

# Guide to Common Insects and Other Arthropods Found in and Around North Carolina Homes



## Arthropods of Our Homes

[www.yourwildlife.org/projects/arthropods-of-our-homes/](http://www.yourwildlife.org/projects/arthropods-of-our-homes/)

Arthropods are by far the most diverse group of organisms on Earth, and have been for hundreds of millions of years. There are currently over 1,000,000 known species alive today, and many times that number are yet to be found and described. They are present on almost all land surfaces and throughout the ocean. Because of this, they are among the most familiar animals we come in contact with, including insects, spiders, millipedes, crustaceans and many more.

The following guide aims to help homeowners identify and understand some of the small visitors we get in and around our homes. Its content is influenced by a study conducted in 2012 around Raleigh, NC (USA) by North Carolina State University and the North Carolina Museum of Natural Sciences to investigate the arthropods found in peoples homes. Over the course of the project, more than 10,000 specimens representing hundreds of species were found in the 50 homes we sampled. Although the project was done in the piedmont of North Carolina, this guide may be applicable to many areas where humans coexist with these animals.

## Identification (or continue to the photo guide and reference this key when necessary)

Identifying arthropods is difficult because of the great variation in forms, even among close relatives. However, the following key will help you recognize some of the major groups found in homes (and a few of the many around it).

**NOTE:** This key is *extremely simplified*. It lacks some groups and will not apply to all members of these groups. Please supplement with additional literature.

- A. With 6 walking legs, antennae, compound eyes and [often] wings .....**INSECTS (A)**
- B. With 8 walking legs and no antennae .....**ARACHNIDS (B)**
- C. With more than 8 walking legs (and many body segments) .....**MYRIAPODS & CRUSTACEANS (C)**

### (A) Insects

- 1. Only 2 wings (hind wings reduced to small knobs); sucking/lapping mouthparts; large eyes see **True Flies (Diptera)**
- 2. Front wings hardened or leathery; generally hardened and heavy bodied; antennae variable in shape see **Beetles (Coleoptera)**
- 3. Wings membranous; body with a distinct waist; many with stinger and/or elbowed antennae see **Wasps/Bees/Ants (Hymenoptera)**
- 4. Wings covered in dust-like scales which often form patterns; have a long, coiled proboscis see **Moths/Butterflies (Lepidoptera)**
- 5. Mouthparts form a rigid to needle-like feeding tube; usually have 4-5 antennal segments, most  $\leq 10$  see **True Bugs (Hemiptera)**
- 6. Medium to large insects; hind legs modified for jumping; wings (when present) thickened see **Crickets & Kin (Orthoptera)**
- 7. Medium to large, flattened, fast insects; head hidden from above; antennae whip-like and legs spiny see **Cockroaches (Blattaria)**
- 8. Small pale and wingless, or dark and winged insects; live in large colonies; inhabit rotting wood or the soil see **Termites (Isoptera)**
- 9. Small to tiny, sideways flattened, wingless, jumping insects; dark red/brown and shiny; antennae minute see **Fleas (Siphonaptera)**
- 10. Flat, gray, scaly insects; lack wings; have 3 "tails" (cerci) and small, leg-like structures under abdomen see **Silverfish (Zygentoma)**
- 11. Tiny cream-colored and wingless; antennae thread-like; with a bulging face and thickened "thighs" see **Book lice (Liposcelididae)**
- 12. Tiny, gray or brown jumping insects; often covered in scales or hairs; have a forked tail-like process see **Springtails (Collembola)**

### (B) Arachnids

- 1. With two body segments; 6-8 eyes; fangs; can spin silk see **Spiders (Araneae)**
- 2. With one body segment; 2 eyes usually on top of body; very long thin legs; medium to large see **Harvestmen (Opiliones)**
- 3. With one body segment; often flattened; legs usually short and thick; small to tiny see **Mites & Ticks ("Acari")**
- 4. First, non-walking legs (pedipalps) pincer-like; no tail; small, at usually under  $\frac{1}{4}$ " see **Pseudoscorpions (Pseudoscorpionida)**

### (C) Myriapods & Crustaceans

- 1. Usually  $\geq 10x$  longer than wide; one pair of legs per segment; fast and with "fangs" (modified front legs) see **Centipedes (Chilopoda)**
- 2. Usually  $\geq 10x$  longer than wide; two pairs of legs per segment; slow and with normal mandibles see **Millipedes (Diplopoda)**
- 3. Less than  $10x$  as long as wide; often gray, sometimes brown, with a rough surface; many roll into balls see **Pillbugs/Sowbugs (Isopoda)**

## True Flies (Diptera)

True flies are among the most ecologically diverse orders of animals alive today. With over 160,000 described species they are also among the most species diverse, and make up over 10% of all animal life on Earth. Many are linked to water as larvae (or at least moist environments), but others have also invaded the drier parts of the world. Although many flies feed on decaying plant or animal matter, there are numerous species of predators, parasites, herbivores and fungus feeders. Flies are the most important group of blood-sucking creatures and are responsible for transmitting diseases that cause millions of deaths per year worldwide. There are also many species that are plant pests. The vast majority of flies, though, are benign or beneficial (e.g. many are important pollinators, decomposers and predators). Flies can be recognized by having only front wings, the hind pair being reduced to small knobs called halteres.



### dark-winged fungus gnats (Sciaridae)

These small, dark flies are among the most common insects in homes. As larvae they feed on decaying plant matter and fungi, which they sometimes find in potting soil of over-watered house plants. The adults are fragile flies that do not feed, but may swarm indoors. They can readily be identified by the thin portions of their eyes that meet at the top of their head (“eye bridge”) and wings with a set of veins that resemble a tuning fork.



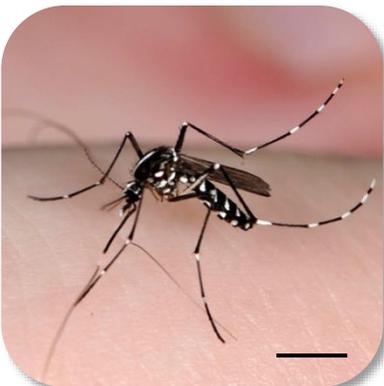
### gall midges (Cecidomyiidae)

These tiny flies are closely related to dark-winged fungus gnats, but have fewer wing veins and more elaborate antennae. As larvae they generally feed on plants, where they often produce galls (tumor-like structures in the leaves and stems of the plant). Other larvae, however, may feed on fungus, or are predators or parasitoids of soft-bodied insects. Adults do not feed and are often attracted to lights, where they may enter houses undetected.



### moth/drain flies (Psychodidae)

These small, moth-like flies are often found on bathroom walls or around compost piles. Their hairy antennae, body and wings (with many straight veins) are distinctive among similar flies. Moth fly larvae are aquatic or semi-aquatic where they feed on decaying matter. This environment is found in household plumbing where waste builds up, thus their common presence in homes.



### mosquitoes (Culicidae)

Everyone knows mosquitoes. Most females use their long proboscis to drink the blood of animals, including humans, while males use it to drink nectar. Their larvae are adapted to living in calm bodies of water where they filter feed on microorganisms. Mosquitoes can transmit many diseases, but many of the more severe ones are only present outside the US. Their nuisance, however, is always present where they are.



### non-biting midges (Chironomidae)

These flies develop in many bodies of water, even highly polluted ones, and are commonly attracted to lights. Though mosquito-like, they do not bite and can be identified by their lack of a proboscis, long front legs and wings that do not have scales.



Approx. Life Size

## crane flies (Tipulidae)

The largest family of flies with over 15,000 known species, these flies are variable in size from just a few millimeters to a few inches long. Many resemble large, leggy mosquitoes and are often given local names like “mosquito hawks”. However adults seldom feed, and when they do it is only on nectar not mosquitoes (or people!). Their larvae are equally diverse, though most are aquatic or semi-aquatic and feed on decaying vegetation. Many are attracted to lights.



## scuttle flies (Phoridae)

Probably the most ecologically diverse family in Diptera, these small flies dart around and take small flights, giving them their common name. They are hunch-backed, with a spiny head and large hind legs. They often inhabit decaying matter as larvae, though many are parasitic, predatory or herbivorous. They are very hardy flies, even rarely surviving in shoe polish and paint. Some species are found around human habitations worldwide.



## vinegar/fruit flies (Drosophilidae)

A small fly circling a rotting peach in your home is likely what most people call a “fruit fly”. However, “vinegar fly” is more accurate (and what entomologists call them) because they are actually attracted to the fermentation where their larvae can find bacteria and yeasts on which to feed. These conditions are also found in other human environments, such as compost bins and garbage cans. The family is large and diverse though, having extreme lifestyles including living in the gills of live crabs and in the spittle nests of froghoppers (Cercopidae).



## blow & flesh flies

These are among the most common heavy-bodied flies to enter homes. Blow flies (Calliphoridae; left) are often metallic blue or green, with bristly bodies and large eyes. Larvae largely feed on decaying animal remains or meat. Cluster flies (*Pollenia* sp.) sometime overwinter in attics, but in warmer months their larvae parasitize earthworms. Flesh flies (Sarcophagidae; right), a closely related family, feed on rotting meat as well. They are large and look like gray carbon fiber.



## house & stable flies (Muscidae)

These flies are the stereotypical insect associated with humans. They have been transported around the world and are closely linked with people and their livestock. They often breed in dung and rotting materials, and can transfer diseases to us directly or through the foods we eat. Related flies like the stable fly (*Stomoxys calcitrans*; right) can even bite to drink the blood of people and their animals.



# Beetles (Coleoptera)

Beetles are the largest group of organisms on Earth, making up over 25% of all animal species. As such, they do many things and live many places. Their front wings (elytra) are hardened and cover the hind wings when at rest. Elytra not only protect the soft hind wings while walking, digging and boring in materials, they also cover the abdominal respiratory holes (spiracles) reducing water loss/intake. This is why many species can survive in deserts (and the dryness in homes), while others are at home in the water. Beetles vary immensely in size, from less than a millimeter to over 7 inches long. They also come in many shapes and forms – too numerous to describe here. Larvae of beetles are equally diverse in forms and habits. Many beetles are domestic or agricultural pests, though many are also beneficial.



## carpet beetles (Dermestidae)

These are among the most common beetles found in homes. There are several types, but generally they are round or oval beetles with a hairy or scaly appearance. Many have different colored scales that form patterns (*Anthrenus* sp.). Many also have a single simple eye (ocellus) on the head – atypical for beetles. Larvae are small, hairy, caterpillar-like insects that feed on a variety of dried organic materials including hair, feathers, dead insects, grains and other stored products.

[see special section on carpet beetles at end of guide]



## death-watch beetles (Anobiidae)

Although they have an ominous name, these beetles are not deadly. The name comes from the sound that males sometimes make in their wooden tunnels, which was once thought to foretell death. This diverse family includes members who bore into dried wood (and can be structural pests) and many that feed on dried products, such as spices and grains. They are often brown or reddish-brown and have a head that is generally hidden. Their antennae are also often distinct, usually with the last 3 segments elongated.



## darkling beetles (Tenebrionidae)

This large family of beetles is extremely diverse in shape and form. Most have kidney-shaped eyes, with antennae that attach nearby and under a shelf. They also have 5 segments in the front and middle “feet” (tarsi) but only 4 in the hind feet. Many are dark red, brown or black, but a few are shiny or colorful. Most feed on fungus or decaying matter, but some that enter homes, such as flour beetles (*Tribolium*), feed on stored products. Comb-clawed beetles (Alleculinae; above) and others are often attracted to lights, and may enter homes. Familiar species also include the mealworms, which are often fed to pet reptiles.



## little brown beetles (various families)

There exist many small, brown beetles that may enter homes either to feed on fungus (particularly molds) or stored food products. Most have been transported around the world with humans and can sometimes be abundant in pantries or cabinets containing food products. There they feed and reproduce, all the while destroying the product. Some are flightless, while others can fly. Most are under ¼” and many have antennae with a distinct club at the end.

**Pictured above from Left to Right** - merchant grain beetle (Silvanidae); lesser grain borer (Bostrichidae); minute brown scavenger beetle (Latridiidae)



## ground beetles (Carabidae)

With over 40,000 described species, this family is one of the largest among animals. Because of their great diversity they are common in many habitats. They often actively run across the ground – hence their name and their tendency to run into homes. Most species are predators or scavengers as both larvae and adults, though some feed on seeds or other plant parts, and a few are parasitic on other insects. Though they are not dangerous to people, larger specimens can give a bite if mishandled and a few create tiny explosions out of their rear (bombardier beetles; *Brachinus* sp.).



## scarab beetles (Scarabaeidae)

Another large family, these beetles (usually just called “scarabs”) are often large and heavy bodied. The major characteristic of the family is their antennae which have the last few segments forming fan-like, expandable “fingers”. Many are familiar to us, like Junebugs, Japanese beetles and dung beetles. Some are major pests of plants, either eating the foliage (adults) or roots (usually larvae). Many are beneficial, especially dung beetles who dispose of animal waste. Larvae are typical C-shaped grubs. Adults are often found at lights and may be attracted to homes for this reason.



## weevils (Curculionidae)

This distinct group of beetles is one of the largest families, with over 60,000 described species. They are easily identified by their enlarged “nose” (rostrum) and elbowed antennae. The majority of larvae, and many adults, feed on plants. This family contains myriad pest species, many being economically important (e.g. the boll weevil, *Anthonomus grandis*). A few are beneficial. The bark/ambrosia beetles (Scolytinae), who bore into wood and may attack healthy trees, have recently been put in this family. Many are attracted to lights or are pests of stored products, and thus invade homes.



## click beetles (Elateridae)

These common, elongate beetles get their name from the clicking sound produced when they right themselves by springing in the air. Their larvae are diverse (called “wireworms”), and are predators or feed on plants (especially the roots). Adults are often attracted to lights, bringing them to homes. They can be recognized by the clicking process on the “chest” and by the pointed thorax just in front of the elytra.



## rove beetles (Staphylinidae)

Rivaled only by weevils in number of described species, these beetles are equally common and often found in the soil or leaf litter. Most are predators, but many eat fungi; some even parasitize other insects. They are common in many habitats (and at lights) and can usually be recognized by their short elytra.

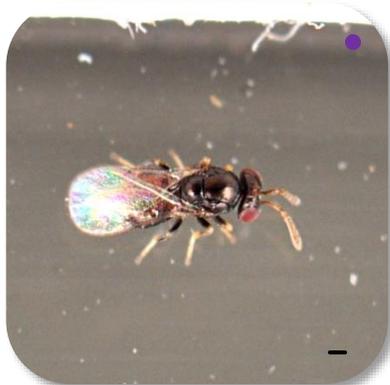


## ladybugs (Coccinellidae)

A very familiar family, ladybugs are often brightly colored red/orange with black spots. They are common on plants, where they (and their larvae) feed on soft-bodied arthropods like aphids. A few species are plant feeders and may be pests. One species, the multicolored Asian ladybug (*Harmonia axyridis*; left) was brought to the US for its supposed benefits, but now is a nuisance that can congregate in homes, and has even been reported to bite!

## Wasps, Bees & Ants (Hymenoptera)

Wasps, bees and ants make up a large and diverse order (>120,000 described species) of herbivorous, parasitic or predatory insects. “Primitive” wasps all feed on plants/wood and have caterpillar-like larvae. The majority of species, though, are parasitoids (parasites that kill their host). Most of these parasitoids are small to minute (including the smallest known terrestrial animals) and parasitize a wide range of arthropods and their eggs. Other wasps are predatory, many of which hunt and paralyze their prey to feed to their young, which often reside in specialized burrows or mud nests. True sociality has evolved several times in the group, with colonies made up of mostly female workers and a queen (producing males sporadically). Hymenopterans have a specialized reproductive system where males are produced from fertilized eggs, while females come from those that are not fertilized. Many are also known for their painfully venomous stings.



### tiny parasitoid wasps (Chalcidoidea, Platygastroidea & others)

There are many thousands of species of these wasps, and likely tens (to hundreds) of thousands left to be discovered and described. They are generally small to minute, rarely over 5 mm and some are smaller than certain single-celled organisms (the record holder being 0.15 mm long!). Most are either black or metallic blue/green, and have a reduced to absent wing venation and elbowed antennae. They cannot sting, but inject eggs into their host. Many of the smallest species attack arthropod eggs, while others attack different life stages of various insects and other arthropods. Adults may feed on nectar.



### ichneumons & braconids (Ichneumonidae & Braconidae)

Another group of parasitoids, both of these families are among the most species rich of all insects. Most have a long thin egg laying device (ovipositor) which is often used to bore into wood or other substrates. They also have long, thin, many-segmented antennae. Though many are small, they are usually over 1 cm long and some grow quite large (> 2.5 inches!). They are very common and often attracted to lights. Many mimic the black and yellow coloration of stinging wasps.



### paper wasps & hornets (Vespidae)

These wasps collect wood to construct paper nests. Paper wasps (left) form single-layer, open nests, while hornets (right) create a multi-layered nest enclosed in an outer shell (some build it underground). Hornet colonies can get very large (thousands of individuals), while paper wasps have smaller colonies. Both have painful stings, though hornets are generally more aggressive. Despite all this, they are particularly fond of soft-bodied insects, especially caterpillars that attack crops.



### bees (Apidae & others)

These are among the most familiar insects due to their pollinating practices and production of honey. They are highly adapted wasps that live on a vegetarian diet of flower nectar and pollen. Many plants depend on both honey bees and native bees (over 3,000 species of which live in North America alone) for fertilization. Bees can be told apart from other wasps (such as hornets above) by their extremely hairy bodies, each hair being feather-like (seen under magnification). Honey bees (*Apis mellifera*) form large colonies and produce combs for their young and honey storage. Bumble bees (*Bombus*) have smaller colonies, while many of our bees are solitary. Carpenter bees (*Xylocopa*) are well known for nesting in wood, while leafcutter bees (*Megachilidae*) find holes and line them with cut leaves. Most species can sting.



## hunting wasps (Sphecidae & Pompilidae)

These wasps are active hunters who locate prey which they paralyze with a powerful sting. They then take the prey to a nest (which may be made of mud, such as in mud daubers; left), where they store the living-but-immobile food to be eaten when their young hatch. Many hunt specific prey: many hunt spiders (all Pompilidae and many Sphecidae), while others hunt crickets, cicadas, aphids, flies, beetles or caterpillars. Many nest in cavities around homes or build their mud nests under eaves or on the sides of houses. Though they can sting, they are not generally aggressive and prefer to spend more energy on hunting than defense.



## ants (Formicidae)

These familiar, social insects are among the most abundant animals on Earth. With over 10,000 described species, they are also extremely diverse. They often nest in the soil, but many also live in rotting wood or in trees. Some invade homes to search for food and water, mainly generalists scavenging different things. Other species are specifically predators, seed feeders, or feed on other items. Workers/soldiers are always wingless. Queens have wings for part of their life, while males have wings their entire, short-lived lives. Swarms of these winged ants happen at certain times of year (depending on which species). Some species, like fire ants (*Solenopsis invicta*), have a painful sting, while others produce foul chemicals. Ants can be told from other wingless wasps by their elbowed antennae and the presence of one or two small segments in between the thorax and abdomen. The following is a list of some common ants shown above.

1. The odorous house ant (*Tapinoma sessile*) is a typical household "sugar" ant looking for water or food. They and the Argentine ant (*Linepithema humile*) are similar in many ways, but odorous house ants have a distinct smell when crushed.
2. Little black ants (*Monomorium minimum*) are aptly named due to their size and color. They are fairly slow moving for ants and, in homes, often form distinct lines of workers close to one another.
3. Acrobat ants (*Crematogaster*) are a group of mostly tree-living ants, that can often be seen running up and down trunks holding their heart-shaped abdomen in the air. They frequently come into homes.
4. Chinese needle ants (*Pachycondyla chinensis*) are new to our fauna and typically live in decaying logs where they feed on termites. They may enter homes and have a painful sting (used to kill termites). They are distinctly black and elongate.
5. Carpenter ants (*Camponotus*) are the largest ants in our area. They are often black and nest in decaying wood which they excavate for their nest. They can be structural pests and often enter homes.
6. Field ants (Formica) are typically red, black or red & black. This one is carrying one of its larvae. Black species are similar to carpenter ants, but workers have 3 simple eyes (ocelli) and a more wavy thorax (as opposed to the sloping back of carpenter ants).
7. Red imported fire ants (*Solenopsis invicta*) usually construct mounds in disturbed areas. These ants are famous for their stings, which are painful at first, but then produce an itchy pustule. They are red with a brown abdomen and have 10-segmented antennae.
8. Citronella ants (some *Lasius*) are small, yellow/amber ants that smell lemony or like citronella when threatened. They may infest buildings, but mostly live in decaying wood and in the soil.

## Moths & Butterflies (Lepidoptera)

Moths and butterflies are familiar insects to most people because of their large, showy wings covered in patterns of scales – either highly colorful, or drab and camouflaging. There are over 150,000 described species in the world and the vast majority of them feed on plants as larvae (caterpillars) and nectar or other sugary liquids as adults. A few are predators, parasites or fungus feeders as larvae. Many communicate with each other using chemicals (pheromones) – they can sometimes be seen raising their abdomen and fanning it with their wings to help disperse the chemicals. This order contains some very important crop and forest pests, whose larvae devour and damage plants we value. Moths and butterflies can generally be identified by their scaly wings (flattened hairs that are often colored or shiny) and long, coiled mouthparts used to drink liquids. Caterpillars usually have soft, false legs near their posterior that have tiny hooks.



various sizes

### moths (various families)

While butterflies get a lot of attention, the vast majority of Lepidoptera is made up of various moths. Many are drab brown and small. Most are also nocturnal, so they are not as popular as the colorful, day-flying butterflies. However, they are extremely diverse and important organisms in nature. Despite this diversity, many share a common trait that brings them to us: their attraction to lights. This is most likely the result of them locating their way using the moon's light, and our artificial lights fooling them.



### meal moths (Pyralidae)

A few moths actually come into, and dwell in, our homes. The most common are grain and meal moths, whose larvae (right) feed on stored products. The Indian meal moth (*Plodia interpunctella*) is a widespread species that infests pantries and sometimes rodent food stores in walls. Its larvae often crawl on the ceilings of rooms to pupate. Clothes moth caterpillars in the family Tineidae (not shown) are adapted to feed on animal fibers so they may consume wool clothing and rugs.



various sizes

### caddisflies (Trichoptera)

This order of insects is closely related to Lepidoptera. Adults differ by lacking a tube-like mouth and having hairs instead of flat scales. Larvae are caterpillar-like and live in water where they often construct homes or cases out of silk and debris. Cases that they carry around with them can be elaborate and diagnostic. Adults are often attracted to lights so they may come to homes, especially those near bodies of water.

# True Bugs (Hemiptera)

With over 90,000 species, true bugs represent the largest order of insects that undergo incomplete metamorphosis. Unlike the previous groups, young bugs (nymphs) look similar to adults in contrast to larva which are very different in form to their adults. Bugs are all characterized by mouthparts that are fully formed into a sucking beak, used to drink liquids. Many also have wings that are leathery at their base but membranous near the tips (and often folded over one another). Most bugs are plant feeders, which they pierce to suck the sap. Plant feeding bugs often secrete excess liquids and sugars as drops of honeydew, which is fed upon by various insects and molds. Other bugs are predators, piercing prey and often having digestive saliva which helps to liquefy the prey's body contents. These species can often give a painful bite. Many species are agricultural pests while others are beneficial. Several groups have scent glands that produce strong defensive odors.



## stink bugs (Pentatomidae)

As their name implies, these bugs have scent glands that produce a distinct smell when disturbed. Many feed on plants, while others are predatory. The brown marmorated stink bug (*Halyomorpha halys*; left) is a recently-introduced bug that is now common in homes, especially during the winter where they may hibernate in attics, sheds, barns, etc. They are not dangerous, but are an annoyance and their smell can be difficult to tolerate.



## assassin bugs (Reduviidae)

This is the largest group of predatory bugs. Most have a thick beak and large front legs which they use to grab and pierce prey. Some are camouflaged while others are brightly colored. They vary in size from a centimeter to over an inch and a half long. Many can give a painful bite if mishandled. One group (Triatominae) includes the blood-sucking conenoses, which feed on the blood of animals and can transmit Chagas disease in the tropics. Others, however, are beneficial and may hunt pest species. A few are very fragile looking and creep around spider webs where they grab spiders and their prey for food.



## bed bugs (Cimicidae)

These flat, reddish-brown, wingless bugs (*Cimex lectularius*) are the bane of hotels and homes. In recent years they have had a resurgence in numbers, and can be quite common in certain places. All life stages feed on blood and are nocturnal, preferring to feed when their hosts are asleep. Though they do not transmit any diseases, their bites cause annoyance and can lead to psychosis and feelings of uncleanliness. The related bat bugs (*Cimex adjunctus*) will sometimes bite humans, though they prefer to feed on bats that sometimes roost in people's attics.



## leafhoppers (Cicadellidae)

These are among the most diverse groups of insects in yards, and are often attracted to lights at night. All can hop and fly at a moments notice – they can often be seen doing so while walking through grass. All feed on plants and some are serious pests, having the potential to transmit plant diseases. They are often attracted to lights and, because of their size, may enter homes (though they will die if they cannot find food or water). Many are small and all are characterized by hind legs with spines running the length. Many are also brightly colored.

## Other Insects

Although most insects belong to the previous groups, there are many insect orders with fewer species. However, this does not mean that they are any less common or important (in fact, most contain more species than the known mammals on Earth!). Some are pests, while many are benign or even beneficial. In total, there are about 30 orders of insects. Because of the great diversity, it is impossible to summarize their habits and habitats here.



### termites (Isoptera)

These insects form large colonies and are truly social, having cooperative care of the young, different castes (queens/kings, workers and soldiers) and overlapping generations. All feed on plant materials and our most common ones, the subterranean termites (*Reticulitermes*), feed on wood underground or in rotting logs. However, they can and do feed on structural wood in homes, thus being one of the most economically destructive pests around. Most members of a colony are pale and eyeless, and cannot usually be seen outside of the colony (above left and middle). The most frequently seen termites are the dark, winged reproductives that swarm to find mates during certain parts of the season (above right). Worker termites can be distinguished from ants (the other major group of social subterranean insects) by lacking hard, pigmented bodies and having bead-like antennae (rather than elbowed antennae). Winged termites can be told from winged ants by the similarly-shaped fore and hind wings (fore wings much larger than hind in ants) and the bead-like antennae. There is a large body of evidence that termites are simply social cockroaches (see below).



### cockroaches (Blattaria)

Although universally despised, these insects are actually incredibly diverse, with 99% of species living only out in nature. They are so diverse that they have members that care for their young, roll into balls and even a few that glow! However, in homes, cockroaches are unwelcome, especially pest species like the German cockroach (*Blattella germanica*; left). These insects can leave feces in our pantries and high densities may produce allergens that contribute to respiratory difficulties, like asthma. They are also considered dirty and may track disease microorganisms into our homes and onto our food.

[see special section on cockroaches at end of guide]



### camel crickets (Rhaphidophoridae)

A common denizen of basements and crawl spaces, these insects are much more feared than they deserve to be. Their long legs and antennae make them a little creepy, but they are completely harmless. They are relatives of crickets, grasshoppers and katydids, but are wingless (and thus do not make sounds). They feed on various things – from dried plant materials to dead insects. Though they cannot fly, they are able to hop quite a distance.



## earwigs (Dermaptera)

Despite their mythical names, these insects do not nest in people's brains. They are most at home in the tight spaces between bricks, under debris or in plants/flowers, and also enjoy cool damp places like crawl spaces and basements. Earwigs are omnivores, feeding on plant and animal matter, and even hunting with their pincer-like tail! They are also good mothers, guarding their eggs and young from enemies and diseases. Studies have even shown that more eggs perish when mothers are removed from guard duty.



## silverfish (Zygentoma)

These "primitive" insects are a common sight in homes, especially when they scurry across the floor or up a wall. Their speed may be frightening to some people, but they are completely harmless. Although they often feed on starchy crumbs and other bits of food in homes, they have some of the toughest stomachs of any insects, being able to subsist on things like book bindings, wallpaper glue, photos, sugar, coffee, hair, carpet, clothing, cotton, linen, silk, synthetic fibers, dead insects, shed skins and even leather. Silverfish are always wingless, have silvery scales covering their body (thus their name) and have 3 distinct "tails". Unlike most insects, they shed their skin throughout their long lives.



## springtails (Collembola)

Once considered true insects, these creatures are now treated as "non-insect hexapods" (hexapods referring to six-legged arthropods). They differ from true insects in that they have mouthparts that are inside their head and have external fertilization. Most springtails are small to minute and feed on detritus, algae and other bits of edible debris. They get their common name from the fact that they use a forked, tail-like process to spring into the air, used to avoid enemies or get around. They are common in homes, especially on window sills and baseboards, but also where moisture can be found (potted plants, bathtubs and sinks).



## book lice (Liposcelididae)

These insects are distant cousins of true parasitic lice (such as head and body lice), but do not have the same blood thirst. Instead, they feed on dead insects, crumbs, stored products, hair, feathers and other organic matter. They can be found in bird and mammal nests, as well as in our homes, but are so small that they often go unnoticed. They are wingless and have a bulging face and large hind legs. Some populations are made up only of females, who reproduce without mating. Because of this, under certain conditions they can attain large populations very quickly.



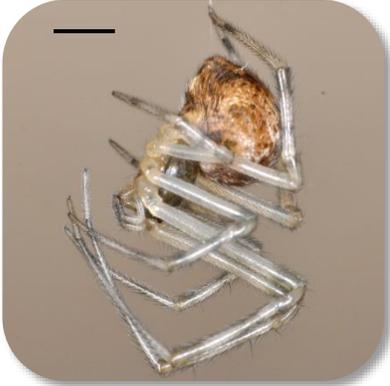
## fleas (Siphonaptera)

These familiar insects are an annoyance to both people and their pets. All adult fleas feed on the blood of either birds or mammals. Their legless larvae live in carpets and the cracks of wooden floors and eat detritus. Adults can remain motionless in their cocoons for some time, waiting for the movement of large animals, and thus can appear out of nowhere. Fleas can transmit plague (though uncommon) and tapeworms which are transmitted when a flea is swallowed (which may occur while pets groom themselves). They are very distinct in form, being hard, shiny brown, and sideways flattened, with small antennae and large legs. Their jumping behavior is also well known.

# Spiders & Other Arachnids (Arachnida)

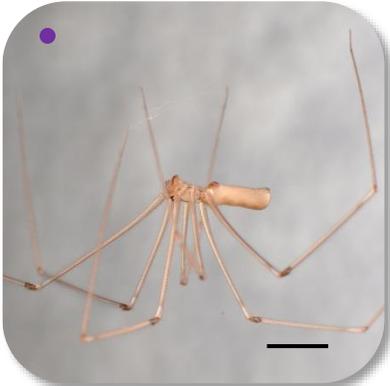
Besides insects, spiders and other eight-legged arthropods (including mites, daddy-longlegs, scorpions, etc.) are the dominant group of Arthropods on land. Spiders are the most familiar because of the many species that live around people and their intricate webs. All are predatory, and while some stay in webs to catch prey, others actively hunt prey. Almost all spiders are venomous, but only a few can even bite people and only two groups (widow and recluse spiders) are dangerous. Other than spiders, mites (including ticks) are the most diverse and common group, though because of the tiny size of many species, they are rarely seen. Mites fill various niches, being predators, scavengers, plant feeders and parasites. Most other arachnids are predators (scorpions and pseudoscorpions) or scavengers (harvestmen; sometimes take prey).

Note: lengths are body length not including legs which may be very long



## cob web spiders (Theridiidae)

These are the most common spiders in homes. They build irregular webs with many strands connected to the ground, which they use to snare prey walking by. They are generally fat spiders, with a large, dome-shaped abdomen. They also have a thick row of curved, toothed setae on the underside of each hind leg, characteristic of the group. The common house spider (*Parasteatoda tepidariorum*; left) is a species that lives with humans around the world and likely originated in South America.



## cellar spiders (Pholcidae)

Also called daddy-longlegs (but not to be confused with harvestmen; below), these leggy spiders are often found in basements and crawl spaces, though they sometimes build webs in other areas of homes. They are generally pale tan to gray with 6-8 eyes arranged in groups (not rows). When disturbed, some species shake their bodies violently to scare would-be predators. Despite their frightening appearance, they are not dangerous to people and likely could not even deliver venom through our thick skin.



## jumping spiders (Salticidae)

These spiders are among the most charismatic arthropods, due mostly to their large, cartoonish eyes and their awareness of people (they tend to “look” at humans with curiosity). Many species are small though some can get up to 0.75 inches long. Many are brightly colored or patterned, and males often have ornamented legs which they use to “dance” for females. As their name implies, they can jump a great distance to pounce on prey and have extremely good eyesight. The two large eyes on a flat face will help distinguish these spiders.



## spitting spiders (Scytodidae)

Although they sound like a bad nightmare, these spiders are small, fragile and secretive. Their name comes from the fact that their large venom glands produce a sticky, venomous silk that is “spit” out of their fangs in a very quick zig-zag motion. They use this silk to bind up their prey so they can get close enough to deliver a bite. *Scytodes thoracica* (left) is a species that exists with humans around the world, and originated in Europe. Females will carry eggs under their body until the young hatch.



## orb web spiders (Araneidae)

When most people think of spider webs, they are thinking of ones built by these spiders: large, flat webs, with many “spokes” and spiraling strands. They commonly create webs around lights and some species can get quite large (especially *Argiope* spiders, like the common black and yellow argiope, *Argiope aurantia*). These spiders sit in the center of the web waiting for prey to get caught. Once the prey item hits the web, they quickly run to it and wrap the unfortunate item in thick sheets of silk. New webs are often built daily. Though menacing to look at, they are generally harmless.



## funnel web spiders (Agelenidae)

Also called grass spiders, these spiders are often found in between windows and their screens or on the outsides of homes. Their characteristic webs have a large, thick sheet that leads to a tunnel in which the spider hides. There it waits for prey to stumble onto the sheet, at which point it darts out to bite the prey. They will later bring it into the tunnel to feed on. Though not dangerous or generally aggressive, they can give a painful bite. However they usually remain in their webs and don't often venture out.



## wall spiders (Oecobiidae)

These small (about 4 mm long), flat spiders resemble little stars with their legs splayed out. They usually sit motionless on walls (exterior and interior) or near the base boards of houses. When small prey comes close, they quickly run around it, wrapping it up in silk. They are sometimes very common, and the name of the main genus, *Oecobius*, translates to “house living” in Greek.



## wolf spiders (Lycosidae)

These spiders are among the largest of the hunting spiders and can be very common. They have a characteristic eye arrangement consisting of two large eyes above a row of four eyes on the face, with another two, small eyes on the top of the head (see left). They are active prowlers and often have stripes on the head. Some burrow and many are found around bodies of water (like many spiders they can walk on the surface of water). If molested they can give a painful bite, but otherwise avoid confrontation and are not dangerous.



## Other ground spiders (various)

There are numerous types of spiders that run around looking for prey. They usually prefer to be outside in nature where there are plentiful food items. However, during their travels they sometimes enter homes. These fast spiders are almost always harmless, and tend to avoid contact with people. Some may actually hunt in the home, but most usually want to get outside eventually.

## dangerous spiders

Two groups of North American spiders have members considered medically important. Unfortunately both can be found in and around homes. Widow spiders (*Latrodectus*; far left) are common cob web spiders (see Theridiidae) throughout the South and have a characteristic red hourglass underneath their abdomen. Adult females have a neurotoxin that induces extreme pain and, in rare cases, death. Recluses (*Loxosceles*; left) are secretive spiders native to the central states and very rarely encountered in NC. They have a toxin that causes skin lesions and blood disorders. They can be recognized by six eyes arranged in three pairs, and a dark brown violin shape on their head. **Regardless of the dangers, spider bites in general are extremely rare and are highly misdiagnosed, especially without a specimen.**



## harvestmen (Opiliones)

Also called daddy-longlegs, these arachnids are extremely common in wooded habitats. They are easily recognized by their central, undivided body with extremely long and thin legs. They often shed their legs when grabbed in order to escape. Despite old wives' tales, these arachnids are not venomous. They usually scavenge small arthropods, but may hunt organisms (though they are not well built for the task). While wandering around they may enter homes, where they often perish due to a lack of food and moisture.



## ticks (Ixodidae)

These tenacious, blood sucking arthropods are actually a group of large mites. All suck the blood of vertebrates, including reptiles, birds and mammals. Many also transmit important diseases such as Lyme disease and Rocky Mountain spotted fever. Their taste for human and pet blood, combined with their active searching for hosts, makes them a familiar group. They may come into homes on pets or just enter to find hosts.



## dust mites (Pyroglyphidae)

These tiny (less than 0.5 mm!) arachnids are found everywhere that humans are, usually attaining large populations in warmer temperatures with relatively high humidity. They generally live in carpets, beds, pillows and other areas of homes where they scavenge dead skin cells and other materials. Some people are sensitive to their feces and shed skins, and develop allergies.



## pseudoscorpions (Pseudoscorpionida)

Similar to a tick crossed with a scorpion, these small arachnids are sometimes collected in homes. More often they can be found under the bark of trees. They are predatory, usually feeding on small arthropods and other organisms. Some produce silk, while others have venom glands in their claws (harmless to humans). Mother pseudoscorpions lay eggs in a small pouch under the body, and the young may climb on her back for protection. Some hitchhike on larger insects to get from one place to another. One species in particular in Central America lives only on large beetles, feeding on the mites and such that infest the giant insect.

## Other Arthropods

Though insects and arachnids make up most land-living arthropods, there are a few other groups that are commonly encountered. The most common are the Myriapoda (“many-legs”), which include millipedes and centipedes. These arthropods are worm-like, though they have many jointed legs, body segments and a true head with antennae. Many are medium sized, averaging about an inch long. However, some are very small, while others can attain a foot in length! Besides myriapods, there are some crustaceans that dwell near homes. Though most of their relatives (like shrimp, crabs and lobsters) live in the water, some like isopods and a few amphipods (beach fleas/lawn shrimp) are able to survive on land, albeit in moist conditions.

---



### millipedes (Diplopoda)

These slow-moving arthropods look like worms with legs and antennae. They generally feed on decaying matter and plants, and are often found in moist habitats. When frightened they tend to curl up in a spiral. Many produce defensive chemicals, some of the more brightly colored ones having cyanide compounds. However, they are harmless to humans unless, perhaps, they ingested in large numbers.



### centipedes (Chilopoda)

These fast, predatory arthropods are similar to millipedes in many ways. They differ from them in that they have only one pair of legs on each segment (unlike the two pairs on millipedes). They are venomous, having their front legs modified into “fangs”. They prey on any organism they can handle and some larger species can take down vertebrates. The larger species that come into homes may bite if they are threatened or accidentally come into contact with people. Their bite is not life threatening or generally medically important, though.

---



### sowbugs & pillbugs (Isopoda)

Close relatives of shrimp and crabs, these arthropods are extremely common around (and often in) homes. They need some moisture to breathe, so they do not often thrive in homes, but rather under rocks or in leaf litter. Pillbugs (far left) are able to roll into a ball, giving them the common name roly-polys. Sowbugs (left) are usually more flattened and unable to roll into a ball. Many carry their young in a pouch under their body called a “marsupium”.

## carpet beetles (Dermestidae)

Beetles in this family are well adapted to live in the dry and sparse environment of homes. They most commonly feed on hair (including wool products), feathers, dead insects, dried pet food (right) and dried meat (usually late stage carrion). One genus (*Apsectus*) even feeds on spiders' silk and eggs! Both larvae and adults can be seen in homes. The adults (especially *Anthrenus*) are often seen dead on windowsills after trying to get to flowers for pollen, their main food source. There are many species in several genera that may enter our homes. The most common types are shown below.



larva —



adult —

### black carpet beetles (*Attagenus*)

- medium sized
- adults pill-shaped with thin, silky hairs
- larvae with long tuft of hair on posterior, dark scale-like setae and a hidden head



larva —



adult —

### (varied) carpet beetles (*Anthrenus*)

- small
- adults round with colorful scales arranged in patterns and small, clubbed antennae
- larvae less elongate, with abundant hairs; thick tufts of hairs present on top of last few body segments and lacking long posterior tuft



larva —



adult —

### carpet/grain beetles (*Trogoderma*)

- small to medium sized
- adults with thick, colorful hairs arranged in patterns
- larvae elongate with abundant hairs; thick tufts of hairs present on top of last few body segments in addition to long tuft on posterior



larva —



adult —

### skin/larder beetles (*Dermestes*)

- large
- adults elongate with coarse hairs, those on the underside sometimes white or with white patterns
- larvae somewhat shiny, with long, sparse hairs and two large spines on top of their posterior

## cockroaches (Blattaria)

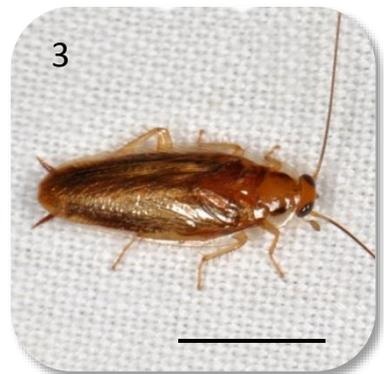
If you ask people what their least favorite “bugs” are, you will commonly get the answer “cockroaches” or just “roaches”. These fast, beetle-like insects are actually most closely related to praying mantises and termites (more distantly to crickets and grasshoppers). Most are omnivores, an adaptation useful for inhabiting homes. Cockroaches often produce hard, purse-like egg cases and have several nymphal stages before adulthood (right). Some pest species produce proteins that can cause allergies and asthma, and they may also carry diseases on their bodies. Despite all this, the majority of species are not pests.



## pest cockroaches

These species are the most common to enter, persist and thrive in homes:

1. The German cockroach (*Blattella germanica*) is perhaps the most important pest species around the world. It is small and light brown, with two dark lines on the plate above the head (pronotum). Contrary to the name, they originated in Africa.
2. The brown-banded cockroach (*Supella longipalpa*) is a relative of the German cockroach. It can become a common pest in buildings and homes. It is small with prominent brown markings, thus the name.
3. The American cockroach (*Periplaneta americana*) is a large, common pest species. Adults are a reddish-brown with lighter markings around the pronotum. Again, though called “American” these insects originated in Africa.
4. The Oriental cockroach (*Blatta orientalis*) is a large dark-brown to black species with short wings (especially in females; shown here). They are often found in basements and other cool, dark and damp locations.



## “wild” cockroaches

These species prefer to live outside and are unlikely to infest homes (their presence is usually only temporary):

1. The smoky-brown cockroach (*Periplaneta fuliginosa*) is the most common cockroach outdoors in the Southeast and one that frequently enters homes accidentally. Nymphs are black and white (1a) while adults are a uniform dark brown (1b).
2. The little yellow cockroach (*Cariblatta lutea*) is a native cockroach whose close relatives live mostly in the Caribbean. They are very small (about 1 cm long) with a lightly marked pronotum. They rarely enter homes but may come to lights.
3. Woodroaches (*Parcoblatta*) comprise a group of several species of native outdoor cockroaches, mostly found under the bark of dead trees (thus the name). They may come indoors or to lights and are usually medium sized, thin and without conspicuous patterns.

## Glossary of Useful Terms

---

**arthropod** – an animal with a hard exoskeleton, several to many jointed legs, body divided into segments, and lacking blood vessels (open circulatory system); includes insects, spiders, crustaceans, etc.

**antenna (pl. antennae)** – the pair of sense organs on the head of many arthropods (absent in arachnids); in insects can be different shapes including clubbed, thread-like and comb-like forms

**cercus (pl. cerci)** – the usually paired (three in silverfish and a few other insects) “tails” on the end on the abdomen; sometimes modified like those forming pincers in earwigs

**chelicerae** – the mouthparts of arachnids; the fangs of spiders are attached to these structures

**nymph/larva** – young insects are called different things depending on the group; many insects (for example grasshoppers, cockroaches and true bugs) have young that look like the adults, but without wings and are called nymphs; insects that go through complete metamorphosis have young (larvae) that look very different from the adults (think of caterpillars versus butterflies)

**ocellus (pl. ocelli)** – the simple eyes of an insect; they are made up of a single lens and are smaller than compound eyes; they are usually arranged in

**pronotum** – the section on top of the front part of the thorax; it is often large and noticeable in insects like beetles and cockroaches

**tarsus (pl. tarsi)** – the “feet” of insects; in some groups, like beetles, the number of segments in each foot may aid in identification