

Identification of Cockroaches (Blattodea)

Ecology and Life History

Cockroaches are among the most common insects and rank high on the homeowner's list of pest problems. Based on fossil evidence, roaches are known to have been present on Earth for over 305 million years. There are approximately 3,500 – 4,000 known species of cockroaches in the world; 55 of which live in the United States. They have a worldwide distribution and because they have adapted so well to man's environment there are probably more now than ever.



The cockroaches, often known as “waterbugs”, are scavengers who feed on animal protein and vegetation. In nature, cockroaches are most abundant in tropical and sub-tropical climates and generally live outdoors or in forest regions. The outdoors species do not come inside the home, and usually do not develop large populations inside homes, but often die or migrate outdoors. Heated buildings meet the temperature and humidity requirements of this organism.

Only a few of the cockroach species found in the United States routinely enter and infest our dwellings. Cockroaches are more common in the southern United States. The most common of these are the American Cockroach, Asian Cockroach, Australian Cockroach, Brown Cockroach, Brown-banded Cockroach, Field Cockroach, German Cockroach, Oriental Cockroach, Smokybrown Cockroach, and the Woods Cockroach. In some parts of the United States, one species may be more important than another. Certain other species may infest homes or other buildings, but will generally be found in very localized situations or under other unusual circumstances.

Biology and Life Cycle.

Cockroaches develop by gradual metamorphosis and have three life stages: egg, nymph and adult.

Egg Stage:

Adult females produce small, bean-shaped egg capsules. Most species of cockroaches will lay eggs in an ootheca (egg case) that is either deposited on or under suitable substrate, or carried attached to the genital region until just prior to hatching. The ootheca is formed in the female and as it exists it is stamped into shape by the ovipositor valves, and hardens on being exposed to air. The shape of the ootheca is often species specific. The egg stage lasts from a few weeks to a few months. The young are active from hatching and resemble the adults, but are usually lighter in color and lack wings.



In some species females carry around the ootheca for the entire embryonic development. Although the majority of cockroach species lay their eggs externally (in oothecae), there are some in which egg development is internal. Internal egg development can be divided into three main categories:

- **False Ovoviviparity** – The ootheca is produced inside the female but instead of being laid, it is retained in a uterus or brood sac where the eggs develop. This is the main form of reproduction in the family Blaberidae (Cape Mountain cockroach) but has also been recorded rarely in the Blatellidae (German cockroach).
- **True Ovoviviparity** – This form of reproduction is different from false ovoviviparity in that an ootheca is not formed. Instead, eggs pass from the oviducts into the uterus where they lie in no particular order and undergo embryonic development.
- **Viviparity** – Viviparity is only known in the genus *Diploptera*. The eggs are small and have insufficient water and yolk to complete development. They are kept inside the uterus within an incomplete oothecal membrane and their embryos absorb water and dissolved proteins and carbohydrates that are produced by the uterus.

Nymph Stage:

They hatch more-or-less simultaneously from the ootheca by swallowing air and inflating themselves, in this way splitting open the two halves. The young cockroaches develop through a number of nymphal instars, which may range from 2 to 12 depending on the species and may take from a month or so up to 12 months to reach maturity. The nymphs are similar in general shape to the adults but are smaller, lack wings and genitalia are undeveloped.



Adult Stage:

Depending on species, adult cockroaches can range in size from 3 mm to at least 65 mm long. In some species males and females look superficially similar but in others the adult females are winged and the adult males wingless. However, most mature roaches with wings will rarely fly. Their flattened bodies and long, spiny legs enable them to run rapidly and to squeeze into narrow crevices and other dark hiding places.

As a general rule, Cockroaches prefer to live near a daily supply of water. They can live without food for up to a month, but they can only go without water for approximately a week.

Cockroaches are suited to live in the cracks and crevices of your household, especially the kitchen. This habitat also provides higher humidity and is a good collecting place for food. Cockroaches domestic diet preferences are starches, sweets, grease, and meat products.

In a pinch they can get along on dairy products, beer, any kind of baked goods, glue, hair, skin flakes, dead animals, etc.

Besides being so adaptable they are also very transportable. Besides houses, apartments and other buildings they have been found living in airplanes, submarines and aircraft carriers.

Identifying Cockroach Species.

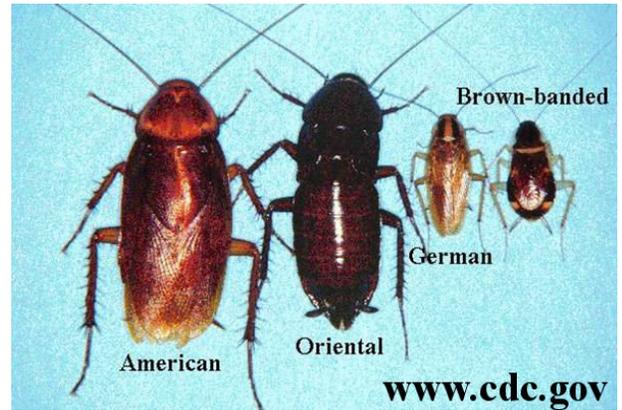
All cockroaches have the following characteristics:

- Oval and flattened shape.
- The thorax is covered by a large plate (the pronotum), which extends partly over the head.
- Chewing (mandibulate) mouthparts.
- Compound eyes and 2 simple ocelli like spots.
- Two pairs of membranous wings when present. The forewings are more sclerotised than the hind wings. Wings are folded left over right when at rest.
- Prominent cerci.
- Long antennae.

American Cockroach (*Periplaneta americana*).

Characteristics

- American cockroach is the largest of the structural roaches.
- Growing to a length of 1 ½ to 2 inches.
- Also known as the waterbug, and in some areas of the U.S. the palmetto bug.
- Reddish-brown with a light yellow band around the edge of the head shield.
- Reddish-brown wings and light markings on the thorax.
- Both sexes have well-developed wings, but the males wings extend beyond the abdomen; seldom fly.
- They are capable of gliding flights.
- Nymphal cockroaches are smaller than adults, glossy, reddish to blackish brown in color and less fully winged.



Life Cycle and Reproduction

- Female needs to mate only once to produce many egg capsules. Each capsule contains an average of 13 eggs.
- Adult female usually drops her egg capsule within a day after it is formed.
- The egg capsule is often placed near a food or water source, or in a location where it can be covered with miscellaneous debris.
- Occasionally, she glues the capsule to some surface with secretions from her mouth.
- Egg capsules are formed at about 1 per week until about 15 to 90 capsules are produced.
- Capsule may be deposited outdoors in moist wood, in cracks in bark or in whorls of plants.
- Nymphs are grayish brown and molt 6 to 14 times before reaching maturity.
- The nymph stage varies from about 6 – 12 months.
- The adult female, under ideal conditions, can live 14 to 16 months. Males live for a shorter period.

Habitat

- Very aggressive.
- Prefer warm temperatures around 84° Fahrenheit and do not tolerate cold temperatures.
- Commonly found in warm, moist situations; hiding in dark shaftways, basements, moist sites in kitchens, bathrooms, steam tunnels, sewers and even in crawl spaces under buildings.
- Often live out of doors in alleys, lawns, decayed trees and plants.
- Enter and thrive in homes, commercial establishments and other buildings, which provide favorable shelter and an ample food supply.

Diet

- Scavenger; eats almost anything.
- American cockroaches will feed on almost anything but prefer decaying organic matter. They are also attracted to sweets, bookbindings, clothing and starchy items.
- They can survive two or three months without food but will die in about a month without water.

Asian Cockroach (*Blattelle asahinai* Mizukubo).

Characteristics

- Identified as a newly introduced species in 1986, heavily spreading and infesting the southeastern United States.
- About 1/2 to 5/8 inch (13 to 16 mm) long.
- Light brown to tan in color, except for two dark longitudinal bands on the pronotum (the dorsal area behind the head).
- Nymphs are typically pale along the abdomen's lateral margins.
- The wings of the Asian cockroach are usually longer and narrower.
- Identical in appearance to the German cockroach, but has different behavior.
- The main morphological differences between the Asian and German cockroaches are the shape of a groove in one segment (eighth) of the abdomen and in the shape of the tergal glands in the males.
- Good flyer and attracted to exterior and interior lighting, especially in your homes at night.
- The most accurate method of species identification is gas chromatography, an elaborate chemical test.

Life Cycle and Reproduction

- The life cycle of the Asian roach is very similar to that of the German cockroach.
- Females have a lifetime reproductive potential for producing approximately four egg capsules, each containing 35 to 44 nymphs. Asian cockroach egg capsules are smaller than the German's, but they average the same number of eggs.
- Nymphs take approximately 67 days to reach adulthood.
- Adult females can then live for 104 days and adult males can live for 49 days.
- Females can produce their first egg capsule 13 days after reaching adulthood, and can drop another 20 days later.
- Adults are abundant February through May and again August through September. Nymphs predominate May through August.
- The life expectancy of adult Asian cockroaches is much shorter than Germans, mainly due to increased environmental exposure. As a result, most females bring only two egg capsules to maturity.

Habitat

- A rural and suburban pest that mainly infests single-family, suburban houses and yards.
- Prefers to infest shaded and moist areas in the landscape, grassy areas and leaf litter.
- Typically becomes most active just at dusk, remaining so for a few hours.
- Commonly considerable nuisances, often seen flying indoors into TV screens, onto people, into backyard barbeques, etc.
- Once inside your home, their survival is poor like other outdoor cockroaches.

Diet

- Feeding behavior is similar to other cockroaches, in that they are omnivorous.
- The adults have been found feeding on the honeydew of aphids on citrus trees, and on the flowers of other plants during the night.

Australian Cockroach (*Periplaneta Australasia*)

Characteristics

- Similar in appearance to the American cockroach.
- Adults are rarely more than 1 ¼ - 1 ½ inches long.

- Nymphs are slightly smaller.
- Light reddish-brown and can be distinguished by prominent ivory-yellow circular bands along the outer front edge of either wing, and by a prominent dark spot in the center of the head.
- Nymphs are marked with distinct splotches of yellow on the dorsal side of the thorax and abdomen.
- Wings of both sexes cover the abdomen.

Life Cycle and Reproduction

- Adult females drop their egg capsule in a crack, crevice or other hidden area shortly after it is formed.
- Eggs hatch about 30 days after the egg capsule is dropped.
- Immediately after hatching or molting the nymphs are white, but the cuticle soon darkens to the normal color.
- There are approximately 24 eggs per capsule, but only about 2/3 of this number usually hatch.
- Nymphs take nearly 1 year to develop to adulthood.
- Egg capsules are dropped at about 10-day intervals.
- Adult Life span: 4-6 months



Habitat

- Likes warm, humid environments and are often found in kitchens, restaurants, bakeries and food storage areas.
- Nymphs prefer temperatures, which are warm, 30° C (86° F).
- Ideally they prefer to be in warmer areas rather than the American cockroach, but will survive in slightly cooler areas.
- Nymphs and adults move about under loose bark and in moist decaying vegetation.
- Usually found in the South, but has been found in greenhouses, zoo buildings, and houses in the northern states.

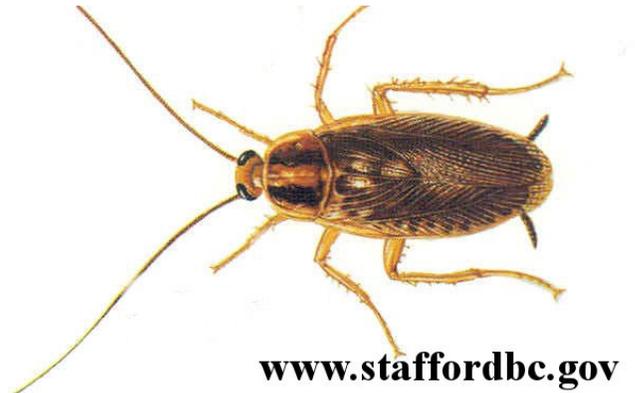
Diet

- Feeds predominantly on plant materials, although it will feed on various starchy materials in homes.
- Apparently more vegetarian than the other cockroaches.

Brown Cockroach (*Periplaneta brunnea*).

Characteristics

- First reported in the United States in 1907 in Illinois.
- Adult is reddish-brown.
- 1 ¼ - 1 ½ inches (33 to 38 mm) long.
- Other than in Illinois, is well established in numerous states throughout the Southeast, from Florida to Texas.
- Often mistaken for an American cockroach, except it has a broader body and less distinct markings on the thorax.
- Upon close examination of the cerci (a pair of dorsal appendages at the posterior end of the abdomen) the two species difference is evident.
- The last segment of the cerci is short and blunt, when compared to that of the American cockroach.
- At maturation, the color fades to a reddish brown, with the lateral and posterior margins of the segments retaining the darker brown coloring.



Life Cycle and Reproduction

- Capable of reproducing parthenogenetically (without fertilization by a male), but the success rate for hatching and maturation is low.
- Life cycle requires 339-351 days to complete.
- Egg capsules contain an average of 24 eggs each.
- The oothecae turn black in color soon after they are deposited.
- The egg capsule is normally glued on a wall near the ceiling, usually in open places in either homes or commercial buildings, preferably cement or plaster, rather than wood.
- Each ootheca may contain 21 to 28 eggs, and one female may produce 32 individual oothecae during her lifetime.
- Undergoes simple metamorphosis. Development time, from egg to adult, ranges from 7 to 11 months depending on temperature and other abiotic factors

Habitat

- Found mostly in the South, from Texas to Florida, but some sightings have been made in northern states.

- Occurs mainly outdoors, under the bark of trees, mulch, crawl spaces, greenhouses and in sewers.
- In the South, they are associated with trees, particularly palm trees.

Diet

- Normally feed on plant materials.

Brownbanded Cockroach (*Supella longipalpa*).

Characteristics

- Light gold to glossy dark brown, 1/2 to 5/8 inch long.
- Transverse yellow bands across the base of the wings and across the abdomen.
- Wings of adult males cover their abdomen, while the females' wings are shorter.
- Yellow bands across the back are more pronounced on nymphs than on adults.
- They have two pale brown bands on the wings and the pronotum is clear.
- These cockroaches are quite active, and the adult male flies rapidly when disturbed.
- Both adults and nymphs may jump to escape danger.



Life Cycle and Reproduction

- The adult female carries her egg capsule for only a day or two before gluing it to a protected surface underneath or inside furniture, in a closet or on the ceiling in a darkened room.
- Can also be found in television and other appliances.

Habitat

- The brown-banded are more apt to be found in homes, apartments, hotels, motels, nursing homes and hospitals than in restaurants, grocery stores and other commercial establishments.
- They occupy dry locations within a building.

Diet

- Prefer starchy foods and appear to have lower water requirements than other cockroaches.

- Found on ceilings in dark or dimly lit rooms, behind picture frames, light switches, upper walls of cabinets and closets, or on undersides of furniture and inside upholstered furniture.
- Found in so many locations, they are more difficult to control.

Field Cockroach (*Blattella vaga*).

Characteristics

- About ½ inch.
- Grayish to olive-brown with two brown to black stripes on the shield-shaped section behind the head.
- Very similar to the German cockroach, but can be distinguished by a blackish area on the front of the head, extending from the mouthparts to between the eyes.
- Slightly smaller and more greenish-brown in coloration than the German cockroach.
- Not repelled by light, can often be seen during the day.

Life Cycle and Reproduction

- Adulthood can be reached in about 3 months.
- Females carry their egg capsules until they are ready to hatch.
- There are usually 30-40 eggs in each capsule, with a maximum of 48.
- The average number of nymphs hatching is 30.
- The average incubation period is 28.4 days.
- Females at room temperature may produce an average of 4-5 capsules.
- Nymphs mature to adults in 103 days.

Habitat

- Distribution is from California to Texas.
- Normally lives outdoors occupying areas under stones, leaves, plant debris, clump of earth and similar locations.
- Occasionally will wander into homes during early summer when it is hot and dry.

Diet

- Feeds largely on decomposing vegetation and is common in irrigated areas.
- During the drier part of the year, it temporarily may come into the house in search of moisture.

German Cockroach (*Blattella germanica*).

Characteristics

- Adult German cockroach is light brown, 1/2 to 5/8 (17 mm) inches long, head shield has two dark stripes, which run length wise, fully winged, but rarely fly.
- Nymphal German cockroaches are wingless and nearly black with a single light stripe running down the middle of the back.
- Flattened, oval shape, spiny legs, and long, filamentous antennae.
- Males can be distinguished from females by a tapering shape of the abdomen.



Life Cycle and Reproduction

- Produces more eggs per capsule.
- Egg capsules are light tan.
- Has a developmental period as short as 2 months.
- Troublesome infestations can develop rapidly from a few individuals.
- This is the only domestic species in which adult females carry egg capsules protruding from the abdomen until eggs are hatched.
- Few eggs will hatch, if capsule is detached from female more than a day or two before hatching normally takes place.
- Female may produce 4 to 6 cases during her lifetime, each containing 30 to 40 eggs.
- It takes approximately 3 months to reach adulthood.
- Life span is about 200 days.



Habitat

- Most common roaches found in houses and restaurants.
- Only live with humans, no “wild” populations.

- These cockroaches thrive in all types of buildings, but are found most often in homes, apartments, condominiums and commercial food establishments.
- Usually enter homes with food items from grocery store.
- Seek dark shelters near moisture and food.
- Can appear in bedrooms when food is scarce.

Diet

- They eat food of all kinds and may hitchhike into the house on egg cartons, soft drink cartons, sacks of potatoes or onions, used furniture, beer cases, etc.
- If water is present, adults can live about a month without food, but young nymphs will die of starvation within 10 days.
- Without food or water the adults will die in about 2 weeks.

Oriental Cockroach (*Blatta orientalis*).

Characteristics

- Also known as “water bugs” or “black beetles”.
- Adult oriental cockroaches are glossy dark brown to black.
- Females may be nearly 1-¼ inches long, while males are 1 inch long.
- Male’s wings cover most of the body, while female’s shorter wings are reduced to mere lobes.
- Neither sex can fly. These cockroaches are rather sluggish and do not move very fast when disturbed.
- Nymphal cockroaches are smaller than adults, dark brown to black, and have wing stubs without definite veins.

Life Cycle and Reproduction

- Adult female oriental cockroach usually carries her egg capsule for about a day, then drops it or attaches it to a protected surface near a food supply.
- Appear to have a seasonal cycle in their development.
- Few live adults are found throughout the year. If nymphs have not reached maturity by late fall or early winter, their development seems to slow considerably and maturity is not reached until spring.



- In spring, they migrate from buildings to the outdoors where they spend the summer months.
- In fall, the next generation tries to find shelter indoors where they can spend the winter.
- Natural mortality usually reduces the number of adults in the population during the summer, fall and winter.
- The developmental period is from 1 year to as long as two years.
- After maturity oriental roaches can live for as many as 180 days.

Habitat

- Usually found in the southern portion of the United States.
- Generally live in moist areas, but can survive in dry areas if they have access to water.
- Prefer cooler temperatures around 75°F and can survive over winter in protected areas outdoors where temperatures average 40 to 45° F.
- Common in basements, crawl spaces, cracks and crevices of porches, foundations, and walkways adjacent to buildings.

Diet

- Feed on a wide variety of plant and animal material.
- Often found feeding on garbage, sewage and decaying organic material.

Smokeybrown Cockroach (*Periplaneta fuliginosa*).

Characteristics

- Closely related to the American cockroach but are distinguished by their smaller size.
- Adult is slightly more than 1 inch long and is a uniform, very dark brown (mahogany) to black.
- Head shield is a solid dark color.
- Both males and females have wings longer than their bodies and are capable of flying or gliding.
- Nymphs are smaller than adults and have only partially developed wings, with long antennae, which are white at the tip.



Life Cycle and Reproduction

- Adult females usually carry their egg capsules for a day or two before attaching them to the outside surfaces of buildings and other protected sites near the ground.
- Egg capsules contain 24 eggs and are dark-brown to black.
- Their life cycle is similar to other Periplaneta species, except that the average adult life span is less than the American cockroach.
- In a protected area, they will live for about 200 days at room temperature.

Habitat

- Common throughout central Texas and eastward, along the Gulf Coast, throughout Florida and up the eastern seaboard.
- These cockroaches live primarily outdoors and prefer woods, leaf litter, trash piles and other humid sites with abundant organic matter.
- Hide under rocks, ground cover and building materials.
- May enter homes with infested firewood during seasonal migrations.
- These species are most commonly found in South Texas.

Diet

- Normally feeds on plant material, but it can feed on almost anything that other cockroach species feed on once inside a dwelling.
- Has been known to feed on decaying organic matter.

Woods Cockroach (Parcoblatta)

Characteristics

- Small, usually not more than 2/3 inch long.
- Adults are dark brown with the sides of the thorax and the front half of the wings margined with yellow.
- Male's wings are longer than the body, females cover only 1/3 to 2/3 of the abdomen.
- Males are strong fliers, females do not fly.

Life Cycle and Reproduction

- Egg capsules are produced during the warm months and are deposited loosely behind the loose bark of dead trees, fallen logs or stumps.
- Rarely breed indoors.

Habitat

- Widely distributed in the eastern, southern and Midwestern states, up to Canada.
- Nymphs and adults are usually found outdoors beneath loose bark in woodpiles, stumps and hollow trees.
- Do not infest houses-they are simply casual or accidental invaders.



Diet

- Feed primarily on decaying organic matter.

Damage Caused by Cockroaches

Damage to Food: Health Problems

Cockroaches cause no structural damage, they do, however, pose a potential health problem to humans.

- Scavenging behavior lends them to potentially contaminate human foodstuff.
- They feed on almost anything of plant or animal origin, fresh or spoiled.
- They can carry contaminating organisms on their legs.
- Thus, a roach going from a garbage can to a fruit bowl or silverware drawer has the potential to pass these contaminants to you.

Food contamination

1. Allergic reactions

- Many people have allergic reactions to roach excrement and molted skins.
- Common reactions are rash, watery eyes and sneezing.

- It is important to note, however, that roaches are rarely connected to an illness of a severe nature or disease epidemics.

2. Cockroaches can also foul food

- They secrete a nasty-smelling liquid material.
- If populations are high this fetid odor may permeate food or even the room.

Dwelling Interiors

The American and Oriental roaches are responsible for most of the feeding damage on book covers and paper products.

- Large roaches have strong, chewing mandibles and bite off bits of cover and paper.
- Begins at the edges of magazines and paper products.
- Resembles mold at a distance.
- Feeding will often remove the surface layer and begin to break into the fibers of the cloth cover.
- American roaches may leave behind pellet-sized excrement on or around the products on which they are feeding.
- Pellets are very distinctive in shape and will be the color of the material on which they have been feeding; most of the time pellets are dark in color.
- A comparison of house mouse and American cockroach droppings indicates:
 - a. American cockroach droppings are uniform, blunt-ended with longitudinal ridges.
 - b. House mouse droppings are irregular and tapered with no ridges.

Lawn and Ornamental

American and Oriental Cockroaches are very common pests of African Violets and cause a lot of damage.

- They feed on both the foliage and flowers of African Violets
- Sometimes devouring entire blooms and eating large chunks from leaves

Distinguishing Symptoms

- Not flowering, blooms are being eaten
- Visible insects

Other Symptoms

- Leaves are damaged, leaves are eaten
- Leaves have holes in them, appear to have been eaten
- Flowers are damaged, have holes in them

Oriental cockroaches feed on all kinds of filth, rubbish, and other decaying Organic matter. It is especially fond of garbage and the contents of discarded tin cans

- If water is available, it can live for a month without food.
- Without water, they die within two weeks.
- Most important aspect of the cockroach damage derives from their habit of feeding and harboring in damp and unsanitary places such as sewers, garbage disposals, kitchens, bathrooms, and indoor storage areas
- Filth from these sources is spread by cockroaches to food supplies, food preparation surfaces, dishes, utensils, and other surfaces
- Cockroaches contaminate far more food than they are able to eat

Cockroaches in general produce odorous secretions from various points in their bodies

- Such secretions can affect the flavors of various foods.
- Secretions may result in a characteristic odor in the general region of the infestation.
- Disease-producing organisms such as bacteria, protozoa, and viruses have been found in their bodies

Principal Diseases Transmitted by Oriental Cockroaches

- Different forms of gastroenteritis (food poisoning, dysentery, diarrhea, etc) appear to be the principal diseases transmitted.
- Organisms are carried on their legs and bodies and are deposited on food and utensils as they forage.
- Cockroach excrement and cast skins also contain a number of allergens, to which many people exhibit allergic responses such as skin rashes, watery eyes, congestion of nasal passages, asthma and sneezing.