1)Class: Arachnida Order: Uropygi Common Name: Whipscorpion Metamorphosis: None Mouthparts: Chewing & Sucking	 Photo: DB Richman, NMSU.

The common name for the order is 'whipscorpion.' The best known whipscorpion and the largest species in the Order occurs in New Mexico, other Southwestern states and Florida: *Mastigoproctus giganteus*, also known as the vinegarone or vinegaroon. Fully extended, a large adult can be 6" or longer. While this arthropod somewhat resembles a scorpion, compare the photo above to a scorpion, noting the distinct differences:

1. The whipscorpion has a long, string-like, multi-segmented 'tail' on the end of the more elongated, flattened, broader abdomen, BUT no stinger. The scorpion's abdomen is also broad and flat where it joins the cephalothorax, but the 'tail' is shorter, thicker (actually 5-segmented) and DOES HAVE a stinger on the tip. For most common species, the scorpion's stinger looks like a sharply pointed 'fish hook' or a 'comma.' No comparable structure is on a whipscorpion's tail.
2. Lacking antennae, the first of 4 pairs of legs on the whipscorpion is very slender, considerably elongated and covered with receptors for touch and probably taste and smell. Whipscorpions tap and touch the substrate with these thin legs repeatedly as they explore their environment and hunt. Scorpions also lack antennae but their 4 pairs of walking legs are similar in length and thickness.
3. The whipscorpion's small mouthparts are flanked by stout, more cylindrical pedipalps with small terminal 'claws.' The pedipalps catch, hold, crush and sometimes tear apart prey including insects, spiders, other arthropods and probably small lizards. Scorpion claws are enlarged and prominent whereas the segments joining them to the cephalothorax are usually slender and longer than wide.
4. If a live whipscorpion is threatened or startled, the tail is quickly stiffened and raised perpendicular to the substrate when---POOF---a spray of vinegar-smelling fluid is released. A threatened scorpion curls the tail up and over the back, raises and opens the claws and stings in defense.

Whipscorpions usually are nocturnal predators of insects, spiders and occasionally small vertebrates such as lizards. By day, whipscorpions often hide under debris on the ground. Females carry their fertile eggs in a membranous sac under the abdomen; hatchlings ride on the back of the female for a short time before dispersing. Most commonly seen during summer monsoon season, these unique predators are usually encountered outdoors in the garden or landscape. Whipscorpions are harmless to humans; they can be maintained in terraria, sometimes for several years, on a diet of crickets and other insects.

2)Class---Arachnida

Order---Araneae

Common Name---Widow Spider

Metamorphosis---None

Mouthparts---Combined Sucking And Chewing

(Left) Male & female widow spiders. (Right) Female and egg sac. Photos: D.B. Richman, NMSU

While there are 5 known species of widow spiders (Genus *Latrodectus*) in the U.S., the western black widow, *Latrodectus hesperus,* is the species most likely to be encountered in New Mexico. Adult females are extremely variable in color and pattern, ranging from black through dark brown or even plum-colored to burgundy. Dark brown Western widow females may have banded legs, but most have unbanded black legs. These females can have a classic and complete red hour-glass on the underside of the abdomen, have the mark broken into two triangles (just the sand in the hour-glass), or even be totally without markings except for a small reddish area near the pedicel (connection of abdomen and cephalothorax). On the dorsal abdomen, immature females often have white curlicues and a row of red dots; they may sometimes have red or rarely canary yellow markings as well. Occasionally, adults retain these markings. The considerably smaller male Western widows are mostly white with banded legs and an orange hour-glass marking. All stages of both sexes are sleek, smooth-bodied spiders.

Outdoors, Western black widows nest from ground level to well over 10 feet in trees or hedges. They can be found in utility housings, wood or firewood piles, crawl spaces under mobile homes or houses, protective tangles of weeds, grasses or other plants and similar habitats. Indoors, they are most likely found in cluttered or undisturbed areas such as closets, storage areas, garages, etc. or under shelves or heavy furniture, wherever dusting and sweeping are difficult or rarely done.

Silken webs made by both sexes are messy in appearance; they make a faint crackling sound when a finger, broom or stick tears through them. The spiders emerge from day-time hiding places to sit on or near their webs at night, waiting for prey. Adult females lay their tiny eggs in off-white, opaque silken sacs the sizes of grapes; these egg sacs are often seen in or on the webs of females. Hatchlings commonly disperse by producing long single strands of silk which act like parachutes in the breezes (ballooning).

Widow spiders are known for their potent venom, a neurotoxin. Typical symptoms of envenomation include profuse sweating, hypertension, rigid abdominal muscles, facial twitching, swollen lymph nodes, weakness and nausea. Antivenin is readily available in medical facilities to treat widow bites; no human deaths have been attributed to widow bites since the 1940s.

3) Class: Arachnida Order: Araneae Common Name: Recluse Spiders Metamorphosis: None Mouthparts: Combined Sucking and Chewing	
	

Top right: 'Head' of a brown recluse spider, showing 3 pairs of simple eyes. Lisa Ames, University of Georgia, Bugwood.org

Lower left: Brown recluse spider. Lower right: Apache violin spider. Both Lower Photos: DB Richman, NMSU.

The Recluse Spiders are a second family of medically significant spiders that occur in the lower to middle elevations of New Mexico (the other family is the Widow Spiders). While not aggressive, these spiders can bite when antagonized or threatened, and their venom does have tissue-killing enzymes. The Brown Recluse likely occurs on NM's eastern border with Texas; it has been verified in Roswell. At least two other species also occur in NM; 13 are known in the U.S.

While very many species of spiders are brown in color, very few are actual members of the Recluse family---and only one is THE Brown Recluse. Again, subtle characters distinguish these spiders from members of other families. The bodies of Recluse Spiders are either all tan or with a tan cephalothorax and brownish-gray oval abdomen. A darker brown 'violin mark' occurs on the top of the cephalothorax; the 'body' of the violin points forward, but the 'neck' aims back toward the abdomen. Note the 6 simple eyes arranged in 3 pairs, another distinguishing feature. Adults and immatures have very short setae (hairs) on their bodies and bases of the legs; magnification generally is needed to see these.

Preferring dark, undisturbed habitats, these spiders create small webs to capture small arthropods. While the brown recluse is considered a dangerous, venomous spider in North America, spider specialists have determined that the frequency of envenomation has been exaggerated, mostly because what are assumed to be spider bites are misdiagnosed. Unless the spider that actually bit the victim is captured for identification, a variety of serious medical conditions can present initial symptoms similar to what is assumed the bite of a recluse. Recluse venom typically causes small, dry, irregular necrotic lesions that heal very slowly. These bites are likely prone to secondary microbial infections that progress rapidly and very dramatically, requiring extensive and sometimes complex medical treatments.

4) Class---Arachnida

Order---Araneae

Common Name---Jumping Spider

Metamorphosis---None

Mouthparts---Combined Sucking and chewing

Photos above and below: D.B. Richman, NMSU. Photo above: J.Berger, bugwood.org

Photo: popterser, Wikimedia.com

While some species of these interesting spiders resemble ants, and some look like beetles, the species you are likely to see in New Mexico look more like typical spiders with two body regions (cephalothorax and abdomen) and 8 legs. Two very useful features are fairly easy to see on larger spiders with magnification and good lighting. Jumping spiders have 8 simple eyes arranged in 3 or 4 rows; the 'anterior median eyes' are substantially larger in size than the other eyes and face forward, like the headlights on a car. Second, the chelicerae or 'jaws' are often iridescent blue or green. Jumping spider bodies are fairly stout while their legs are shorter and generally heavier than many other common spiders. The bodies and sometimes upper parts of the legs are often covered in very short, dense hairs. While adult females of most common species are grayish-tan, with or without subtle geometric patterns visible dorsally, adult males of some species have bright or contrasting color patterns---e.g. black with white markings or black with bright reddish-orange covering the dorsal parts of the body. Some of the tiniest jumping spiders---2-3mm long---are clothed in iridescent rainbow colored scales.

The size and orientation of the 'anterior median eyes' significantly aids a jumping spider in its cat-like hunting behavior. Upon sighting a likely prey insect nearby, the jumping spider stalks it, jumps on it and kills it with a quick bite. These spiders do spin silk---mostly as single filaments that allow them to escape threats by rappelling to safety, or---by climbing back up the filament---to regain their former perch; they do not make webs. Depending on species, females may lay their eggs in a small silken sac or cover them with a thin sheet of silk. Females guard their eggs and hatchlings at least through their first molt, when they disperse.

Some of the larger jumping spiders like the black and white (male) *Phidippus audax* may bite people. Bites from a jumping spider are initially painful, with some redness and swelling around the wound, but then become itchy. Simple first aid treatment is usually adequate.

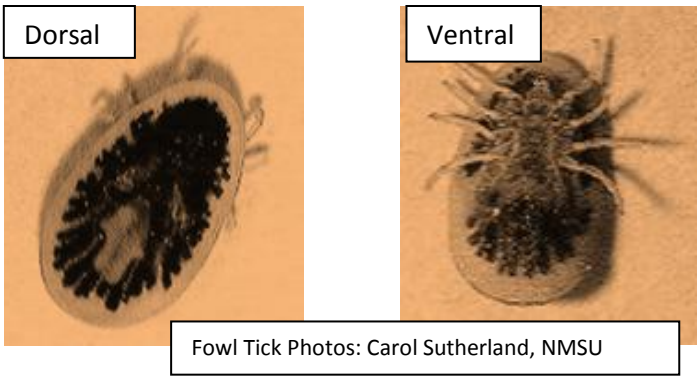
5) Class: Arachnida

Order: Acari

Common Name: Soft Tick

Metamorphosis: None

Mouthparts: Sucking



Fowl Tick Photos: Carol Sutherland, NMSU

Left: Spinose ear tick adult & nymph (r); both dorsal views. Photo: Mat Pound, USDA ARS, Bugwood.org

Right: Spinose ear tick, ventral view. Photo: Oklahoma State Univ., Coll. Vet Health & Sci.

Mouthparts of Soft Ticks are located on the underside of the uniformly leathery body. Body surfaces of different species can appear granulated, wrinkled, dimpled, or covered in short spines. Larger nymphs and adults of some species (e.g. fowl ticks) can be 3/8-1/2" long, although most species are smaller and some associated with bats are minute. The life cycle includes egg, 6-legged larva, two to several 8-legged nymphs and the adult. Host ranges and feeding habits vary considerably by species.

Poultry producers will be most familiar with fowl ticks on chickens. Growing as long as 1/3," these ticks repeatedly attack roosting birds at night, sucking enough blood to weaken and kill the birds. Fowl ticks can transmit at least two microbial diseases to poultry. Fowl ticks will bite humans also and may become significant pests inside homes located under or near roosts for gregarious wild birds such as starlings, blackbirds or grackles. Fowl ticks have an amazing ability to survive without food or water, sometimes for several years.

The spinose ear tick is widely distributed within the western U.S., Canada, Central and South America, Africa and India. Although often associated with cattle, these pests will feed on lymph and blood in the ears of many different animals including horses, mules, sheep, dogs, cats, other domestic animals, deer, coyotes, rabbits, mountain sheep, other wild animals, and rarely---people. The non-feeding adult ear tick has a rough, granulated appearance to its oval, dimpled body. Larvae and nymphs are covered with numerous short spines, giving the pest its common name and helping the immature stages stay firmly embedded in the soft ear tissues of their hosts as they suck lymph and blood. Dense ear infestations cause severe inflammation, waxy discharge, excessive discomfort and ear rubbing. Secondary bacterial infections may cause deafness from invasion of the middle ear and perforation of the eardrum. In such cases meningitis and death may result.

6) Class: Arachnida Order: Acari Common Name: Hard Ticks Metamorphosis: None Mouthparts: Sucking	 Brown dog tick. Engorged female, unengorged female and male. Photo: Kent Loeffler, cals. Cornell.edu  Male & female American dog tick. Photo: Center for Disease Control Archive, Centers for Disease Control and Prevention, Bugwood.org

Hard ticks are external, blood-feeding parasites of various vertebrates. Distinguishing features include a hard dorsal plate (the scutum) visible on the upper surface of their one-part bodies; cephalothorax and abdomen are fused into an oval or elliptical, highly flattened body when not engorged with blood. The scutum covers the entire back of the adult male (above, left photo) but only the forward part of the adult female's back (above, right photo). Also, the mouthparts of hard ticks project forward from the body and are visible from above (compare to 'soft ticks'). Male hard ticks in the U.S. usually are less than 3/16" long, although engorged adult females of the same species can be 5/8" long or more, and round.

Feeding habits and host preferences among hard ticks vary considerably by species; some tick species accept a variety of hosts while records for other species suggest specificity for certain groups of mammals, birds or reptiles. The brown dog tick is commonly encountered on dogs in New Mexico.

Hard ticks are the most important vectors of disease for domestic animals and second to mosquitoes as vectors of disease to humans. In the Western U.S., the most important tick-borne diseases include Rocky Mountain spotted fever, relapsing fever, tularemia, Texas cattle fever and Colorado tick fever; so far, Lyme disease does not seem to be established in New Mexico, but cases have been reported from New Mexicans visiting other parts of the U.S. where infection occurred. Females of some tick species can transmit viruses to their eggs, making the offspring vectors; this is called 'transovarial transmission.' 'Tick paralysis' is a potentially fatal condition caused by the injection of salivary enzymes ('venom') into the base of the skull by certain species of engorging female ticks.

Female ticks lay their eggs on the soil or another substrate. These hatch to become 6-legged 'larvae' that immediately begin to 'quest' for a host by climbing nearby grasses, stems, shrubs or other vertical surfaces where they wait---sometimes for weeks or months (as long as 8 months!)---for a potential host to pass. Once on board a host, the ticks usually keep climbing to reach feeding sites along the upper spine, nape of the neck or head where the host can't reach or dislodge them. Common species of Hard Ticks take only one blood meal in each of their three life stages: 6-legged larva, 8-legged nymph and 8-legged adult; each blood meal may last for several days to a week or longer, especially in cold weather. After feeding, immature hard ticks usually---but not always---drop off their hosts to digest their blood meals, molt and quest again for another host.

7) Class---Insecta

Order---Thysanoptera

Common Name---Thrips

Metamorphosis---Simple

Mouthparts---Chewing & Sucking

Both photos: Alton N. Sparks, Jr., University of Georgia, Bugwood.org

Thrips are very small to minute (e.g. 1-3mm long), splinter-shaped insects that should be familiar to anyone growing a crop or tending a vegetable or flower garden. (Note: 'Thrips' is one of those unusual words, like 'deer,' that can be singular or plural.) Probably the most common pest thrips in New Mexico and much of the United States is the Western Flower Thrips (WFT) (the larger of the thrips in both photos above). An excellent hitchhiker on fresh fruits, vegetables, flowers, transplants and nursery stock, these tiny creatures also are lightweight enough to be blown many miles on the winds. Adult WFTs are yellow or tan with 2 pairs of fringed, straplike wings that give the order its name: '*thysano*'='fringe', '*ptera*'='wing.' The mouthparts are unusual in that only one mandible (left one) is present; the thrips uses this mandible to slash at succulent plant parts. When sap oozes from the wound, the thrips sucks it up through a conical proboscis located posteriorly on the ventral surface of the head. Plant cells are destroyed as thrips feed, producing minute white or yellow spots on affected plant parts as well as minute black dots of thrips frass (waste). Onion thrips (the other smaller thrips in both photos above) is very common wherever onions or garlic are grown.

Thrips populations can be extremely high, significantly reducing growth rates of host plants, as well as damaging buds, flowers, fruit and seed such that it is severely distorted, unpalatable or unusable if it even survives to maturity. Some species, such as WFT, are important vectors of certain plant diseases such as tomato spotted wilt virus, a pathogen that infects young thrips larvae as they feed; when they become adults, they transmit the pathogen to a variety of common garden vegetables, some flowering ornamentals and crops like alfalfa.

Many species of thrips are parthenogenetic (females can lay viable eggs without mating); in others, males are smaller than females. Several to many generations may be produced annually, especially in greenhouses or protected growing areas. While well known as crop pests, WFTs can also be cannibalistic when food quality is reduced and thrips populations are very high. Still other species of thrips feed on spores or pollen grains. Some species, like the 6-spotted thrips, are important predators of insect eggs, small insects and mites.

8) Class: Insecta Order: Hemiptera Common Name: Mealybug Metamorphosis: Simple Mouthparts: Sucking	 Citrophilus mealybug. USDA ARS Photo Unit, USDA Agricultural Research Service, Bugwood.org	 Madeira mealybug. Sally Tucker, Bugwood.org

Aptly named, mealybugs are small, soft-bodied insects covered in mealy or filamentous wax secretions produced by pores on the upper surfaces of their bodies. Most common species are barely 1/8” long at maturity. The body of the female is elongate-oval, segmented and has well developed legs. Some species lay eggs while others give live birth to their offspring. When eggs are laid, they are placed in loose, cottony wax. Mealybugs may be found on almost any part of their host plant.

Over 200 species of mealybugs are known from North America. Several, like the long-tailed mealybug, are important pests of foliage and ornamental plants, especially in greenhouses. The citrus mealybug is a serious pest of citrus trees as well as greenhouse plants. The obscure mealybug is a widespread pest of both woody and herbaceous plants.

Plants with mealybug infestations are likely stressed and not growing well. Some unsightly mealybug colonies may be visible on the surface of the plant but, in many cases, the bulk of the population is almost completely hidden in cracks and crevices in the bark, in bud scales, the axils of leaves or even the basal roots. Some mealybugs like the tamarisk manna scale famously produce copious honeydew. This species is believed to be the producer of the manna mentioned in the Bible.

Left untreated, mealybugs can cause foliage to turn yellow and fall. Plant growth slows, parts of it may wither and the plant dies or falls victim to various microorganisms that kill it. In the meantime, the mealybugs crawl away, perhaps finding other potential host plants.

9) Class---Insecta

Order---Hemiptera

Common Name---Big-eyed Bug

Metamorphosis---Simple

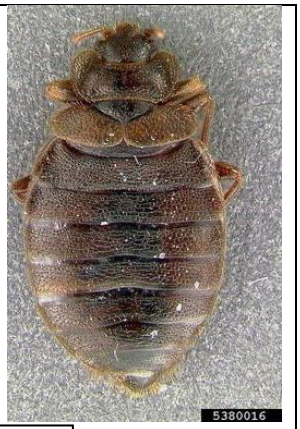
Mouthparts---Sucking

Photo: Bradley Higbee, Paramount Farming, Bugwood.org

Upper Photo: Russ Ottens, University of Georgia, Bugwood.org
Lower Photo: Julieta Brambila, USDA APHIS PPQ, Bugwood.org

With their exceptionally large, kidney-shaped compound eyes, it is obvious why these small (about ¼" long) insects are called 'big-eyed.' Both nymphs and adults are well known, effective, solitary predators of a variety of arthropods, attacking eggs, hatchlings and any other living stage they can find and overpower. On occasion, they also feed on plant sap, another source of moisture and nutritents. Both adults and nymphs are commonly found on or near the ground where they actively search for prey.

Again, these are solitary predators, readily distinguished by those huge, 'overhanging' compound eyes. They might be confused with 'false chinch bugs,' highly gregarious plant feeding pests that also invade homes and other sensitive locations. While adult false chinch bugs are about the same size as big-eyed bugs and share many features of 'true bugs', false chinch bugs are 'seed bugs' that have considerably smaller compound eyes when viewed from above.

10) Class: Insecta Order: Hemiptera Common Name: Bed Bug Metamorphosis: Simple Mouthparts: Sucking	   All photos: Gary Alpert, Harvard Univ., Bugwood.org

Bed bugs are highly flattened, flightless, reddish-brown, blood-feeding bugs up to 3/8” long. Long considered an indicator of dirty conditions and poorly educated people, more recently the pests have surged in numbers nearly world-wide, and demonstrated no respect for nationality, age, sex, economic class, family status, or cleanliness standards. The pests are excellent hitchhikers on luggage and other belongings stowed in hotel or motel rooms, dorms, barracks, summer camps or other temporary or permanent housing. They also are excellent at hiding by day, finding temporary or permanent harborage in beds and bedding, in adjacent beds, other bedrooms or other rooms of a house or apartment complex. By hitch hiking on victims’ clothes, they can be spread to sofas, chairs and other non-bedroom furniture, and even seats on buses, trains and airplanes.

When in need of a blood meal, all stages of nymphs and both sexes of adults emerge at night to hunt. Body heat, scent, and carbon dioxide in the victim’s breath all stimulate the pests to approach, probe the skin one or two times and then settle to feed for up to 30 minutes before retreating to a crack or crevice to rest and digest. Bed bugs typically take one blood meal per instar (growth stage of the nymphs), molting before feeding again. Adults may feed multiple times over the courses of their adult lives. The sleeping victim initially is unaware of the pests since the saliva of bed bugs contains enzymes that not only keep blood from coagulating but also anesthetize the wound. Bed bug bites usually swell, turn red and itch, although responses to bites vary considerably among people. Whether or not bed bugs transmit various common human pathogens is unclear and still being investigated. Control is often difficult, complicated and expensive.

Bed bugs, specifically *Cimex lectularius*, have been significant blood-sucking pests associated with humans probably since the last Ice Age when people first inhabited bat caves in Asia Minor and the eastern Mediterranean. Nine other known species in the same genus are blood feeders on bats.

11) Class: Insecta Order: Hemiptera Common Name: Whiteflies Metamorphosis: Simple Mouthparts: Sucking	 Whitney Cranshaw, CO State Univ, Bugwood.org	 Scott Bauer, USDA Agricultural Res Serv, Bugwood.org

Whiteflies are the bane of existence for houseplants as well as popular home garden vegetables such as tomatoes and various cucurbits. Several species also are major plant pests in greenhouses, hoop houses and other growing areas---including open fields. At least one whitefly is a foliar pest of mulberry trees. Adults of most species are 2-3mm long, with soft greenish-yellow bodies partially covered by two pairs of opaque wings dusted with white wax, a product of numerous glands on the insect's integument. While many insect species are identified based on features shown in the adult stage, whiteflies are an exception in that features of their scale-like nymphs are used for species identification.

Nymphs and adults suck the sap of their plant hosts, reducing growth and productivity while showering the plant and surroundings with honeydew; sap removal, toxins in the pests' saliva and transmission of certain plant pathogens all can weaken host plants, make them sticky and unproductive, unsalable and ultimately kill them. Greenhouse, silverleaf and sweet potato whiteflies are widely recognized by farmers, gardeners and researchers as some of the most difficult to control and most damaging pests for their various hosts.

Many species of whiteflies lay their eggs in spiral patterns on the undersides of host plant leaves. First instars, called 'crawlers', have 3 pairs of stubby legs; they disperse short distances from where they hatched to places on the host, usually the undersides of leaves, where they will settle to feed and molt for the duration of their lives as immatures. Winged adult whiteflies usually 'billow' off infested host plant foliage when they are disturbed, a sure sign of whitefly infestation.

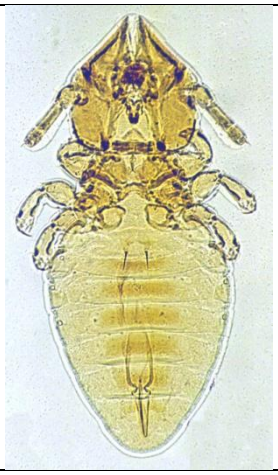
12)Class Insecta

Order: Phthiraptera (thir-RAP'-tera)

Common Name: Chewing Louse

Metamorphosis: Simple

Mouthparts: Chewing



Chicken feather louse Deer biting louse Chicken head louse

Photos: (left) k-state. edu (middle)www.pdis.org/ImageLibrary (right): insects.tamu.edu/extension/youth

Chewing lice (louse, singular; lice, plural) are flat-bodied ectoparasites of warm-blooded animals, especially birds and some groups of mammals. Many of the described species of these lice not only have definite host preferences for certain species, but also preferences for colonizing particular parts of the host's body. Chewing lice feed on skin scales, dried blood and either bits of feathers or hair, depending on host type. Affected hosts often develop a bedraggled appearance with 'balding spots' and patches of skin irritated by constant preening or scratching. Heavily infested animals often appear run-down and emaciated. If not actually killed by the lice, these animals are still easily infected by a variety of pathogens.

Adult chewing lice are usually 3mm long or less. Females of most species may lay 50-150 eggs each, nearly always attaching these eggs ('nits') to the hairs or feathers of the host. Eggs usually hatch in about a week. Nymphs begin feeding on the host animal immediately, passing through three nymphal instars on the way to becoming permanently wingless adults. One life cycle can be completed in a month or less. Lice can be transferred from one host to another by physical contact or by other insects (e.g. flies) accidentally carrying hitch-hiking lice.

Common biting lice for farm or ranch animals include several species of body or feather lice affecting chickens, ducks and turkeys and at least six species of biting lice attacking cattle, goats, sheep, horses, dogs and cats. Numerous species of wild birds, especially pigeons, and game animals are also common hosts. Fortunately for us, no chewing lice species have been associated with humans. Those who handle poultry or other infested animals may get chewing lice on themselves, but the lice do not stay long. Control of these pests typically involves dipping or dusting the animal with an appropriately labeled insecticide.