In Kansas, black-legged ticks can be encountered from May through July. Unengorged adults are approximately  $\frac{1}{16}$  inch long with long, mahogany to black colored legs. Males do not feed as adults. They appear dark



Male black-legged tick

brown to almost black with a dorsal shield that covers the dorsal (top) surface. Females have a dark dorsal cover that covers the front third of the body. The back two-thirds is orangish-brown. Adults can be found from September through December in Kansas, but a few may be present in the spring. Black-legged ticks are of concern because they are capable of transmitting Lyme disease; however, only a small percentage of the black-legged tick population harbor the disease.

## Brown Dog Tick – *Rhipicephalus sanguineus*

The brown dog tick is important for several reasons. It is the only tick found in Kansas that can infest human dwellings and kennels. Additionally, all three feeding life stages — larva, nymph, and adult — prefer to feed on dogs but will also feed on cats, humans, and other animals. The brown dog tick is reddish-brown but lacks the white markings found on the American dog tick. The larvae and nymphs are often found feeding along the backs of dogs. Adults attach to ears and between the toes but can feed anywhere on the body.

Females crawl up into ceilings and into the cracks and crevices along walls and floors where they lay eggs or molt. The brown dog tick can complete its life cycle in as little as two months. Each female lays 3,000-4,000 eggs and populations build rapidly.

Brown tick infestations have been associated with canine ehrlichiosis outbreaks. Eliminating ticks from homes and kennels is difficult and requires an integrated approach. First, dogs and other pets should be treated by a veterinarian. Then focus on sanitation. Remove all infested pet bedding. Vacuum furniture, rugs, carpets, draperies and baseboards regularly, reaching into cracks and crevices where ticks lay and hide their eggs. Destroy the contents of the vacuum bag when done. Residual pesticide treatments can be used to help to eliminate tick infestations in these areas, but it may take several treatments to eliminate ticks completely. Remain vigilant to prevent animal infestations from reoccurring.



Female brown dog tick



Engorged female brown dog tick



Male brown dog tick

## Lone Star Tick – *Amblyomma americanum*

The lone star tick can be readily identified by the single white spot on the back of the female. The males lack this spot but have several white to yellow lines along the outer edge of their backs. These ticks are common in the eastern half of the state but have been found further west and are commonly associated with streams and woodland areas with dense underbrush. They have a wide host range and all life stages and both sexes feed on mammals. The white-tailed deer is a prominent host. After an egg mass hatches, hundreds or thousands of larvae stay together waiting for a host to approach. In the months of July and August larval lone star ticks may attach to hikers and campers in large numbers and are often referred to as ‘seed ticks’. The nymphs and adults are known to attach in the ears of deer and cattle by the hundreds but will feed anywhere on the host. After a tick is removed, long mouthparts may remain embedded in the skin, causing intense itching for a period of time. In addition to being a major nuisance, the lone star tick can vector human monocytic ehrlichiosis and a southern tick-associated rash illness, which is similar to the rash of Lyme disease.



Female lone star tick



Male lone star tick

## Windscorpions Order Solifugae

**Description:** Windscorpions, also called sunspiders, are an unusual-looking type of arachnid. Several species can be found in Kansas, ranging in size from ½-1¼ inch long. They are pale tan to brown and somewhat hairy. They have prominent jaws with long leg-like pedipalps on either side, making it appear as if there



Adult windscorpion

are five legs on each side of the body. The body is slightly constricted in the middle with a relatively large abdomen. The arachnids tend to be more common in the western half of Kansas as they prefer dry, sandy areas.

**Biology:** Windscorpions are nocturnal, hiding under rocks, logs, and covered areas during the day. At night, they hunt for prey by touch, using their long pedipalps and feeding on arthropods and small lizards. They are fast runners. The name windscorpion refers to their ability to “run like the wind.” The female lays eggs in burrows where she guards them as she provides food for her young. The average life span is 1-2 years. Windscorpions wander indoors occasionally, attracted by lights and other insects targeted as prey.

**Damage:** Finding a windscorpion in the home can be alarming because of their ferocious appearance. In reality, they are mostly harmless. Windscorpions can bite if provoked but they do not possess poison glands or inject venom. Most encounters in the home take place between late June and early August. Windscorpions do not live long or reproduce indoors.

**Management:** Windscorpions are usually not present in large enough numbers to warrant control. If found, carefully relocate outdoors.



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## Photo Credits

Most of the photos in this book were taken by the authors. We would also like to credit the following individuals and sources: Raymond Cloyd, Kansas State University: oak leaf itch mite. Glenn Salsbury and Stephan White, *Insects in Kansas*, 3rd Edition: baldface hornet, cat flea, pubic louse. Kansas State University Entomology teaching slide collection: clothes moth and webbing clothes moth larvae. Kaysie Morris, immature black widow spider. John Reese, Kansas State University: ants around a bait station.

# Arthropod Index

## A

Acari 77  
*Acheta domesticus* 28  
*Agapostemon* spp. 60  
Agelenidae 94  
*Amblyomma americanum* 101  
American Cockroach 17  
American Dog Tick 98  
Anobiid Beetles 40  
Anobiidae 86  
Ants 9  
*Apis mellifera* 59  
Araneidae 95  
*Argiope aurantia* 92  
*Arilus cristatus* 76  
Attic Flies 11  
*Augochlora* spp. 60

## B

Baldface Hornet 61  
Bat Bug 54  
Bed Bug 55  
Bees and Wasps 57  
Bird and Rodent Mites 77  
Black Flies 65  
Black Imported Fire Ant 68  
Black-Legged Tick 99  
Black Widow 90  
*Blatta orientalis* 19  
*Blattella germanica* 18  
Blattidae 15  
Blow Flies 12  
*Boisea trivittata* 13  
*Bombus* spp. 58  
Booklice (Psocids) 45  
Bostrichidae 41  
Boxelder Bug 13  
Brown-Banded Cockroach 18  
Brown Dog Tick 100  
Brown Recluse 87  
*Bryobia praetiosa* 80  
Buffalo Gnats 65  
Bumble Bees 58  
Buprestidae 39

## C

Calliphoridae 12  
Camel Crickets 14  
*Camponotus* spp. 36  
Carabidae 26  
Carcinophagidae 21  
Carpenter Ants 36  
Carpenter Bee 37  
Carpet Beetles 46  
Cat Flea 66  
Cave Crickets 14  
Cellar Spiders 91  
Centipedes 78  
*Centruroides vittatus* 85  
Cerambycidae 39  
*Ceuthophilus* spp. 14  
Chiggers 79  
Chilopoda 78  
Cicada Killer 62  
Cigarette Beetle 47  
*Cimex lectularius* 55  
*Cimex pilosellus* 54  
Clothes Moths 48  
Clover Mites 80  
Cobweb Spiders 89  
Cockroaches 15  
Collembola 34  
Combfooted Spider 89  
*Ctenocephalides felis* 66  
Culicidae 71

## D

Daddy Longlegs 81  
Deer Flies 70  
*Dermacentor variabilis* 98  
Dermestid 46  
Dermestidae 46  
Digger Bees 58  
Diplopoda 82  
*Dolichovespula maculata* 61  
Drain Flies 20  
Drosophilidae 32  
Drugstore Beetle 49

## E

Earwigs 21

## F

False Chinch Bugs 21

Field Crickets 22

Fire Ants 68

Firebrat 24

'Firewood Beetles' 39

Flesh Flies 24

Flour Beetle 50

Formicidae 9

Fungus Gnats 25

Funnelweavers 94

## G

German Cockroach 18

Gnaphosidae 93

Golden Garden Spider 92

Grass Spiders 94

Ground Beetles 26

Ground Spiders 93

*Gryllus* spp. 22

## H

Hackberry Nipplegall Maker 27

*Harmonia axyridis* 30

Harvestmen 81

Head Lice 69

Honey Bee 59

Horse Flies 70

House Cricket 28

House Fly 29

## I

Indianmeal Moth 51

Isopoda 83

*Ixodes scapularis* 99

Ixodidae 97

## J

*Jadera haematoloma* 33

Jumping Spider 95

## L

*Lasioderma serricorne* 47

*Latrodectus hesperus* 90

*Latrodectus mactans* 90

*Latrodectus variolus* 90

Lepismatidae 33

*Liposcelis* spp. 45

Lone Star Tick 101

*Loxosceles reclusa* 87

Lycosidae 96

Lyctid Powderpost Beetles 41

## M

*Melissodes* spp. 58

Millipedes 82

Mosquitos 71

Mud Daubers 63

Multicolored Asian Lady Beetle 30

*Musca domestica* 29

## N

*Neocurtilla hexadactyla* 31

Northern Mole Cricket 31

*Nysius* spp. 21

## O

Oak Leaf Itch Mite 83

*Oeciacus vicarius* 75

Opiliones 81

Orbweaver Spiders 95

Oriental Cockroach 19

*Oryzaephilus surinamensis* 53

## P

*Pachypsylla celtidismamma* 27

Paper Nest Wasps 64

*Parcoblatta* spp. 19

*Pediculus humanus* 69

*Periplaneta americana* 17

Pholcidae 91

Pillbugs 83

*Plodia interpunctella* 51

Polistes spp. 64

Polistes Wasps 64

Pomace Flies 32

Powderpost Beetles 40

*Psychoda* spp. 20

*Pthirus pubis* 73

Pubic/Crab Lice 73

*Pyemotes herfsi* 83

## R

Red Fire Ant 68  
Red Shouldered Bug 33  
*Reticulitermes* spp. 42  
*Rhipicephalus sanguineus* 100

## S

Salticidae 95  
Sarcophagidae 24  
Saw-Toothed Grain Beetle 53  
Sciaridae 25  
Silverfish 33  
Simuliidae 65  
*Solenopsis invicta* 68  
*Solenopsis richteri* 68  
Solifugae 101  
Sowbugs 83  
Sphecidae 63  
*Sphecius speciosus* 62  
Spiders 86  
Springtails 34  
Stable Fly 74  
*Stegobium paniceum* 49  
*Stomoxys calcitrans* 74  
Striped Bark Scorpion 85  
*Supella longipalpa* 18  
Swallow Bug 75  
Sweat Bees 60

## T

Tabanidae 70  
*Telmatoscopus* spp. 20  
Termites 42  
Theridiidae 89  
*Thermobia domestica* 24  
Ticks 97  
Tineidae 48  
*Tribolium* spp. 50  
Trombiculidae 79

## V

*Vespula* spp. 65  
Vinegar Flies 32

## W

Wasps 61  
Wheel Bug 76  
Windscorpions 101  
Wolf Spiders 96  
Wood Cockroaches 19

## X

*Xylocopa virginica* 37

## Y

Yellowjackets 65





This book includes photos, descriptions, basic biology, types of damage, and management options for arthropods found in and around Kansas homes. *Household Pests of Kansas* is a valuable reference for all Kansas residents.

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