

**Earth Friendly**  
**Pest Management**  
**For**  
**Your Home and Garden**  
**and for**  
**Commercial Establishments**

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## **FORWARD by Ryan Clarke**

Every year, approximately 5.1 billion pounds of pesticides are used in the United States alone. Pesticides are intentionally toxic substances associated with birth defects, mutations, reproductive effects and cancer. Exposing our families to these pesticides makes them especially vulnerable to loss of brain function, damage to their reproductive systems, childhood leukemia, soft tissue sarcoma, neuroblastoma, Wilms' tumor, Ewing's sarcoma, non-Hodgkins lymphoma, brain cancer, colorectal cancer and testes cancer. Many "inert" ingredients found in pesticides are suspected carcinogens and have been linked to central nervous system disorders, liver and kidney damage, birth defects and many other serious threats to our health. The warning label on Roundup is 10 pages alone! So why do we continue to use them? Is it possible the loss of brain function associated with pesticide use is what is driving our decision to continue using them? 5.1 billion pounds are being dumped on our gardens, lawns, trees, shrubs, and making their way into our rivers, our water supply, our food supply and our bodies. We are slowly poisoning ourselves and our environment.

96% of all fish analyzed in major rivers and streams contain residues of one or several pesticides. 100% of all surface water contains one or more pesticides. Pesticides, and especially herbicides, are contaminating our water supply. Removal is costly and difficult, and not always 100% effective. Pesticides are suspected to be the cause of amphibian declines and mutations as well as the rapid decline of our most important pollinator, the honey bee. With the honey bee threatened, major crops and wildflower populations reliant upon them will no longer exist. No more bees, no more pollination, no more food, no more us! This chain reaction will have a devastating effect upon the world as we know it.

So, why risk harming yourself, your family, your pets and future generations when you can make environmentally-friendly decisions? Fortunately, Richard Fagerlund has compiled a book of tips and tricks you can use that are simple to follow and do. I have read Richard's newspaper column for years and have turned to him for many times over the years for tips and advice online. Richard has been in the pest management industry for over 40 years. His knowledge and experience with conventional pesticides combined with his love for the quality of life for humans, animals and keeping our planet healthy gives him a unique perspective on eco-friendly pest management. He knows what works best and has the background to prove it. By not using harmful pesticides, you not only encourage natural predators such as ladybugs, chalcids, ichneumon wasps, lacewings, lizards, birds, frogs, hoverflies, brachonids and praying mantis to thrive, but you'll also grow in harmony with nature. Knowing your tomatoes are grown free from powerful environmentally destroying chemicals will give you and your family peace of mind. I have worked in the greenhouse industry for over a decade and have recently become an avid home gardener. Having a tool like this book available is invaluable to those concerned about keeping your family safe and keeping the environment free from toxic chemicals.

Organic and natural gardening is no harder and maybe even easier than conventional gardening. We need to educate ourselves, our friends, our family and our neighbors about these methods. It may seem easy to go to the store and buy a jug of chemicals and dump them everywhere, but in the end, we will only be hurting ourselves. Natural pest control is less expensive than purchasing pesticides and is safe for everyone, for wildlife and the environment. We are caretakers of this planet and treating your garden with the most natural methods available will not only benefit you and your family, but also impact future generations. So, put away those chemical insecticides and herbicides and learn how to garden in harmony with nature by using Richard's non-toxic and homemade remedies.

## INTRODUCTION

This book is written to help everyone understand the so-called pests in their area and how to control them if they are really pests and not just passing through. The book is written in a scientific format using scientific entomological names for all the pests so anyone can check them out for more information if they want. It is easy for everyone to understand as well. For instance, exterminators often tell people they have little black ants because the ants in their house are small and black. That could be any of several common pests, including *Tapinoma sessile*, *Monomorium minimum* or *Tetramorium caespitum*. I will discuss each ant in detail and tell people how they are different and how they need different methods of control. In some cases I will lump several closely related pests together as their habits are the same. In these cases, I will only use the generic name followed by spp., which means several species. For instance, *Crematogaster* spp., means there are several species of acrobat ants that are household pests. Some insect common names make sense, like the harvester ants, which harvest seeds. Others like the acrobat ants make less sense. Ants don't work in circuses. Pavement ants are well named because they live under concrete slabs in a home. Big-headed ants are not well named because 90% of the big-headed ants have normal sized heads! All groups of insects will be followed by their scientific Order name such as Ants (Hymenoptera). Families will also be noted so the reader can see the relationship between different insects. Formicidae is the family of ants. All family names end in "idae". Subfamilies are smaller groups within a family. There are several subfamilies of ants in the book. All subfamily names end in "inae". The reader can Google any of the entomological names and find more information on the insect they are interested in.

There is a lawn and ornamental pest management section as well. In this section I will describe the habits of each bug and what they infest. Some control methods will be listed in this section as well. It will some furnish recipes for some pest management solutions. Not all the recipes are scientifically tested, but people have said they work. Scientific testing is important in some areas, but not necessarily pest management. I want to make the point that most people can recognize and control their own pests without using pesticides and that there are only a few cases when they will need to use an exterminator. There are good companies in the pest control industry and quite a few more that probably should be in another line of work. This includes the "spray and pray" people who like to spray pesticides and pray it kills something. We need to eliminate this group from using pesticides. There is a section in this book on how to hire a competent pest management company. There is a section on the Precautionary Principle which should be used in commercial establishments.

There are also sections on Multiple Chemical Sensitivity (MCS) and Invisible Biting Bug Syndrome (IBBS). Both of these problems are very common. Both are completely caused by exposure to pesticides and other chemicals.

What is a pest? A pest is an organism so designated by the pesticide industry to promote the use of their chemicals. In reality, most so-called "pests" are nothing more than nuisances we occasionally encounter in our homes or business. Bed bugs don't carry any diseases and are not dangerous, but they are one of the most profitable "pests" on the planet. They are nothing more than a nuisance you may end up sleeping with some night. Cockroaches are described by the pesticide industry as being filthy disease-laden bugs that will make you sick. Except in a few cases in ghetto type environments, that is not the case at all. Call your local hospital and ask them how many people they have due to cockroach related diseases. None. Ants are a nuisance in most cases but some species like fire ants can be dangerous and should be considered a pest. Some other species, such as Argentine ants, that have enormous colonies and can overrun a house should also be considered pests. Most species can be controlled with simple baiting solutions. There are other real pests such as certain species of

mosquitoes that can carry diseases. Some fleas and ticks can carry diseases. Also some rodents not only carry diseases such as hantavirus, but carry ectoparasites that can cause problems. Termites can do serious damage to your home and some insects will destroy clothing or get into food. These can be considered pests. But most of the so-called “pests” we spray with dangerous pesticides are really no more than nuisances. We need to look at our household invaders and decide, are they dangerous, or are they simply a nuisance. Then act accordingly. Even in the case of real pests, most can be controlled without dangerous pesticides.

Chances are that no matter what you do, you will see an occasional insect or spider or something else. There are several things you can do to minimize the chances of seeing these intruders. First, proper sanitation is important. Keep debris on your property down to a minimum. This includes dead leaves, mulch, wood, garbage, manure, pet feces, weeds, boxes, grass clippings, and anything else that isn't necessary and that bugs would find attractive. Also, install door sweeps on your outside doors if they do not close tightly. If you can see light under the doors, insects can crawl in. Raise any garbage containers off the ground and place them on concrete pads, bricks or pallets. Routinely clean any gutters you may have. Inspect the outside of your house and seal or caulk any cracks in the foundation or voids around pipes or any other areas which will give bugs access to your house. Of course, make sure all of your screens are in good repair. Do not let any branches from nearby trees or shrubs touch your roof. Prune them back if necessary. If you live in an area where cockroaches are prevalent, make sure all of your drains are closed at night. If you don't have a drain cover, you can put a Ziploc bag filled with water on the drain to keep the roaches from coming up and into the house. Cockroaches are most active from 10 PM to 2 AM.

My resume is next, so you know my qualifications in writing this book.

## **RESUME**

I have been in the pest control industry since 1972. That is a long time ago. I started working for King Pest Control based in Hollywood, Florida as a route man. I knew nothing about bugs at that time. I probably couldn't tell a cockroach from a caterpillar. My training lasted about 2 days and then I was on my own. I was told to go into the home and spray the baseboards with a pesticide. I was using a B & G sprayer, which is still the one most often used in the industry.

In the early years, I was in sales and service for several companies in Florida. I moved to Texas and became a branch manager for Truly Nolen at their office. We moved to New Mexico where I worked for several more companies over the years, including Orkin and Terminex. I also did pest management at the University of New Mexico for 12 years until I retired. I became a Board-Certified Entomologist while on campus. That actually doesn't mean anything, as all you do is take a test and pay a fee. I did teach several graduate courses in entomology in the Dept. of Biology, even though I don't have a degree. The university appreciated the knowledge I accumulated over the years. I also wrote a few scientific papers on campus. Here are several papers I wrote, two with co-authors on campus and one with an entomologist from the University of Texas in El Paso. The last one about fleas and lice has me as the second author, but I conceived the paper and wrote most of it. Since it was published by a government agency and one of their folks, Paulette Ford, was a co-author, they put her as the senior author. The two unpublished manuscripts are listed as references in other works, along with the notation “Available from the author.”

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When I retired from campus in 2006, I became a pest management consultant. I try to teach people how to do their own pest management, or how to pick a good company if they want one, which is the purpose of this book.

## COMMON HOUSEHOLD PESTS

### Bristletails

Silverfish and firebrats are the only two insects from this order that become pests and firebrats are not common in homes. True bristletails (Machilidae) are almost always found outside.

#### **Silverfish (Lepismatidae – *Lepisma saccharina*)**

Silverfish are small insects, up to  $\frac{3}{4}$  inch long and silvery in color. They are covered in scales, which will be hard to see with the naked eye, and they have three appendages protruding from their abdomen.

They feed on fungus, sugar and starch products such as flour, glue and paste. They can feed on some synthetic fabrics and cellulose which includes paper, books, photographs and cardboard boxes. They will also feed on dead insects. Silverfish are attracted to moisture so you want to make sure you fix any plumbing leaks as soon as possible. They are frequently found in crawl spaces under a home if it is damp there. You have to make sure no moisture is available for these insects and try to keep items such as paper, books, and food products as far from the floor as possible.

You can trap them by putting some flour in a glass jar and wrapping it with duct tape so they can climb up the sides. They will get in the jar but will not be able to get out. Niban Bait is a good commercial bait for controlling silverfish.

## **Cockroaches (Blattodea)**

First, I have to state that there is some disagreement among entomologists as to the proper name for the order of cockroaches. Sometimes they use Blatarrria or Blattoptera. Some even use Dictyoptera.

You can help prevent cockroaches from coming into your home by inspecting all incoming food products, all boxes, and any used furniture or appliances for the presence of cockroaches or their egg capsules. Do not store paper bags anywhere in the kitchen. Seal any holes or crevices around plumbing under sinks and behind toilets. Regularly vacuum and clean floors under the kitchen appliances. Keep all of your drains closed at night to prevent them from coming up from the sewer system. Also, get your attic and crawlspace, if you have one, dusted with food-grade diatomaceous earth.

There are a number of good baits available for controlling cockroaches. You can put equal amounts of baking soda and sugar out in flat containers and they will take it. Make a roach dough by combining ½ c. powdered sugar and ¼ c. shortening or bacon drippings. Add ½ c. onions, ½ c. flour and 8 oz. baking soda. Add enough water to make a dough-like consistency. Make balls of bait and put them wherever you see roaches. However, there is a very good roach bait available commercially. It is Niban Bait and it is made from boric acid. It would probably be easier to get this product and use it if you are in an area where roaches are very common. You can't buy Niban in stores, but it is available online. One good supplier is [www.pestcontrolsupplies.com](http://www.pestcontrolsupplies.com). When using Niban, put it under and behind appliances, around hot water heaters, inside lower cabinets, in the garage and other places roaches will hide.

German roaches, Oriental roaches, Australian and American roaches all originated in North Africa. German and Oriental roaches traveled on Phoenician or Greek vessels to Asia Minor and areas around the Black Sea. Then they moved from Russia to Western Europe and eventually to America. I don't know where or why they got their common names. It is thought the American cockroaches came to America from Africa on slave ships.

### **American cockroaches (Blattidae - *Periplaneta americana*)**

This common roach feeds on a wide variety of plant and animal material and it is commonly found in sewer systems. It will come up the drains at night and enter the living space of a home. It also likes the homes that have crawl spaces under them. In some parts of the country, particularly the southeast, they frequently live outside. This is the largest of the home-infesting roaches in the country. It will reach a little over 1 ½ inches in length. It is a dark brown with yellowish band around its thorax (section behind head).

One beneficial aspect of this cockroach is that it will feed on bed bugs. Of course most people don't want roaches in their bed feeding on the bed bugs that are feeding on the humans. Niban Bait is a very good commercial bait that works well on controlling these insects. Other methods of control are discussed above. American roaches are called "Palmetto Bugs" in Florida. They can fly unlike most roaches.

### **Australian cockroaches (Blattidae - *Periplaneta australasiae*)**

The Australian cockroach is similar to the American cockroach, but is slightly smaller. The yellow markings on the thorax are much more distinct on this roach and it has a yellowish marking on the outer edge of each wing or the “shoulder”. It is found from central Florida to east Texas in the south. It has been found in some northern states, but usually in greenhouse environments. They normally infest the attics and crawl spaces of homes and then wander in the living areas for food. I would suggest dusting attics and crawl spaces with food-grade diatomaceous earth. Niban Bait works well with these roaches.

### **Oriental cockroaches (Blattidae - *Blatta orientalis*)**

Oriental cockroaches or “waterbugs” are found throughout the United States but they aren't seen very often in the southeastern states. They are about an inch long. The female is all black and the male has two brown wing tips, but it cannot fly. These roaches are common in sewer systems and will come up the drains into the homes. They are also common under ground debris outside and love stacks of firewood. These roaches will readily take Niban Bait as well as the homemade baits discussed above.

### **Turkestan cockroaches (Blattidae - *Blatta lateralis*)**

Turkestan cockroaches are closely related to Oriental roaches. They are about an inch in length with color variations between the male and female. Males are red/brown with pale or white lateral stripes on the ventral side of the wing base. The male also has wings that cover the entire abdomen. Females are dark brown in color with short lateral white dashes at end of the wing. The female wings are very short in comparison to the male and do not cover the entire abdomen. They are common in north Africa and the Middle East and probably came to America with military personnel returning from that area in the 1970s and 1980s. Although they are found in the southwest from California to Texas, they usually do not infest homes. They can be found in sewer systems, water meters, compost piles, potted plants and large cracks in pavements. Niban Bait is a good product for controlling these insects.

### **Brown-banded cockroaches (Blatellidae - *Supella longipalpa*)**

Brown-banded cockroaches are about a half inch long. Males are light brown while the female has dark brown wings. Both sexes have light colored bands running across the wings. These roaches do not require as much water as German roaches and will often be found in bedrooms and living rooms. The roach baits described above will work on these insects.

### **German cockroaches (Blatellidae - *Blatella germanica*)**

The German cockroach is the most prolific of the roaches. It is small, dark brown with two distinct black stripes on its thorax. It will feed on almost anything edible and a lot of things we wouldn't consider edible. They go from egg to adult in as little as 45 days and, if left unchecked, can severely infest a home or business. Usually they are most commonly found in kitchens and bathrooms. When you are controlling German roaches, you should use German Roach Pheromone Traps as well as some of the baits. The traps will attract and catch the roaches. They are available online. One good supplier is [www.pestcontrolsupplies.com](http://www.pestcontrolsupplies.com).

German cockroaches are also believed capable of transmitting *staphylococcus*, *streptococcus* and *coliform* bacteria and are known to be responsible for many allergy and asthma problems. In addition, German cockroaches have been implicated in the increase of asthma and the spread of typhoid, AIDS, dysentery and leprosy organisms. Living roaches, dead roaches, roach feces, saliva, cast skins, cockroach eggs and their decaying body parts all contain allergens, can contaminate the air with aeroallergens and cause allergic reactions in people.

## **Ants (Hymenoptera)**

Ants are the most common household pests in the country. They create more calls to pest control companies than most other pests combined. For being so noticeable and so persistent in your homes, they are not readily recognized beyond five generic group names: sugar ants, grease ants, piss ants, red ants and black ants. One supervisor with a very large pest control company narrowed it down to two groups; inside ants and outside ants. That is a little bit simplistic.

Ants are very successful social insects. They have small to very large colonies that contain workers (which are sterile females), queens (one or many), secondary reproductives that take the place of a queen that passes on and winged reproductives (known entomologically as alates) whose sole responsibility is to start new colonies. Many of our most troublesome pest ant species are transplants from some other part of the world. These ants are usually very hard to control; hence they are very successful in establishing new homes. White-footed ants have successfully become established in Florida and have turned up in several other states as well. They were originally described from Indonesia. Ghost ants, who originated in the tropics of either Asia or Africa are also doing well in this country. Pharaoh ants are major pests in many large cities and they are not native to this country either. They probably originally came from Africa. The imported fire ants have wreaked havoc in many parts of the southern United States since they arrived in this country from South America. Probably the most persistent household ant species in this country is the Argentine ant. They originated from Argentina, although Argentineans claim they came from Brazil to their country. In any event, if they came from Brazil, they entered Argentina as nameless little vagabonds because they were given their identity in 1868 by a fellow named Mayr who described the species from samples from Buenos Aires, Argentina. Most of our domestic species that have always made their home with us are much easier to control. For some reason they don't appear to be as resilient as our imported species.

Some species of ants have small colonies with single queens while others have large or very large colonies with multiple queens. This information is important to know when you are trying to control them. Some species of ants have all the workers of one size, or close to one size. These ants are called "monomorphic." Other species have two different size workers, each with its own job in the colony. They are referred to as major workers and minor workers. Ants in this category are called "dimorphic." Finally some species have multiple sized workers, all of which have certain functions in their society. These ants are called "polymorphic." The largest workers in a polymorphic society are called major workers as are the larger workers in a dimorphic society. When trying to identify ants it is always best to use the major workers if they are present as most ant identification keys are based on these workers.

Ants eat a variety of material including insects, the honeydew secretion of aphids and similar insects, and in your home, almost anything you eat. If you know what kind of ants you are dealing with, it is much easier to get them under control by using their dietary habits against them. This is much better than spraying pesticides around which the ants will learn to avoid but that will kill other insects, including beneficial species. Of course there are exceptions to the dietary control rule and we will address them as we cover each ant in the "species accounts."

Ants didn't come into your house just to make your life miserable if you are a homeowner (or renter), nor do they get any joy out of making some pest control professionals irritated over their lack of success in controlling them. Ants are simply trying to make a living, just as you are and we are. Sometimes their lives and our lives conflict and we have to deal with them. Hopefully you will have a

better understanding of them as you use this book and will use the least toxic methods possible when such conflicts manifest themselves.

There will be times when you as a homeowner (or renter) will need professional help in dealing with them. If and when that time comes, there are plenty of pest management professionals who will be able to assist you. Make sure when you pick one that they properly identify the ants as you did. If a professional says you have sugar ants, grease ants or any of the other stupid generic names, then call someone else.

Ants are generally very beneficial and interesting insects. If you can live with them, we recommend you do so. Whether you decide to live with them or make them move on, you should know who they are, why they are there and what to expect from them. In other words, you need to identify them, if for no other reason than normal curiosity.

There are several things you can do to prevent ants from entering your home. The first step is exclusion. Go around the outside of your home and inspect it very carefully from an ant's point of view. Ants can sense cool air and aromatic odors emanating from your home and will try to gain access. Check around the house at ground level and look for cracks in the foundation, voids around pipes, areas under stucco, weep-holes in bricks and similar areas that ants can use to gain entrance. All these areas need to be sealed, caulked, screened or otherwise altered to prevent ants from using them to get into your home. Check around your windows and doors to make sure they close tightly. If the doors aren't tight, you may have to install door sweeps on them. Check your bushes, shrubs and trees to make sure you don't have any branches touching the roof. Don't stack firewood, bricks or anything else next to your house or ants and other insects may find a good place to nest. If you have bushes or shrubs next to your house, periodically inspect them for aphids, scales and similar bugs as ants are attracted to the honeydew they produce. The ants will get on the plants and eventually find their way into your home. Don't put flagstone or flat boards on the ground too close to your home or some species of ants will nest under them. On the other hand, mound-making ants will generally stay outside. They rarely leave their complicated and efficient home life in the mound to enter homes. If you don't want the ants making mounds in your yard, you can flood the nests with club soda or with white vinegar or food-grade diatomaceous earth (DE). If you use the DE, mix 4 tablespoons per gallon of water. You can also use 1 gallon of orange juice diluted with 2 gallons of water and a dash of soap. If you prefer, you can also spread dry instant grits on the mound. The ants will eat it and not be able to digest it and die.

You can repel ants with a wide variety of products, including cinnamon, baking soda, Comet Cleanser, cedar oil, medicated baby powder, Tide, talcum powder, chalk, coffee grounds, borax, garlic, broken egg shells, bone meal, black or red pepper, peppermint, paprika, chili powder and mint leaves. If you have ants going into your hummingbird feeder, you can put duct tape, sticky side out, on the wire holding the feeder, to deter them.

The best way to control them when they get in your home is with baits. Different species have different food preferences. Some species will take a wide variety of baits, while others are more fussy. You can use a bait containing half baking soda and half powdered sugar and place it where you see foraging ants. You can also use instant grits, which they can't digest or use 2 packets of Equal or Nutrasweet, which contains aspartame, wherever you see the ants.

If the ants have a preferred food in your home, such as apple sauce, peanut butter, canned cat food, Karo Syrup, jelly or similar products, you can mix in small amounts of boric acid or borax or

aspartame. Mix about 2% of any of these products in the food. Make sure you keep these baits away from children and pets. If the ants are dying near the baits, you are making it too strong and need to make a fresh batch with less boric acid or borax.

Here is a recipe for effective, homemade ant baits/traps that use borax. It attracts ants looking for either moisture or food. You will need: 3 c. water, 1 c. sugar, 1 tsp. borax or 2 tsp. food-grade DE or aspartame, 6 small screw-top jars with lids, such as jelly jars covered with masking tape, which will enable the ants to climb up the side. Mix the sugar, water and borax (or food-grade DE or aspartame) in a bowl. Loosely half-fill the jars with cotton balls or pieces of sponge or wadded paper towels. Pour up to ½ cup of the sugary mixture over the cotton balls, saturating them. Make several small holes in the lid. Screw the lids on the jars tightly.

If you smoke, always wear plastic gloves when making ant baits or they will sense the tobacco smoke on the baits and not go to it. Ants do not like cigarette or cigar smoke.

### **Subfamily PONERINAE**

Ponerine ants are very primitive in structure and habits. The workers are almost as large as the queen in size and the colonies are relatively small, usually numbering a few hundred individuals. They are carnivorous as they prey upon insects and other arthropods. They dismember the prey and feed them directly to the larvae. Regurgitation (trophyllaxis) is not as important in this family as it is in more recent ants. They are mostly tropical. About 21 species inhabit the United States and a couple reach southern Canada.

#### **Asian needle ants (*Pachycondyla chinensis*)**

The Asian needle ant is small, black and shiny, quite like many other species of ants. Needle ants have a distinct constriction between the first and second abdominal segments. They also have a very large node on the petiole, which is the section between the thorax and abdomen. Unlike other ants, these ants cannot climb up glass. Put some in a glass and if they climb out they are not Asian needle ants. If they can't climb out, they may be.

Needle ants are found in 9 states on the East Coast; Alabama, Florida, Georgia, North Carolina, South Carolina, Tennessee, Virginia and also in New York and Connecticut. The records from Florida and Alabama are old and no new sightings have occurred. In the other states, the needle ants are well established and seem to be expanding.

They have very painful stings that can cause allergic reactions leading to anaphylaxis in humans. Needle ants prefer undisturbed areas like forests, but can be found in large numbers around homes.

Needle ants do not take baits readily. It is best to locate the nest, which is usually under an object such as railroad ties and ornamental stones and spray it with a good natural pesticide such as diatomaceous earth.

### **Subfamily ECITONINAE**

This is a subfamily of legionary ants. There is only one genus that is common in the United States and it is easily recognized by its very small eyes. Legionary ants are nomadic and are constantly moving. They are entirely carnivorous and they are capable of stinging.

**Legionary ants, driver ants, army ants (*Neivamyrmex* spp.)**

There are 23 species of legionary ants in the United States. One species, the black legionary ant, *Neivamyrmex nigrescens*, is found as far north as Illinois, Iowa and Nebraska. The others are found in southern states. This species is usually dark brown or black in color and very hairy.

Legionary ants are nomadic and are always moving around looking for insects, which is their primary food. They are occasionally found in yards foraging for food and will come in homes under doors, although this is rare. They will not nest in homes and will eventually leave by themselves.

Normally, no control is necessary. If you have to control them in your house, spray them with a natural product such as Greenbug for Indoors, which is made from cedar. It is absolutely safe to use.

**Subfamily MYRMICINAE**

This is the largest subfamily of ants. They are distinguished from other subfamilies in that they have two petiolar nodes on the pedicel (the segment that separates the thorax from the abdomen). Most species have functional stingers. There are eight genera of this subfamily that may be encountered in or near homes. They are *Aphaenogaster*, *Crematogaster*, *Monomorium*, *Myrmica*, *Pheidole*, *Pogonomyrmex*, *Solenopsis* and *Tetramorium*.

**No Common Name (*Aphaenogaster* spp.)**

These slender ants are very fast when running outside. Their head is longer than broad and they have large eyes. The antennal club is poorly defined and has four segments and there are spines on the thorax. This genus is widespread. *Aphaenogaster cockerelli* is common in the southwest. *Aphaenogaster lamellidens* is common in the southern states and will nest in wood. *Aphaenogaster rudis* is found in most of the eastern states from Massachusetts to Illinois south to Colorado and Florida. *Aphaenogaster tennesseensis* is found from South Dakota and Ontario, Canada, south to Oklahoma and Georgia.

They make nests in the soil and the entrance to the nest is surrounded by pebbles. They feed on dead and dying insects, parts of plants and seeds. They rarely go into homes but they may be found near buildings and they are very aggressive when they are disturbed. They cannot sting, but they will bite in large numbers.

If you find them inside, you can mix a bait with 2 tablespoons of peanut butter mixed with a teaspoon of boric acid or borax. Outside, you can use Niban Bait to control them by placing the bait around the entrance hole to their nests.

**Acrobat ants (*Crematogaster* spp.)**

Acrobat ants are found over most of the United States. There are many species of this interesting ant. If you look at the picture, you will see the abdomen (last segment) appears flat on top. It is spade-shaped when viewed from above. They have two little spines on the thorax. When they get excited they point their abdomen up in the air and run around on four legs, hence their name, “acrobat” ants. Acrobat ants are monomorphic. These ants will sting and bite when they are in large colonies. When they are in smaller colonies, they are not as inclined to sting or bite.

Acrobat ants normally feed on the honeydew secretion of aphids and related insects that infest plants near your home. They may enter your home from the roof if there are any branches touching the house or from the ground. They will get between vigas and latillas in some homes and kick out a lot of loose sawdust. It looks like they are doing damage, but they aren't. They are simply making a mess.

They will readily take sweet baits. You can make a bait with two tablespoons of honey or Karo Syrup mixed with one teaspoon of boric acid or borax. Terro Ant Bait is also very good. You can deter acrobat ants by removing any firewood stacked near the house and by making sure none of the plants near the house are infested with aphids, scales or mealybugs. Also trim any branches that are touching the house, particularly on the roof.

### **Little black ants (*Monomorium minimum*)**

Little black ants (that is their name) are very small, shiny black ants that are monomorphic. They do not have spines on their thorax. These ants are found throughout the United States and southern Canada. *Monomorium cyaneum* is very similar in appearance. It has a series of small depressions on the side of the mid portion of the thorax. *Monomorium minimum* does not have these depressions. *Monomorium cyaneum* rarely enters homes. It is usually found nesting under rocks and other ground debris in arid areas. *Monomorium minimum* is a major household pest. A Florida species, *Monomorium destructor*, can also be a major pest in homes.

Usually they nest outdoors where they can feed on the honeydew secretion of some insects, but occasionally they infest homes. In a home they will eat whatever is available, including bread, meats, sweets, fruits and vegetables. They will bite to protect themselves.

They can be controlled using a bait made from two tablespoons each of peanut butter and jelly mixed with one tablespoon of boric acid or borax. They have large colonies and the baiting process may take awhile before it is effective.

### **Pharaoh ants (*Monomorium pharaonic*)**

Pharaoh ants are very small, yellowish ants that are monomorphic. They got their name because they were originally discovered and described in Egypt in 1758. They are found in many areas of the United States. They are especially common in hotels, apartment complexes, groceries and hospitals.

They will nest in any small, dark voids such as old boxes, empty bags, stacked newspapers and even an unused salt shaker. Outdoors they will nest under objects on the ground, in potted plants, in stacked firewood or piles of bricks. They are primarily nocturnal and mainly come out to feed at night. They have very large colonies, often exceeding a quarter of a million ants and many queens. They do not swarm to reproduce as most ants do, but use a system called "budding." This is where reproductives just crawl off and mate nearby. Colonies of pharaoh ants usually contain many nests and it is essential to control all of them or you will never get rid of them. Pharaoh ants are a major pest in hospitals where they have been associated with over 20 disease causing pathogenic organisms and they often enter isolation wards, operating rooms and patient rooms where they feed on blood and blood products and then contaminate sterile areas.

Never use synthetic pesticides in trying to control these ants as all you will do is cause them to split up and you will make the problem worse. Place baits such as half and half fruit juice and aspartame in soda straws. Cut the straws into one inch segments and put the segments where you have seen the

pharaoh ants foraging. You can even tape them to the underside of tables. You can change the baits periodically by mixing two tablespoons of peanut oil, sweet syrup, jelly or honey with one teaspoon of boric acid. Place the straw filled baits as close to the nests as possible. You can also put strained liver baby food, honey or peanut butter mixed with boric acid or borax in small cups. Treat any cracks and crevices around the outside of the home with Greenbug for Outdoors or diatomaceous earth.

#### **No Common Name (*Myrmica* spp.)**

Ants in this group (genus) are small, dark-colored, have lots of groove-like indentations on the body and two well-defined spines on the thorax and the antennae has 12 segments. They differ from harvester ants (*Pogonomyrmex*) in that *Myrmica* lacks a psammophore (beard), which is present in pogos. These ants do have stingers but rarely if ever use them. The species in the photo is *Myrmica latifrons*.

These ants rarely enter homes, but may be found in yards in mountainous areas, particularly in areas near pine forests. They will nest in soil, rotten wood or under debris on the ground. They feed on insects as well as the honeydew secretion of aphids and other Homopterans. The nests are very small.

Since the colonies are small and they won't invade a home, but may be found in a yard, no control is necessary, but you should be able to recognize them.

#### **Big-headed ants (*Pheidole* spp.)**

Big-headed ants are very common. There are about 60 species found in the United States and many of them may enter homes. These include *Pheidole bicarinata*, *P. ceres*, *P. coloradensis*, *P. desertorum*, *P. hyatti*, *P. senex*, and *P. sorites*. They do not have large colonies and are not major pests. They have spines on the thorax.

These ants are dimorphic. The smaller minor worker gathers seeds and the larger major worker with the enlarged head, breaks open the seeds. The majors also function as soldiers and help protect the colony. There are many more minor workers in a colony than major workers, so you probably need to get a large number of specimens to properly identify these ants. Big-headed ants usually live outside during the warm months and move indoors in the winter.

Niban bait is a good product to use to control these ants outside. You can put some diatomaceous earth behind baseboards in areas where you see them as they often come into homes through an expansion joint between the slab and foundation.

#### **Harvester ants, agricultural ants, pogos (*Pogonomyrmex* spp.)**

Harvester ants are comparatively large, 3/16" - 1/2" long, red to dark brown or black in color and, with one exception, they have a pair of spines on their thorax. They have a stinger and will use it if disturbed. Most harvester ants have a large psammophore, or beard, of coarse hairs under their head. This is used to carry fine sand during excavation of the nest. There are about 22 species of harvester ants in the United States. Only one species, *Pogonomyrmex badius*, is found east of the Mississippi River.

They make large mounds covered in gravel which retains heat and helps incubate the eggs in the nest below. These ants feed on seeds, which they gather and store for the winter. When they swarm in the summer, they fly high and will often land on a roof to rest. In some cases the swarmers will come

down chimneys and invade homes, or even elevator shafts on commercial buildings.

When making the nest, they clear large areas of vegetation. This allows the sun to warm the ground as their eggs are just below the surface during the summer. In the winter, they move the eggs deeper in the ground. Some species have colonies that may go 12 feet deep in the ground. Harvester ants aren't aggressive, but they will sting intruders on their mounds and the stings can be painful.

The best product to use to control harvester ants is Niban Bait, a commercial grain-like bait that is made from boric acid. Place it around the entrance hole to their nest. Do not stick it in the hole or they will haul it off and not eat it.

### **Imported fire ants (*Solenopsis invicta*)**

The imported fire ant is a dark reddish-brown to black in color and they are polymorphic. They have severe stings that can cause blisters and allergic responses to the venom as well as anaphylactic shock. Over 30,000 people a year in this country seek medical attention from the sting of these ants. Their mounds can be 2 feet in diameter and a foot and a half high. A single colony can contain close to a quarter million ants. Fire ants have successfully invaded many southern states. They have been found in Florida, Georgia, South Carolina, North Carolina, Tennessee, Alabama, Arizona, New Mexico, Mississippi, California, Louisiana, Arkansas, Texas and Oklahoma. Their mounds can be 2 feet in diameter and a foot and a half high. A single colony can contain close to a quarter million ants.

Fire ants will eat both plant and animal products including rodents and some reptiles. They will feed on a wide variety of plants, including strawberries, potatoes and corn. Queens in the colony will need proteins, so when you mix baits for these ants you have to make sure they are protein-based. These ants are attracted to magnetic fields and will get in transformers, air conditioners and other electrical equipment. One good thing about fire ants is that they like to feed on ticks. If you have fire ants in your yard, you won't have ticks. They will also feed on fleas, cockroaches and several species of flies.

When you control these ants, make sure you dust any electrical equipment outside with food-grade diatomaceous earth, Comet cleaner or talcum powder. This will keep the ants out of these area. For a bait, you can mix boric acid or aspartame with sugar, jelly, honey or pet food. Mix two tablespoons of the food with one teaspoon of boric acid or two packets of Equal (aspartame). You can flood their nests with one gallon of orange juice mixed with two gallons of water and a cup of dish soap. You can also pour a couple of 2-liter bottles of Coca Cola down the mounds.

### **Southern fire ants (*Solenopsis xyloni*)**

Southern fire ants are usually dark colored, but sometimes they are bi-colored with a red head and thorax and black abdomen. These ants are polymorphic. They are found over much of the southwest United States.

They are not as aggressive as the imported fire ant (*Solenopsis invicta*), but they will sting and it is painful. They cause considerable damage to seed banks, kill newly hatched birds, girdle agricultural plants, and get into electrical equipment where it is known to have remove the rubber insulation from wires. They will infest homes where they will feed on meats, grease, butter, seeds, grains and similar products. When they enter homes, they are attracted to laundry that needs to be cleaned.

Niban Bait is effective when you have access to the colony. Diatomaceous earth behind baseboards will help keep them out if they are coming in from expansion joints. In some severe cases, you may

have to hire a competent pest management company.

### **Thief ants (*Solenopsis molesta*)**

Thief ants are very small ants that are related to fire ants, but resemble pharaoh ants. They are less than 1/16<sup>th</sup> of an inch long. The best way to tell them from pharaoh ants is to examine the antennae with a magnifying glass. The club on the end of the antennae has two segments in thief ants and three segments in pharaoh ants. Thief ants get their name from their habit of entering the colonies of other ant species and stealing their eggs and larvae for food. These ants are found throughout the United States but are more common in the east and south. They are monomorphic.

Outside they nest under debris on the ground, or under rocks, boards or logs. In a home, they will nest in wall voids and behind baseboards. They will often make themselves known in a house when another species of ant is eradicated. The thief ants were probably feeding off the other ants and when they were controlled and they had to come out and look for food. They will also feed on dead rodents, so they may convey pathogens to human food.

Baits do not work well for these ants as they don't bring enough back to the colony for it to work. If you can find out where they are nesting, you can put some food-grade diatomaceous earth in the void. Cinnamon will repel them from areas you don't want them. You can also spray the ants with Greenbug for Indoors and use diatomaceous earth in all the cracks and crevices around the outside of your home.

### **Pavement ants (*Tetramorium caespitum*)**

Pavement ants are small, monomorphic, brown to black ants covered in small stiff hairs. The head and thorax are highly sculptured, with numerous parallel ridges running lengthwise. There are two small spines on the thorax and they are brown to black in color. Pavement ants are found in the New England area, south along the Atlantic seaboard. It is very common in Washington D. C. It is found sporadically in many other areas including parts of California and New Mexico.

These ants frequently nest under concrete slabs as their name implies. They will also nest under the slab in homes and then enter the home through the expansion joints or where plumbing penetrates the slab. Once inside, they will nest inside of walls or other voids, often close to a heating source for the warmth. They can sting and bite to protect themselves. Pavement ants feed on the honeydew secretion of aphids and other insects as well as on seeds. They have very large colonies.

Pavement ants readily take baits. Mix two tablespoons of peanut butter and jelly or honey with a teaspoon of boric acid or borax. If you can find their nest, you can dust it with food-grade diatomaceous earth.

## **Subfamily DOLICHODERINAE**

These ants can be recognized by the slit-like terminal orifice at the tip of the abdomen. They also do not possess a stinger and the pedicel consists of a single segment (petiole). The antennae of all the species have 12 segments and no club at the end of it. The workers are all monomorphic and they all have a characteristic disagreeable smell, which you can detect when holding an individual between the thumb and forefinger. Most species have small nests consisting of a few hundred workers. The Argentine ants and velvety tree ants are an exception as it as they have very large colonies.

### **Pyramid ants (*Dorymyrmex insanus*)**

Pyramid ants are reddish-brown or black in color. They have a distinct pyramid-shaped projection on the back of their thorax, hence their name. It is found from South Carolina to Oregon and south. There is also a bi-colored pyramid ant (*Dorymyrmex bicolor*) found in west Texas to California.

These small ants rarely come into homes. They usually make many small mound around the yard and in cracks in sidewalks and on patios. They are often found in close association with harvester ants (*Pogonomyrmex* spp.)

They will readily take a sweet bait such as jelly or honey mixed with aspartame if they do come indoors. Terro bait is a good commercial bait. Outside pour a cup of baking soda on the mounds, wait about a half an hour and pour a cup of vinegar on the mounds. You can also pour a 2-liter bottle of Coca Cola or Club Soda down the mound. Push a stick into the mound entrance and move it around to make the hole larger before pouring in the Coca Cola or Club Soda.

### **No common name (*Forelius pruinosus*)**

Ants in this group don't have a common name. It is very similar to the Argentine ants, but have a pair of long hairs on the top of the thorax and four tooth-like projections on the mandibles. They have multiple queens. They are found throughout North America and south to Colombia.

They feed on nectar from flowers and are very common in arid areas such as desert scrub, weedy areas, grama grasslands, creosote, mesquite, cholla, juniper, sagebrush and even in pine forests. They also feed on dead insects. They nest in soil, usually in open areas but may be found nesting under stones. The nest is usually a small mound with a small entrance hole in the center, similar to pyramid ant mounds. The workers forage in groups and will frequently forage for food in the hot afternoon when no other ants are active. They occasionally find their way into homes or commercial buildings where they can become serious pests.

Sweet baits are the best method of controlling them, but it may take time as they have multiple queens and can be quite difficult to eradicate. Many pest control people confuse these ants with Argentine ants. You can treat the mounds the same way as described in treating pyramid ant mounds.

### **Argentine ants (*Linepithema humile*)**

Argentine ants are small, monomorphic and brown in color. They are one of the most successful ants species on the planet. They have huge colonies and when they move into an urban area, they displace any native ant species. Unlike other ants who fight when they encounter other colonies of their same species, Argentine ants will merge and form super-colonies, and in some cases, mega-colonies. There is one mega-colony of Argentine ants in Europe that extends over 3,700 miles and encompasses parts of Spain, Portugal, France and Italy. This mega-colony is estimated to contain hundreds of billions of ants. They came to the United States in 1891, landing in New Orleans. Since then they have spread to several other states. They were first found in California in 1905 near Ontario. Three years later they were found in Alameda, East Oakland, San Francisco, San Jose, Los Angeles, Azusa and Upland. The Argentine ant is now found in almost all urban areas of California where it is a major household pest. Besides California and Louisiana, there are records of these ants in Utah, New Mexico, South Dakota, Arkansas, Illinois, Florida, Alabama and Hawaii.

These ants have enormous colonies that often merge with other colonies. They originally came from Brazil, moved to Argentina and now they are all over most of California and some other parts of the

country as well. In New Mexico they have been documented from Albuquerque only. They have many queens in a colony and each one is capable of producing 60 eggs per day. Argentine ants are capable of transporting the causative organisms of dysentery, typhoid fever and tuberculosis because of the filthy places they may crawl through.

Nests are often found in urban habitats and it does not live in arid areas. They are very persistent house pests. When two colonies of this ant meet, they form mega-colonies and can control very large areas. Outside it will nest in exposed soil and under stones as well as in rotten wood, refuse piles, bird nests, bee hives and in dead trees. They do not swarm as many other ants do, but the winged reproductives mate in the nest. Outside they will feed on a variety of foods, including certain plants, buds of fruit trees and even ripened fruit such as figs. They also feed on the honeydew secretions of aphids, scales and mealybugs. In a home they will eat almost anything edible, including sweets, meats, pastries, fruit, dairy products, eggs, animal fats and vegetable oils. They are particularly fond of sweets. They will crawl over everything in a house, including appliances, furniture, shelves and clothing. The good news is that they do not sting. However they can bite.

Outdoors I recommend using a very good cedar product called Greenbug for Outdoors. Cedar will repel most ants including Argentine ants. Spray this around your foundation every couple of days for awhile. After a couple of weeks, spray it once a week. Soon you can do it every two or three weeks. It doesn't have the residual power of a pesticide, but it isn't dangerous either. You can also use aromatic cedar mulch which will control them for several months. Also; Remove all mulch (other than aromatic cedar mulch) from around the foundation of the building. Seal all cracks and crevices. Do not let any branches touch the building. If you find the nests outdoors, flood them with orange juice in soapy water. Argentine ant workers have a sweet tooth, so indoors you can use sweet baits. Mix two tablespoons of honey or light Karo Syrup with a packet of Equal (aspartame) or a teaspoon of boric acid or borax. However, queens also have high protein requirements so you may want to make some peanut butter or fish meal baits with boric acid or borax at the same ratio. Keep all of these baits away from children and pets.

Populations indoors are usually smaller and less active. Find the most active areas and sprinkle the areas with baking soda, Comet, Tide laundry soap, talcum powder or food grade diatomaceous earth. You should also place any of these materials in any cracks and crevices, wall voids and electrical outlets. If you see trails of ants, you can spray them with bleach or vinegar. Never spray pesticides on the ants as all you will do is kill a few and the rest will go to other areas of the house.

If the infestation is severe, you may want to treat the perimeter of your house with Termidor, which is labeled for Argentine ants. Termidor is a General Use pesticide that is available to the public. You can get it online. One good supplier is [www.pestcontrolsupplies.com](http://www.pestcontrolsupplies.com). Mix the material as specified on the label, put it in a one-gallon sprayer and spray around the foundation of your house. Don't spray more than six inches from the foundation as you don't want to kill beneficial insects in your yard.

### **Velvety tree ants (*Liometopum apiculatum*)**

These ants have large heads and a very pubescent abdomen, which gives them their name of velvety tree ants. They have enormous colonies, consisting of tens of thousands of individuals and they can be very aggressive. They can't sting, but they will bite. This ant is the dominant ants species in oak forests and if a home is in this area, it may get infested. They are found from Colorado and New Mexico west to California.

They feed on dead insects and the honeydew secretion of aphids, scales and mealybugs. They will share their nests with other species of ants. When they are found in homes, their nests may be a couple of hundred feet away from the building, which makes control difficult. The nests can be under stones or in dead trees, particularly oaks, if they are available. They usually enter homes by climbing trees and gaining access to the roof from branches touching the house.

Controlling these ants is best accomplished by finding the nest. However, that is often not possible, so the next best thing to do is to pest proof your home so they can't find their way in. Seal or screen any openings, cracks, crevices, etc. and make sure there are no tree or shrub branches touching the house.

### **Odorous house ants (*Tapinoma sessile*)**

Odorous house ants are small dark reddish-brown to black ants. When crushed they give off a pungent odor similar to a rotten coconut or rancid butter, hence their names. While other species in the subfamily Dolichoderinae give off an odor, this species is much stronger. These ants are found in all of the continental United States and adjoining parts of Canada and Mexico. They are probably the most common ant found in homes, except in areas where Argentine ants live.

They are found in a wide variety of habitats from grasslands to oak forests and into high elevation forests consisting of pines, pinyons, juniper and aspen. They do avoid very arid areas such as open desert. They have large colonies consisting of up to 5000 workers and the nests contain multiple queens. They feed on dead insects, juices of decaying fruits and vegetables and the honeydew secretion of aphids and related insects. They nest under objects such as rocks, boards, or any kind of debris. When they come into a home, they can nest in wall voids. If the house has a crawl space, they will nest in that area and come into the house to forage for food and water.

A good bait for controlling these ants indoors is two tablespoons each of peanut butter and jelly mixed with a teaspoon of boric acid or borax. A good commercial bait is Terro Ant Bait which is made from boric acid. Treat areas where they are entering your home around the outside with Greenbug for Outdoors, which is a cedar product.

### **Ghost ants (*Tapinoma melanocephalum*)**

Ghost ants are very small, have a black head and thorax and whitish abdomen and legs. They are monomorphic. They are common in Florida and Hawaii and are also found west to Texas. It is not known where they originated from, but they were described from Indonesia and have been found in many parts of the world, including Africa, Australia, New Zealand, Japan, and much of Polynesia.

These ants are highly adaptable and can nest outside or in your home. They may have several sub-colonies in one structure. They will nest in walls, behind cabinets, behind baseboards and in potted plants. They are very fond of greenhouses. Indoors they prefer sweet foods such as syrups, sugar and cakes. Outside they will feed on dead insects and the honeydew secretion of aphids.

Ghost ants do not swarm. They reproduce by budding as does the pharaoh ants. Budding occurs when one or more reproductive females leave a colony with several workers and find a new location to establish a home.

A good bait is two tablespoons each of peanut butter and jelly or honey mixed with one teaspoon of

boric acid or borax. You can put the layer of food grade diatomaceous earth on the soil of any potted plants. When you water it will mix in with the soil and remain effective.

### **White-footed ants (*Technomyrmex difficilis*)**

White-footed ants are small, black ants with white tarsi (end of legs). They are monomorphic. These ants are one of the hardest species to control. There are several reasons for this, but the primary reason is their reproductive habits seem to be designed to confuse people. Winged female white-footed ants only live a little over a year after starting a colony. When she passes on she is replaced by a wingless female who mates with a wingless male and who is capable of multiple matings. These wingless reproductive white-footed ants can comprise up to half the colony. In other words, they can reproduce faster than almost any other species of ants as they have so many queens laying eggs almost constantly. Because of their multiple queens constantly reproducing, some colonies can contain up to 3 million individual ants (and remember, half of these can be reproductives). The good news is that they don't bite, sting or cause any damage. They are simply a nuisance by their numbers.

These ants are embedded in central Florida and have also been found in South Carolina, Louisiana, California in this country and in Montreal, Quebec, Canada.

White-footed ants feed on the nectar of some plants and the honeydew secretion of aphids and similar insects. They will actually protect these insects from their natural predators. Outdoors, white-footed ants can be found under the bark of trees or even in the old galleries of termites in wooden structures. They can also live in compost piles, leaf litter, under rocks and in outdoor furniture. They can move into homes and nest in attics, under roof shingles, in walls, and similar areas. One colony can have several branches or "satellite" colonies in or around a single home.

Sweet baits will help but because of their numbers, it will take a very long time to get control. It is more important that you pest-proof your house to prevent them from getting in. Treating the perimeter with Termidor will also help.

### **Subfamily FORMICINAE**

Ants in this subfamily have a circular orifice, surrounded by hairs, at the end of their abdomen. Some species will spray a formic acid mixture at their enemies from this orifice. The antennae have 12 segments and there is no antennal club. Some species are dimorphic or polymorphic. They prefer cooler, moister areas of the state. Workers of most species tend Homopteran insects such as aphids, for the honeydew secretion. These ants cannot sting although many of them will bite.

### **Yellow ants, citronella ants (*Acanthomyops* spp.)**

Yellow ants are medium size ants yellow in color. The eyes are fairly small. If you look at the antennae, you will see the first long segment (the scape) is shorter than the head. In other ants, the scape extends beyond the top of the head. They are monomorphic. When they are crushed, they give off a distinct lemon or citronella odor, hence one of their common names. These ants are found from Alberta, Canada to New England and in the southern states including Texas and New Mexico. There are approximately 15 species of yellow ants. As some species may cross-breed, that number is tentative. Four species, *Acanthomyops coloradensis*, *A. interjectus*, *A. latipes* and *A. occidentalis*, may be encountered by the homeowner.

They feed on the honeydew secretion of aphids and similar insects. They will nest under debris on the ground around a house and in foundation walls but rarely forage in a home. They will nest under a slab in the home and push dirt up from cracks or expansion joints. Usually it is the swarmers that are found in homes and they are often mistaken for termite swarmers.

If they come in the house, use a sweet bait mixed with aspartame to control them. If you can find their nest and reach it, you can dust the area with diatomaceous earth.

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### **Carpenter ants (*Camponotus* spp.)**

Carpenter ants are found throughout the United States comprised of about 43 species. Most of them are large, but there are several smaller species. They have a convex thorax which makes it easy to tell them apart from field ants, which have an indented thorax. Otherwise the two ants are very similar in appearance. Carpenter ants are polymorphic. Common species found in homes are *Camponotus herculeanus*, *Camponotus laevigatus*, *Camponotus modoc*, *Camponotus nearcticus*, *Camponotus pennsylvanicus* and *Camponotus vicinus*. The last species is illustrated and the most common one found in the Albuquerque area.

Most species are active in the late afternoons and at night. They will nest under the slabs of homes and enter through expansion joints or around plumbing. They are also found in crawl spaces under homes that have them. They will be most common in areas where there is moisture. If there is damp wood available, they will make galleries to make their nests. The galleries will follow the grain of the wood. If left alone, they can hollow out and destroy structural wood. They don't eat the wood, they just carve out areas and create wood segments (frass). If they are in the house, they will forage for any foods available, including pet foods, candies, syrups, sugar and other sweet products. They will also feed on any fruits they encounter and will root through the garbage looking for grease, fat or meat scraps.

You can use a bait made from two tablespoons of honey or jelly mixed with a teaspoon of boric acid and place it where the ants are foraging (keep out of the reach of children and pets). You can also put out open packets of Equal (aspartame), which they will take. You can use a commercial bait like Niban also.

To prevent carpenter ants from entering your home, you should remove or repair all damaged wood that has a moisture problem. Make sure your gutters are clean so water doesn't back up and damage the siding or the roof and that no branches are touching the house. Store all firewood off the ground and away from the house. Remove all dead stumps and logs. I also recommend dusting your crawl space, if you have one, with food-grade diatomaceous earth. This can be done with a power duster.

### **Field ants (*Formica* spp.)**

This is the largest group of ants in North America with about 78 species. They come in a variety of colors, including red and black, all brown, all black or all yellowish. Large species are similar to carpenter ants, but have an indented thorax instead of the evenly rounded thorax that carpenter ants have. You have to be an expert in the study of myrmecology (ant entomology) to properly identify many of them.

Field ants are more common in the northern part of the state. They will nest in soil, thatched mounds or in logs and stumps. They feed on other insects as well as the honeydew secretion of aphids and scales. Many species are very aggressive. Although they can't sting, they will bite and then spray

formic acid in the wound made by their mandibles. Repeated exposure to formic acid can cause the skin to peel. They are common pests at picnics in the mountains. Some species will enslave other species of ants. These ants rarely enter homes and are not normally a pest indoors.

The best method of controlling these ants if you live in an area where they are common, like Los Alamos or Santa Fe is to pest proof your home to keep them out. They won't take baits very well. If you have a crawl space, you may want to get it power dusted with diatomaceous earth.

### **Bosque ants, cornfield ants (*Lasius* spp.)**

These ants have a distinctive shaped thorax as it is flat and almost vertical on the posterior end, just before the node on the pedicel. They are normally light to dark brown. The cornfield ants (*Lasius alienus*) is widely distributed in the United States and is a common household pest in northern states. *Lasius neoniger* is an outside pest as it builds its mounds in open areas such as golf courses.

Ants in this genus feed on the honeydew secretion of aphids and other Homopterans and also on small insects. Some species feed tend plant lice on the roots of plants, including corn and are named cornfield ants. These ants will store and care for aphid eggs in their nest during the winter. In the spring, when the aphids have hatched from the eggs, the ants will carry them to the roots of certain grasses where the aphids will remain until the corn is grown and can support them. The ants then carry them to the corn roots. The ants actually protect, care for and transport the aphids as necessary. They do the same thing with aphids of cotton.

Mix a bait with two tablespoons each of peanut butter and jelly with a teaspoon of boric acid and place that where you see the ants. If you can find a nest, you can dust it with diatomaceous earth.

### **Crazy ants (*Paratrechina longicornis*)**

Crazy ants are black or brown, appear thin and have very long legs. They run around erratically, giving them the name. They are monomorphic. These ants are found from Florida to Texas. They originally came from India. There is another species in the U. S. now, the Caribbean crazy ant (*Nylanderia fulva*). It is closely related to *Paratrechina*. Caribbean crazy ants do not sting. They have large colonies like other species of crazy ants, but they are a nuisance, not a pest. They will take sweet / protein baits mixed with boric acid. Diatomaceous earth in their nesting areas will get them to move as it will other ants. Termidor around your house will help keep them away.

They live in a variety of habitats, including areas that are very dry to areas that are wet. They will nest under wood, in tree cavities, in or under any debris left on the ground for a long time and even in potted plants. They feed on a variety of foods, including sweets and even other insects. They particularly like house flies when they can catch them. They will also feed on the honeydew secretion from aphids and scales.

Baits should consist of sweets or proteins mixed with about 5% boric acid. They love garbage, so make sure garbage storage areas are as clean as possible. It will help to put food grade diatomaceous earth around the house under any bushes or shrubs. If you can find the nest, spray it with a good natural pesticide such as Greenbug for Outdoors.

### **Small honey ants (*Prenolepis imparis*)**

Small honey ants (also called false honey ants) are monomorphic. They are light brown or dark brown to black and the body is smooth and shiny. The thorax is very constricted in the center so it appears to

be divided into two parts. This is best viewed from above. They have small colonies, consisting of a few thousand workers. They are found throughout the United States.

These ants are more cold tolerant than other species and may be active all winter, even when the ground is frozen. They usually come in homes from outside, but occasionally will come up from under a slab through an expansion joint. Entire colonies of these ants have been found in potted plants. When they infest a home they will feed on sugar, syrup, honey, cakes, breads and fruits. They prefer sweet foods. They will even raid beehives to get the honey. They also feed on the honeydew secretion of aphids and other Homopterans.

If you can find their nests outdoors, you can treat it with diatomaceous earth, or a liquid substance such as Coca Cola or Club Soda. Poke a stick into the nest and pour in the soda. Inside, diatomaceous earth can be injected into cracks and crevices in uncarpeted areas where the ants hide. In carpeted areas, you may have to pull back the carpet to get the diatomaceous earth behind and under baseboards. Sweet baits such as two tablespoons of peanut butter and jelly mixed with a teaspoon of boric acid will work. You can also mix boric acid in with tuna fish or rotten liver. If you want to use a commercial bait, Terro Bait is a good product.

## **Wasps & Yellowjackets (Hymenoptera)**

There are a number of species of wasps and yellowjackets that you may encounter, but the habits and control methods of most of them is the same. If you can't live with them in your yard, you probably should call a professional as they (wasps and yellowjackets) can be dangerous if disturbed or threatened.

### **Paper wasps (Vespidae; Polistinae - *Polistes* spp.)**

A paper wasp queen is the lone female reproductive, who begins her nest by attaching a thick paper strand to an overhanging structure or protective site. She then builds hollow paper cells by chewing wood or plant fibers (cellulose) mixed with water and shaped with her mouthparts. There are 27 species in North America that are considered semi-social.

When a half dozen cells or so are hanging together facing downward, the Queen lays an egg near the bottom of each one. The little white grubs that hatch from the egg glue their rear ends in the cell and begin receiving nourishment in the form of chewed up bits of caterpillars provided by their mother. The fact that they feed on caterpillars makes paper wasps beneficial insects which you want some place close by, but not necessarily on your house. When they grow large enough to fill the cell cavity, they break the glued spot and hold on their own by their stuffed fat bodies, hanging head down. Paper wasps are not normally aggressive until you disturb their nests. The European paper wasp is far more aggressive than our native paper wasp. This wasp first came to the United States in 1981 and has been found on both the east and west coasts and probably occurs all across the country.

From Spring on, the queen continually lays eggs and the female workers feed larvae and expand the comb or nest. Each nest can house a few to several dozen paper wasps. They do not eat the protein (insect) food they gather for the larvae but get their energy from flower nectar. Later in the season, some of the larvae develop into males and others will become next year's queens. The new males and females mate with those of other colonies, and the fertilized females find hiding places under tree bark or in logs and wait out the winter until they can begin their new colony in the spring. The male wasps die in winter; likewise the original nest disintegrates and will not be used again.

Paper wasps nests are often found near doorways and other human activity areas without occupants being stung. Colonies in trees, out buildings, hollow fence posts and other protected places are not as easy to control as those from nests on structures.

### **Yellowjackets (Vespidae; Vespinae - *Vespula* spp.)**

Yellowjackets are often considered serious pests that have to be eliminated from your property. If you have children playing outside or if you are allergic to stings, then they should be removed. I recommend that you hire a professional who has the proper safety equipment to deal with them as they can be dangerous.

In some circumstances, it may not be necessary. When I lived in Corrales, we were in a mobile home. There were four skunks living under the mobile home. They came out every night and roamed around the neighborhood making a living. In the morning, they would come home and sleep under our mobile home. There were some feral cats in the neighborhood as well. I would put cat food out on the porch for the cats at night. Every night a skunk or two would join the cats to eat. Never any animosity at all. One night a raccoon showed up as well, so I put out more food. The raccoon, two skunks and two cats were regulars for supper every night. One day I put some cat food out for a stray cat I saw. The cat didn't come to the food, but several yellowjackets dived right in. I have always seen a few yellowjackets around but didn't pay much attention to them. The next day I put some more cat food out and more yellowjackets came, and they were coming from under the porch. Apparently, they had a nest under there the whole time. Pretty soon, when I came home from work around 3 PM, a large number of yellowjackets came out to meet me. They were never aggressive, just flying around waiting for the cat food. I put out four cans every afternoon and the yellowjackets loved it. I would sit on the porch reading the paper and a few would always fly around, land on the chair or on my shoulder, but never stinging me. They spent the summer around the porch, never bothered the dogs or cats or anyone in the yard. I did put a sign on the gate that said "Beware of Yellowjackets" to discourage salespeople.

I had yellowjackets under the porch when I lived in Algodones. I have been feeding them chicken drumsticks and they have been eating them, even out of my hand and are not at all aggressive. I had no reason to spray poisons to try to kill the yellowjackets. The insecticides that I would have to use would be more deadly than the insects. The yellowjackets in my yard are not pests, they are guests, and that is how I treat them. Unfortunately the chicken I fed them killed them. Chicken contains small amounts of arsenic in some cases and apparently the arsenic killed them. Agencies say the arsenic level isn't high enough to be dangerous, but in my opinion the only level of arsenic that is safe is ZERO arsenic.

## **Bed Bugs (Heteroptera)**

### **(Cimicidae - *Cimex lectularius*)**

Bed bugs are small, nearly wingless, flattened bugs that are external parasites of humans. There are closely related species that feed on bats, cliff swallows, woodpeckers, raptors, chickens and other types of birds. Bed bugs do not transmit any diseases, but they are probably the most profitable bug in the pest control industry. If you made a list of the 100 most dangerous bugs on the planet, bed bugs wouldn't make the list. If you made a list of the top ten most profitable bugs, they would be at the top of the list. You can control bed bugs yourself in your home or business and you don't need toxic pesticides to do so.

The first step in controlling bed bugs is to completely inspect the room to determine the extent of the infestation. Place close attention to the sleeping areas. They can be hiding anywhere but they will stay as close to the food source as they can. Small crevices in solid structures, such as the joints in the bed's headboard or between the wall and the baseboard are the bed bugs' refuge of choice. Strip the bed so you can inspect the mattress and box spring. Examine the seams and buttons on the mattress as well as any labels. Bed bugs will hide in all of these areas. Stand the mattress on end if you have to and examine the box spring if there is one. Stand it up and look at the underside, especially along the edges. Also look behind pictures hanging on the wall, between and behind any books or magazines in close proximity to the bed and in any furniture nearby. You may have to turn some of the furniture over and examine the underside. Carefully check anything that is under the bed including storage boxes. If there is any litter under the bed, it should be removed. Also check for dried cast skins (exuviae) from the molting process and fecal matter.

Before you start the treatment, there are a few preparations you should do. Wash all the bedding in hot water (120 + degrees). This will kill any bed bugs in the bedding. Personal items such as stuffed animals, blankets, etc. should be vacuumed and placed in plastic bags for a couple of weeks. If you have a clock, phone, radio or other appliance near the bed, they should be opened and inspected as bed bugs will hide in those places as well. Thoroughly vacuum the entire room including inside closets and dresser drawers. If the infestation is severe, you will have to use a crack and crevice vacuum tool to suck the bugs out from along the edge of the carpet, from behind switch plates which you will have to remove, from all around the bed frame, inside the box spring and inside any furniture in the room. If you see any eggs on the mattress along the seams, you can remove these by picking them up with duct tape and discarding them or brushing them off with a stiff brush. After vacuuming the room or rooms, remove the bag from the vacuum and discard it right away.

Next, use a hair dryer to blow hot air in all the cracks and crevices and along the edge of the carpet and on the furniture to get any bed bugs the vacuuming missed. You want to get as many bed bugs as you can before the final treatment.

Now it is time to treat the bed. Use a flashlight and carefully examine the seams, buttons and any folds in the mattress along with the headboard and footboard if they are present. Check the box spring and frame as well. If you missed any bed bugs with the vacuum or hair dryer, they will be visible. Spray any bed bugs you see with the Greenbug For People (GFP) as well as all cracks and crevices in the bed. Spray the underside of the box spring as well. If you don't see any bed bugs, then spray along the seams and around the folds and all the other areas mentioned. Make sure to use plenty of solution so the sprayed surface is wet. Then put some diatomaceous earth (DE) in a duster and puff it on all the sprayed areas, including under the box spring. The GFP solution will kill any bed bugs in several hours and the DE will prevent any from hiding in these areas in the near future. You can also sprinkle fine powder body bath powder on the mattress and rub it into the fabric.

Now you have to treat all the furniture in the room including night stands, chairs, couches, dressers, etc. Make sure you carefully inspect all the wooden furniture and treat them as you treated the mattress, box spring and bed frame. If any of the furniture, such as bunk beds, have metal framing, treat inside the metal tubing with the GFP and DE.

Finally, you need to make your bed difficult for bed bugs to access. Tape up any tears in the box spring or mattress with duct tape or, better yet, enclose them in a zippered mattress cover used for dust mites. Put the legs of the bed in plastic food bowls or metal cans and coat the inside with Vaseline. Don't let

the bed touch any walls or let the bed covers touch the floor.

If you have a hotel or motel, the process is the same except for the bed legs in food containers and the Vaseline. If you have or had bed bugs in your establishment, then you should treat each room as it becomes vacant. Then you can retreat them every six months or as needed.

You can trap bed bugs by placing a heating pad on the floor with sticky traps around it or you can use duct tape, sticky side up. Put an Alta-Seltzer tablet on a damp sponge on a small plate on the heating pad. The Ala-Seltzer will attract any bed bugs in the area. You can catch mosquitoes and fleas by placing two Ala-Seltzer tablets in a bowl of soapy water. Used on a damp sponge they will attract bed bugs and kissing bugs.

## **Lice (Anoplura)**

### **Head and body lice (Pediculidae – (*Pediculus humanus*)**

The three main types of lice that infest humans are the head louse, the body louse and the crab louse. Head lice normally infest the heads of children. Children share these bugs when playing with each other. Body lice will live and breed in clothing and normally infest people who rarely change or wash their clothes. Homeless people frequently get body lice. Crab lice (Pthiridae – *Pthirus pubis*) can infest anyone as they are normally spread by sexual intercourse.

You can safely control head lice with coconut oil or olive oil shampoos or a product called Greenbug for People. Salt water will also kill lice, so if you live near an ocean, a swim would help. You can also put a shower cap on the head and use a hair dryer. The heat from the hair dryer will kill the lice.

Body lice can be controlled by washing the person's clothing and vacuuming any beds or other furniture they may have used. Pesticides aren't necessary. Crab lice can also be controlled with coconut oil or olive oil rubbed into the area where they live. They not only live in the pubic region but can get in armpit hairs and the perianal region as well.

Head and body lice cannot live off the host for more than 48 hours. Crab lice are more dependent on us as they will die in 24 hours if not on their host. Head and body lice will only attack humans. Crab lice aren't as fussy. They will also infest chimpanzees.

## **Fleas (Siphonaptera)**

### **Cat and Dog fleas (Pulicidae - *Ctenocephalides* spp.)**

There are many species of fleas throughout North America, but the ones considered pests most often are dog fleas (*Ctenocephalides canis*) and cat fleas (*Ctenocephalides felis*), as these species will infest homes. Other species carry plague and other diseases, but they will not infest a home in large numbers. Dog and cat fleas prefer parts of the country that are humid. They are not established in the arid southwest, although they occasionally turn up when brought in on a dog that moved here from somewhere else.

We do have approximately 107 species of fleas in New Mexico and about 33 species that carry the plague. Pocket gophers are known to carry 7 species of fleas. None are known to carry the plague. Pack rats can carry 34 species of fleas. At least 4 are known to carry plague. Deer mice can carry 36 species of fleas and at least 6 are known or suspected of carrying the plague. The various species of squirrels can carry up to 14 species of fleas and at least 8 species can carry the plague and prairie dogs can carry

10 species of fleas. Only two species are known to be vectors of the plague and they kill the prairie dogs, so the prairie dogs can't spread the plague. In other words, if you have a colony of prairie dogs near your property, they will not spread the plague. If plague fleas get involved with the prairie dogs, the animals will die. Ground nesting birds such as quail and chickens can carry sticktight fleas (*Echidnophaga gallinacea*), and they will get on pets. They are usually found around the eyes and ears and hang on tight to your pet. I put diatomaceous earth (DE) on my fingers and rub the fleas and they will drop off. Use food-grade DE only. It is available at most feed stores.

What else can you do about fleas? If you have ground squirrels, I would recommend dusting the burrows with diatomaceous earth. The DE will kill any fleas in the burrow but won't hurt the squirrels. The fleas will get off the squirrel after feeding and will land in the DE in the burrow.

I never recommend using Frontline or Advantage for fleas in NM. If we had dog or cat fleas, then it might be okay, but still risky. According to Whole Dog Journal, a monthly dog care and training publication, the active ingredient in Frontline, which is fipronil, may not be safe for pets.

If you have fleas infesting your home, here is what you need to do: Steam clean the carpets. This will remove dried blood, carpet fibers and other debris, diluted excrement, some flea larvae, eggs, pupal cocoons, adults, feces and other food sources. Spray pets with (1 oz. per qt. water) with a natural flea spray available at [www.greenbugallnatural.com](http://www.greenbugallnatural.com).

Put a goose-neck lamp 8" - 10" over a pan of "fizzy" seltzer water with a few drops of dish soap at night. The fleas are attracted to the heat and carbon dioxide and drown. Sprinkle salt where animals lie; salt dehydrates the fleas and they die.

To monitor infestations, slowly walk through suspected areas wearing white knee socks. When the fleas jump on you, you should clearly be able to see them on the socks. Or you can put some white pieces of fabric on the floor and the fleas will jump on them.

You can also dust the carpet with food-grade diatomaceous earth (DE). Also dust bedding, furniture and other areas your pet frequents. Let the DE set for four days and then vacuum it up. Also rub some DE through your pet's fur to the skin, especially on the scalp and tail, behind the neck and in any area where your pet can't bite or scratch. Caution: Diatomaceous earth can dry out your pet's skin, so lightly use it no more than once a month. Borax powder used for boosting cleaning power in laundry can also be used to effectively rid your home of fleas. Borax powder is non-toxic and kills fleas by cutting into their exoskeletons. The powder can be sprinkled onto carpets and floors where flea infestations exist. Apply it to pet bedding and upholstered furniture where pets sleep, in addition to the flooring. Work the borax powder into the surface with a stiff-bristled broom, then vacuum it up. Even though borax powder is non-toxic, use caution when young children and pets are around as it can make them sick.

## **Flies (Diptera)**

Flies are the fourth largest order of insects and there are over 100,000 species. Most of them are beneficial to some degree as they serve as a food source to many animals and even a few plants. Many breed in organic material such as animal manure and help recycle its nutrients to the soil. Others contribute to the decomposition of dead animals. Flies can also be serious pests. Mosquitoes and other biting flies can cause human deaths by spreading such diseases as malaria, dengue fever, encephalitis, yellow fever and many others. Flies are different from other insects in that they only have

a single pair of wings.

You certainly don't want any flies around schools, day care centers, hospitals, nursing homes, animal shelters or other areas where they can infect people or animals. If you have a fly problem, a good electric flytrap works well but they are expensive. I use an apple cider vinegar trap at our place. I monitor and identify the flies around my home with a simple flytrap. I cut the top off several plastic water bottles; invert the top into the lower portion forming a funnel. I put about two inches of apple cider vinegar in the bottle with a quarter teaspoon of sugar. Almost all flies, no matter what their normal food preference, will enter the trap. I then pour them out through a sieve, let them dry and identify them. Gallon size milk jugs cut as described above and baited with apple cider vinegar and sugar will catch a lot of flies in a large building or yard.

### **House flies (Muscidae - *Musca domestica*)**

House flies have a gray thorax (part where head is connected and wings are attached) with four dark stripes, and a mottled abdomen (posterior portion). These flies are considered "filth flies" and will feed on excrement, garbage, carcasses, and even human secretions from wounds and mucous membranes. If you accidentally eat the larvae (maggots) in contaminated food, they can survive in your intestine. They can harbor over 100 different pathogenic organisms and are capable of transmitting more than 65 diseases and bacteria that can cause duodenal and stomach ulcers. House flies are the most common fly in the world that is found around homes and areas with livestock.

When you swat a fly remember that it has an unblurred range of vision of only about 1½ feet. You should aim your flyswatter about 1½" behind the fly, because when houseflies take off from a horizontal surface, they jump upward and backward. Set out a saucer filled with bubble soap to attract and kill flies. Adult flies eat only sugar, so make some light Karo Syrup or honey or sugar water with 5% boric acid or borax baits.

I have frequently written about hanging Ziploc bags filled with water around doors and windows. The sun's refractive light is said to disorient flies when the sun's rays are shining through the bags and the flies won't come in the building. From the mail I have received, these bags work very well.

### **Little house flies (Fannidae - *Fannia canicularia*)**

Little house flies are dull gray with yellow on the upper abdomen and 3 dark longitudinal stripes on the top of the thorax.

These flies resemble house flies but they fly in circles in the middle of a room or on a porch and don't appear to land. They can lay their eggs in any organic material including compost piles, pet feces, dead leaves, etc. They have been known to enter the urinary tract of naked sleeping persons and causing urinary myiasis. To prevent these flies from appearing, empty and clean all food handling equipment, dishes and garbage containers and daily remove and/or bury all animal droppings, fruit and organic debris inside and/or outside. They do like beer so you can put two packets of aspartame in 2" of beer in an open container to act as a bait for these flies. You can also use a fly swatter with a sticky side to swat them when they are circling.

### **Cluster flies (Calliphoridae - *Pollenia rudis*)**

Cluster flies are about ½ up to ¾ of an inch in size. Slightly larger than the common house flies, they move indoors in the winter in hundreds or even thousands of individuals, hence the name. Unlike house

flies, cluster flies are not associated with poor hygiene and poor sanitary conditions. These flies do not carry diseases and other hazards that may affect humans because they do not lay their eggs in human food. They parasitize earthworms in the ground outside. When they invade homes for the winter, they will infest attics, basements, unused rooms, wall voids, ceiling voids and garages.

The best way to deal with cluster flies is to prevent them from coming in. Here are some tips: Check all the obvious entry points. Check your windows and doors for small openings. Cluster flies can squeeze through the sides of doors and windows, so make sure there isn't enough space for them to pass through. Seal or patch cracks and crevices. If you use a screen, make sure there aren't any holes that the insect can go through. Check your cellar door for possible openings too. These are possible entry points because your basement is an ideal undisturbed spot that cluster flies choose to hibernate in. If you have an attic, do the same. Basically, any room or area in your home that is not visited much by any of the people in your home are the ones you should check.

### **Blow flies (Calliphoridae -*Phormia*, *Phaenicia*, *Cynomya* & *Calliphora*)**

Blow flies are larger than house flies and are normally shiny green, blue, bronze or black in color. Blow flies feed on decaying animal matter and if you have them in your house it is an indication of a dead animal in the wall or ceiling. Occasionally the only sign of these flies in an early infestation is when the larvae fall from the ceiling void onto the floor. If you can find and remove the carcass of the dead animal they are feeding on, it will speed up the process of them leaving. If you can't, there isn't much you can do except be patient and wait for the dead animal to dry up. They can also lay their eggs in dog feces or any animal matter with a high protein content, including dry cat food. Common names for the most frequently encountered blow flies are black blow flies, greenbottle flies and bluebottle flies. Greenbottle and bluebottle flies are metallic green or blue in color. Black blow flies have a black sheen. These flies are also used by forensic entomologists to establish the time of death in human fatalities.

### **Flesh flies (Sarcophagidae)**

Flesh flies resemble house flies but differ in only having three stripes on a gray thorax. Some species lay their eggs in foul smelling dead animal matter while others will lay their eggs in open wounds on horses, cattle and other animals. There was a case in Albuquerque several years ago where these flies laid their eggs in the festering wound of a person in a nursing home. One species can lay their eggs in the noses or eyes of humans causing myiasis, which can be serious. Proper sanitation and exclusion is the best way of controlling flesh flies.

### **Fruit flies (Drosophilidae)**

Fruit flies are usually found in the kitchen where they feed and breed on food spilled in out of the way places such as behind or under appliances or similar areas. These small flies have distinctive red eyes, which you can see with a hand lens. They are tan or brown in color and about 1/8" long. They are also known as pomace flies and vinegar flies. They can be serious pests when found in food handling establishments as they breed in and feed on fruits, vegetables and any moist, decaying organic material. They have been known to cause intestinal problems and diarrhea when fruit containing their larvae are eaten. They will also breed in discarded fruit juice and soft drink cans and in unsecured bottles of wine. They are also very prolific as the female can lay about 500 eggs which will hatch and reach adulthood in as little as eight days.

These little flies are also beneficial as they have been studied in research in genetics. This research became the foundation on which future genetic research was built. The species *Drosophila melanogaster* is the one used in genetic and heredity studies. It is also a very common fly in many homes and businesses.

In your home you can control fruit flies by totally eliminating all breeding material. They are attracted to acetic acid (vinegar), so put some drops on duct tape or glue boards. Or you can just fill a small paper cup with vinegar and the flies will dive in.

### **Hump-backed flies (Phoridae)**

Phorids are small flies, about an 1/8" long and tan to dark brown in color. They have a distinct hump-backed shape thorax, hence their common name. They do not have red eyes as fruit flies do. When these flies are disturbed, they will run along the surface they are on rather than flying away.

These flies breed in any moist organic material including dirty mops, garbage, decaying fruits and vegetables and dead animal matter. They are also known as coffin flies because of their presence where dead bodies are found, including inside of coffins. There are over 220 species of phorid flies in the United States.

You have to eliminate the food source and breeding areas in order to control them in your home or business.

### **Dung flies (Sphaeroceridae)**

Sphaerocerid flies are sometimes called dung flies, but that name probably isn't appropriate. While they will breed in dung, they will also breed in other organic materials and are often found in areas where phorid or drosophilid flies breed. Sphaerocerids can be recognized by the enlarged size of the first tarsal segment on their hind legs. The tarsi are the last five segments on the leg. They are very small, about an 1/8 of an inch and dark-colored. There are over 240 species of sphaerocerids in the United States and they are easily transported around the country as they will frequently breed in decaying material carried in commerce between states.

These flies will breed in organic material spilled in cracks in the floor, unclean trash containers and even the bottom of elevator shafts if it is damp and has decaying organic matter there. They can be a problem in food establishments if there is a lot of spilled food that works its way into floor cracks or expansion joints. The best way to control these flies is to find out where they are breeding and totally eliminate the decaying material from the area.

### **Moth flies (Psychodidae)**

Moth flies are small flies with hairy wings that resemble small moths. They are also called filter flies and drain flies. They are usually found in the bathroom. They will breed in the gunk buildup in drains and will often be found in the tub, on shower curtains or the wall. They are poor fliers and seem to just hop around. The larvae live in gelatinous material in sink and floor drain traps, in sewer treatment plants and in septic tanks. They will also breed in damp crawl spaces under a house. In a commercial building you can put duct tape sticky side down on drains to see which ones they are breeding in. You need to keep your drains clean to control these flies as they have a very short life cycle. They can go from egg to adult in a little over a week in some areas.

### **Fungus Gnats (Sciaridae)**

Fungus gnats are very small flies with long legs and long antennae and distinctly patterned wings. They are dark brown or black in color. They are generally found in over-watered house plants where the larvae feed on fungus in the potting soil and moist organic material. The best way to control them is to let the plants dry out almost to the point of wilting before re-watering. That will kill the larvae in the soil. Then put an inch of aquarium gravel on the soil to prevent female fungus gnats from laying anymore eggs in the potting soil. You can also place a yellow sticky trap on a stick in the soil to catch the adult gnats.

### **Mosquitoes (Culicidae)**

Mosquitoes are small, slender, biting flies. They have a long, thin mouth part designed for piercing the skin and sucking out blood. They require water to lay their eggs. They are very important disease vectors and can transmit West Nile Virus, Encephalitis and other diseases in the United States. If you have mosquitoes, make sure you wear a good non-DEET mosquito repellent when you go outside. Never use the DEET products that government agencies recommend as DEET (N,N-diethyl-m-toluamine) is a chemical that some people have severe reactions to. It is a fact that DEET works well as long as it is full strength. However, when it begins to weaken, it actually attracts mosquitoes and you have to put more on, which means absorbing more of the chemicals into your system. Most non-DEET products (catnip, citronella, and lemongrass) are effective for two or three hours before having to be reapplied, but they do not contain potentially dangerous chemicals.

Remove all standing or stagnant water if at all possible. This means old tires, barrels, cans, wading pools that aren't being used, bird baths and other items that can hold water. You can apply a light coating of food-grade diatomaceous earth on any water that can't be removed. Eucalyptus oils, garlic extracts and extracts of orange and lemon peels will kill mosquito larvae in the water.

If you have adult mosquitoes in your grass or bushes, you can spray them with Greenbug for Outdoors. Catnip is a very good repellent according to a report from Iowa State University. Other good repellents include lemongrass, basil, birch, mint, rosemary, spearmint and yarrow. Geraniums or basil plants planted near your doors will repel mosquitoes. Citronella and pennyroyal both work but have side affects. Pennyroyal may increase the risk of a miscarriage if your are pregnant and citronella has been known to attract female black bears. Test anything you put on your skin on a small portion first to make sure you aren't allergic to it. Again, never use repellents that contain DEET.

## **Moths (Lepidoptera)**

There are several types of moths that can become household pests. Clothes moths can damage clothing and pantry moths can infest some stored foods. Other moths that come in the house are occasional invaders and won't do any damage.

### **Clothes moths (Tineidae)**

There are two distinct types of clothes moths commonly found in homes. They are both small moths. The webbing clothes moth (*Tineola bisselliella*) is a solid golden brown on the wings, while the casemaking clothes moth (*Tinea pellionella*) has three black spots on each wing. Casemaking clothes moth larvae construct a small bag from material to protect their body from the environment. They drag the bag or tube wherever they feed.

Clothes moths are occasionally found in closets where they lay their eggs on suitable fabric. The larvae hatch and feed on the fabric doing damage. There are several things you can do to prevent clothes moths. First, keep clothes and other fabrics stored in sealed, plastic bags. Next you can hang some repellents in the closets. Put dried lemon peels, cedar chips, dried rosemary or mint in cheese cloth bags and hang them in the closets. Make sure any carpets in the closet are clean and free of lint or animal hair or any organic debris.

If you already have webbing clothes moths, you should hang one Clothes Moth Pheromone Trap in each closet. It will attract and catch the male moths and stop the breeding process. Don't hang more than one trap or you will confuse the moths and they will just fly around, not sure where to go. The pheromone traps aren't effective against casemaking clothes moths. Dry cleaning all the clothes will kill all the stages of the moths as well as washing all infested clothing in hot, soapy water to kill the larvae and eggs.

### **Indian meal moths (Pyralidae - *Plodia interpunctella*)**

There are several species of pantry moths that can infest your home, but the one most frequently encountered is the Indian meal moth. This moth is small and colorful. The wings are gray toward the body and has dark bands near the tip.

They will feed on a wide variety of dried foods, including cereals, flour, cornmeal, crackers, cake mixes, pasta, dried pet foods, candy, powdered milk, chocolate candy and many other foodstuffs.

The best control is to hang one Flour Moth Pheromone Trap in the area they are infesting. This will attract and catch the male moths and stop the breeding process. Then inspect all open dried foods and toss anything that is infested. Place all non-infested foods in sealed containers or refrigerate them. Completely clean the pantry where the foods are stored to get any larvae that may be crawling around. Then lightly dust the shelves with food-grade diatomaceous earth before putting the foods back.

## **Beetles (Coleoptera)**

There are three groups of beetles that can cause problems in a home. Carpet beetles will damage carpets, clothing, animal fur, feathers and similar products. Stored product beetles will infest many dried foods and wood boring beetles can damage the structure of a home or wooden objects in it.

### **Carpet Beetles (Dermestidae)**

Carpet beetle larvae are small, about 1/4" long and carrot-shaped with long hairs. They will feed on anything organic. The adult beetles are small, round and usually black in color, sometimes with lighter markings.

The best method for controlling carpet beetles is by completely cleaning everything. Steam clean the carpets if possible as well as any upholstered furniture. Make sure you vacuum under all furniture as carpet beetles can survive feeding on dust bunnies. Keep a bottle of Greenbug for Indoors available to directly spray and adults or larvae you find. Make sure you vacuum up all the dead insects as the spines on the carpet beetle larvae can cause problems if they penetrate your pores as they can cause rashes.

Also, adult carpet beetles feed on the nectar in flowers so they don't do any damage beyond breeding indoors. If you have flowers blooming near your house, you will attract adult carpet beetles. Make sure there aren't any ways for them to get into your house.

**Flour beetles (Tenebrionidae – *Tribolium* spp.)**

Flour beetles are small, brownish in color and elongate in shape. There are nine species that are potential pests in stored food products. Two species are very common. The confused flour beetle (*Tribolium confusum*) is common in northern regions and the red flour beetle (*Tribolium castaneum*) is more common in southern areas. They feed on barley, beet pulp, breakfast cereals, grains, nuts, wheat, wheat bran, milk chocolate, dried milk and occasionally hides. Good sanitation is key to controlling these beetles. Freezing stored products at -4 degrees for 24 hours will kill all stages, as will heating at 122 degrees for an hour.

**Drugstore beetles (Anobiidae – *Stegobium paniceum*)**

These beetles have a hood-like thorax which hides the head when viewed from above. They are reddish brown in color and rounded in profile and oval-shaped. They feed on a variety of products including tobacco, seeds, grain, nuts, beans, spices, dried fruits and vegetables, flour, rice, ginger, yeast, herbs, paprika, dry dog and cat food, cocoa, biscuits, raisins, dates, alfalfa, hay, almond hulls, barley, corn meal, rice meal, wheat bran and even rodenticides. They are good at penetrating packaging to get access to food. The same control methods recommended for flour beetles will work on this species.

**Saw-toothed grain beetles (Silvanidae – *Oryzaephilus surinamensis*)**

Saw-toothed grain beetles small, black, elongate and have six distinct saw-like teeth on each side of the thorax. They are commonly associated with breakfast cereals and is frequently found in corn meal, flour, biscuit mix and processed cereals as well as in alfalfa seed, almonds, baking soda, barley, candy, clover seeds, chocolate, sugar, rice, wheat, cereals, dried fruits, corn, cornmeal, corn starch, flour, garbanzos, hay, honeycomb, milo, mixed feeds, oats, raisins, rice, figs, peas, pecans, dried meat and tobacco. Sanitation and freezing and heating will also work on these beetles.

**Hide & Larder beetles (Dermestidae – *Dermestes* spp.)**

Dermestid beetles are larger than other stored product beetles, reaching a 1/3 of an inch long. The hide beetle is brown on top and white on the bottom and the larder beetle is brown with a broad cream-colored band across the front of the abdomen. These beetles prefer animal products such as leather goods, hides, skins, dried fish, pet food, bacon, cheese and feathers. They can be a major pest in museums. Sanitation is important and sticky traps can be used on flat surfaces to catch adult and larval dermestid beetles.

**Weevils (Curculionidae – *Sitophilus* spp.)**

Weevils are easily recognized by their small size and prominent snout. They are very destructive of stored grains in the world. They will feed on chick peas, corn, oats, barley, rye, wheat, kafir, buckwheat and millet. They are frequently found in macaroni and noodles. When you find any of these beetles in your home, inspect all open dried foods and toss anything that is infested. Place all non-infested foods in sealed containers or refrigerate them. Completely clean the pantry where the foods are stored to get any larvae that may be crawling around. Then lightly dust the shelves with food-grade diatomaceous earth before putting the foods back.

**Scorpions (Scorpiones) & Centipedes (Chilopoda)**

Scorpions and centipedes are two groups of arthropods that nobody wants in their homes. Both of these animals have the capability of stinging (scorpions) you or biting (centipedes) you with painful results. Only one species of scorpion in this country is dangerously venomous. It is the bark scorpion (*Centruroides sculpturatus*) found mostly in Arizona but also southwestern New Mexico. It has killed a few people in Arizona, but not in the last 40 years. Centipede bites are painful, but not deadly in this

country. There are some very large centipedes in Asia that have caused human fatalities, but none in the United States. However, anyone can be allergic to anything, including the bite or sting of an insect or some other arthropod. Even if they bites or stings aren't fatal, they can certainly be painful.

There are over two hundred species of centipedes in the western U. S., but most of them are very small and belong to two suborders. They are the stone centipedes (Lithobiomorpha) and the soil centipedes (Geophilomorpha). Stone centipedes are about an inch long and have 15 pair of legs. Soil centipedes aren't much longer and have upwards of 40 pair of legs. Neither group is capable of biting people. Both are common in yards and feed on small bugs including some pests, so they can be considered beneficial. House centipedes (*Scutigera coleoptrata*) are about an inch long and have 15 pair of very long legs. They are common almost everywhere and are often found in homes. They rarely bite and they do feed on such pests as spiders, bed bugs, termites, cockroaches, ants and silverfish, so they should probably be welcome in the home.

Three species of Scolopendromorpha centipedes are found in the western states. The desert centipede (*Scolopendra polymorpha*) is most common throughout throughout the west with the exception of Washington. It is about three or four inches long. The green centipede (*Scolopendra viridis*) is found in the mountainous areas of New Mexico, Arizona, southeastern Colorado, Utah and extreme southern Nevada. It is only a couple of inches long. The giant desert centipede (*Scolopendra heros*) is found in the southern and eastern portions of New Mexico, much of Arizona and the extreme southeast portion of Colorado. This species can reach a length of 6.5 inches and is capable of killing and eating mice. All of the *Scolopendra* have painful bites but they are not dangerous.

Centipedes and scorpions are usually found in areas of high moisture such as loose bark, in rotting logs, under stones, boards, railroad ties, trash, piles of leaves and grass clippings and similar areas. They are nocturnal or active at night and hide by day in the earth, wandering forth by night to hunt. They occasionally invade structures and will feed on cockroaches, cricket, spiders, etc. Although they may be found anywhere in a building, including beds, the usual places are damp basements, bathrooms, and any crawl space under the home or building. Exclusion to keep them out of structures is most important, and this begins with ensuring that no tree or shrub branches are touching the structure. The branches can be pruned away to eliminate this common pathway. You also can carefully examine the entire exterior, including up to the eaves as scorpions and other pests may crawl up rough surfaces, and you want to permanently fill in any openings found and ensure all vent screens are in place and in good condition. In the yard you can eliminate many potential harborage sites for scorpions and centipedes such as rocks, boards, and other objects resting on the soil. Scorpions will also hide under bark on trees, so these can be can be dusted with food grade diatomaceous earth where loose bark is found.

Firewood should be stacked on racks off the soil and kept outside until immediately ready to burn. Garbage cans should be on racks to elevate them. Grass should be mowed to prevent hiding areas for scorpions. centipedes and other pests and weeds should be eliminated.

If you find a scorpion or centipede in your home, spray it with some Greenbug for Indoors. Don't use synthetic pesticides as they are more dangerous than the scorpion or centipede.

## **Spiders (Arachnida)**

Although most spiders possess venom glands, most are too small to break the skin with their fangs and have no desire to do so. All spiders will bite in self-defense if they are handled carelessly, such as being squeezed. Most bites occur when people roll over in bed on one and get bitten or when they put

on their clothes and a spider inside the clothing bites when it is pressed against the skin. I am not saying all spiders are harmless. Black widows are certainly capable of producing a serious bite and any such bite by this spider should be considered a major medical emergency. The brown recluse is also dangerously venomous. Sac spiders and wolf spiders can give serious, though not fatal bites, particularly if you are allergic to any of the components of the venom. Daddy longlegs (aka harvestmen) are not at all dangerous despite their reputation to the contrary. Jumping spiders are interesting to watch but are not dangerous although a large one can bite if mishandled. Most of the small hunting spiders, such as ground spiders are incapable of hurting anyone.

To control spiders around your home if you don't want them, here are a few suggestions. Control the lighting at night that attracts their food, which is flying insects. Keep trash and rubbish out of your yard. If you have firewood, stack it somewhere where there is a lot of sunlight and cover it with black plastic. It will get so hot under there that spiders and other insects / arachnids won't go in the wood. Seal any cracks or crevices around the house that would let hunting spiders inside. If your doors do not close tightly, install door sweeps on them.

Make sure your bed isn't touching the wall. This will make it hard for spiders to get into bed with you. Don't leave clothing on the floor. If you do, completely shake it out before putting it on. If you have a stray spider you need to kill, use a natural product like Greenbug for Indoors.

### **Black widow spiders (Theridiidae – *Latrodectus* spp.)**

There are three main species in the black widow group. The eastern black widow (*Latrodectus mactans*), the western black widow (*Latrodectus hesperus*) and the brown widow (*Latrodectus geometricus*). The eastern black widow is found throughout the east with the exception of Maine, New Hampshire and most of Vermont. The western black widow is found in every state west of central North Dakota south to Texas. The brown widow is found in Florida and Texas and may be expanding into neighboring states. All the female widow spiders have a reddish hourglass-shaped marking on the underside of a shiny black abdomen. The abdomen is brown in the brown widow. Medical: The black widow is feared everywhere although it isn't as dangerous as we are told. The toxic venom is neurotoxic, but the spider injects very little material and the death rate is about 1%. Additionally, the black widow is not inclined to bite unless it is squeezed or defending its egg sac in a web. I pick them up all the time and have never had one try to bite me.

### **False black widows (Theridiidae – *Steatoda grossa*)**

The false black widow is often mistaken for the real black widow. They are about the same size and the same color. The false black widow does not have the red hourglass marking on its abdomen. It usually has a yellowish band across the front portion of its abdomen on top. It originally came from Europe and is found along both coasts, the states that border the Great Lakes and has been found in Colorado, Arizona and New Mexico as well as a few other inland states. It is absolutely harmless and like the real black widow, it is very timid and non-aggressive.

### **Recluse spiders (Sicariidae – *Loxosceles* spp.),**

The brown recluse spider (*Loxosceles reclusa*) is shy, sedentary and builds an irregular web that is often not even recognized as a spiderweb. It has a fiddle-shaped pattern on its cephalothorax. Females lay eggs in flattened egg sacs that are frequently attached to the underside of objects. When they are indoors, they can usually be found in dark places, beneath or behind furniture, in boxes or storage areas, among stored books and papers and similar areas. Outside they live under rocks, boards and other dark areas.

The natural habitat of the brown recluse includes the underside of rocks, loose bark, and crevices in decaying logs. The brown recluse is found from eastern areas of the country west to Texas, Oklahoma and eastern New Mexico. It is frequently transported to different areas of the country in luggage or by commercial vehicles. There are several other species of *Loxosceles* in the southwestern states. None of them have bitten anyone so we don't know if they are potentially dangerous or not. One species introduced into California and Massachusetts, *Loxosceles laeta*, is potentially dangerous. It occasionally comes to the United States in products shipped from South America. Medical: Brown Recluse bites are not painful at the time of the bite. After an hour or so there may be intense pain where bitten. There is usually a dark depressed area at the site of the bite which will turn darker in a day or so. The dead tissue will slough away and the bite area will scar over. Death seldom if ever occurs, but the bite is extremely debilitating and traumatic. If you know you were bitten by a brown recluse, seek medical attention right away.

### **Hobo spiders (Agelenidae – *Tegenaria agrestis*)**

The Hobo Spiders or the aggressive house spiders are in the genus *Tegenaria*. Since 1982, many brown recluse spider bites in the Northwest were shown to actually be hobo spider bites. *Tegenaria agrestis* was first introduced into the ports of Seattle in the late 1920s and has been moving south ever since. It is now found in Washington, Oregon, Idaho, western Montana and much of Utah. They originally came from Europe where they are most common in homes. Generally, these spiders are yellow to pale tan in color with long legs. These spiders occur in highest frequency in July through September and reproduce during this period. Females produce an egg sac that is placed near the opening of the funnel in their webs. Medical: Although the bite of these species is not considered to be as dangerous as that of either the brown recluse or widow spiders, it can cause a similar ulceration or lesions of the skin as the brown recluse and may involve systemic reactions. The venom is a necrotic type that can cause tissue death and sloughing of the skin next to the bite. The wound can require up to 6 months to heal. Dogs and cats are also bitten, with some deaths occurring.

### **Common house spiders (Agelenidae – *Tegenaria domestica*)**

This may be one of the most common spiders found in homes in the country. It is found in every state, most Canadian provinces and virtually all over the world. The cephalothorax (section where legs are attached) is shiny brown with two longitudinal stripes running down the middle. The abdomen is grayish with a series of chevron shaped markings running down the middle to the end. The legs are brownish-gray with black bands. The similar and more aggressive hobo spider does not have bands on its legs. The common house spider is harmless and feeds on a lot of household pest insects, so can be considered beneficial.

### **Orb-weaver spiders (Araneidae)**

Orb-weavers (family Araneidae) are large spiders that make distinct orb-like webs that are often very close to homes. Occasionally the webs are attached to a home. The pumpkin spider, which is large, has two humps and a distinct pattern often scares people. It is common in many areas and is absolutely harmless. You can see one sitting on my face in the photos in the back of the book.

### **Ground spiders (Gnaphosidae)**

Ground spiders (family Gnaphosidae) are very common and are frequently found indoors. They live under debris on the ground outside and often accidentally wander into homes. Most of them are completely harmless. One species, eastern parson spider (*Herpyllus ecclesiasticus*), can give a painful, but not a dangerous bite. Some people suffer allergic reactions to the bite. This spider is about ½ inch

long, blackish with a distinctive white or pink pattern on the middle of its back. The marking resembles an old-style cravat worn by clergy in the 18<sup>th</sup> century. This spider is found almost everywhere east of the Rocky Mountains. A very similar species, the western parson spider (*Herpyllus propinquus*) is found west of the mountains.

### **Sac Spiders (Clubionidae – *Cheiracanthium* spp.)**

Sac spiders are responsible for spider bites in homes more often than most other species. They have a cytotoxic venom, which is the same as the brown recluse, although it isn't as toxic. It is possible many sac spider bites are blamed on the recluse. Two species are referred to as yellow sac spiders due to their similar coloration. They are *Cheiracanthium inclusum* and *C. mildei*. They are light yellowish to a pale yellowish-green, sometimes with an orange-brown stripe on top of the abdomen. They are small, ¼ to 3/8 inches long. Yellow sac spiders are found throughout the country.

Female sac spiders build a silken tube or sac in a protected area, often under furniture. They usually come out at night to hunt and that is when most bites take place. Usually the bite results in a sharp pain, but some people won't feel anything. It is rarely no more painful than a bee sting, but some people can have a bad reaction to it.

### **Jumping spiders (Salticidae)**

Jumping spiders are easily distinguished from other spiders by their four big eyes on the face and four smaller eyes on top of the head. Around the world there are probably more than 5,000 species of jumping spiders. In the U. S. there are at least 40 genera and more than 300 species.

Jumping spiders are charming spiders that look up and watch you. Their excellent vision allows them to hunt and spot their prey from long distances, creeping up then pouncing using their jumping ability.

The most important species of jumping spiders is probably *Phidippus audax* because it can be mistaken for the Black Widow. These spiders are 1/8" - 3/4" long with robust, relatively short legs, are mostly black with white or red markings on the dorsal surface of the abdomen. Another species, *Phidippus formosus* has been reported to bite, but the small amount of venom secreted causes only mild irritation, e.g., localized swelling and sensitivity. They are beneficial because they hunt and pounce on flies and other insect pests and eat them. They like sunny areas and are often found on porches or on walls.

### **Wolf spiders (Lycosidae - *Lycosa* spp)**

Wolf spiders are robust and agile hunting spiders with excellent eyesight. They occasionally enter homes and garages and can be found almost anywhere inside. They are anywhere from ½ inch to 2 inches in length, depending on the species and are hairy, grayish or brown, with various markings on the back. The females are often seen carrying around her egg sac and then her babies on her back. Wolf spiders are not dangerous at all but will bite like any spider if it is squeezed or mishandled.

### **Tarantulas (Theraphosidae)**

Tarantulas are very large hunting spiders. You often see the males crossing the road after a rain. They are looking for females to mate with. Although they are fearsome looking, they are not at all dangerous. A large one can deliver a painful bite if molested, but they are not lethal. I have a photo of a male tarantula on my face in the back of the book.

In the America's the term "tarantula" refers to any of about 300 species of primitive spiders with poor eyesight. About 30 species occur in the United States. Many are among the largest of all spiders, weighing 2 - 3 oz. and with a 10" leg spread. The term "tarantula" is derived from a city in Italy and belongs to a wolf spider of that area, *Lycosa tarentula*. Immigrants who saw the big American spiders called them tarantulas. Female tarantulas have been known to live up to 25 years in captivity, while males only live for a year after it reaches maturity.

## **Ticks (Acarina)**

Ticks are not insects. They are arachnids belonging to the group – mites. They are bigger than all other mites and they are very important. There are hundreds of species of ticks in the world and they are capable of spreading more than 65 diseases, many of them serious. Lyme disease, Rocky Mountain spotted fever, Colorado tick fever and tularemia are a few. If someone made a list of the top ten most dangerous pests, ticks would be close to the top of the list. For some reason, they receive almost no attention compared to bed bugs which are absolutely harmless. Ticks mostly feed on the blood of warm-blooded animals, but some species feed on reptiles. They can be found in lawns, yards with trees and shrubs and, occasionally, inside homes. They prefer the shaded areas of your yard.

If you find a tick imbedded in your pet or on another person or on yourself, do not yank it off. Gently pull the tick straight off with a pair of tweezers. You can also put some diatomaceous earth on the tick and it will come off by itself. Make sure you save the tick so you can get it identified. You want to know what diseases, if any, it can cause. Mark the date of your bite on a calendar and if you develop unusual symptoms in about two weeks, contact your medical professional.

When you have ticks in your yard, here is how to get control of them. Get a large piece of flannel cloth and tie it to a stick. Drag it through the entire yard slowly and pay particular attention to shady areas. Any ticks he drags the cloth over will get snagged. When you are done, put the cloth in a burn barrel and burn it or in a trash bag and seal it shut and take it to the dump. Then get some food grade diatomaceous earth and spread it all over the shady areas including along the sides of the house. Get some all along the foundation where there is dirt abutting the house. Then get some Vaseline and put some on all the outside window sills. If Vaseline is too messy you can use duct tape sticky side up. It takes 30 to 40 days for tick eggs to hatch, so you should repeat this entire process in a month and then again one month later. If ticks are in your house, you need to treat all the areas where they can hide. This would be behind baseboards, moldings, in furniture and carpets as well as around window sills. You can treat these areas with food-grade diatomaceous earth, baking soda, talcum powder or spray them with Greenbug for Indoors. All of these products will be safe for you and your family and pets but will kill the ticks.

Most of the ticks listed below are only found in the woods and remote areas and won't infest your homes. I am listing them because they can be serious vectors of disease if you should encounter them.

### **Talaje soft ticks (*Ornithodoros talaje*)**

Man, rodents, pigs, cattle, horses. Very painful bite. Found in Arizona & California & Nevada, NM  
Medical: It can transmit tickborne relapsing fever in some areas

### **Herm's soft ticks (*Ornithodoros hermsi*)**

This tick is found in Washington, Oregon, Idaho, California, Nevada, Colorado, Utah and Arizona  
Medical: Primary vector of tickborne relapsing fever spirochetes in the area.

**Relapsing fever ticks (Argasidae - *Ornithodoros turicata*)**

It feeds on kangaroo rats, rabbits, sheep, cattle, horses, pigs, humans, rattlesnakes and turtles. It is found in New Mexico, Arizona, Colorado, Utah and California.

Medical: May produce intense irritation and swelling at bite site in humans. Also produces relapsing fever spirochetes.

**Pajaorella ticks (Argasidae - *Ornithodoros coriaceus*)**

This tick has a very painful bite. There are many tales about the seriousness of the bite and it is feared like a rattlesnake in parts of Mexico. It feeds on humans, deer and swallows.

**Lone star ticks (Ixodidae - *Amblyomma americanum*)**

The female Lone star tick has star-shaped marking on its back, hence its name.

They are found from Texas, through the south-central midwest states to the east coast.

Medical: Rocky Mountain spotted fever, ehrlichiosis, tularemia and STARI (Southern Tick Associated Rash Illness).

**Gulf coast ticks (Ixodidae - *Amblyomma maculatum*)**

The larvae feed on birds and rodents, while the adults feed on deer and other large mammal. It is found along the Atlantic coast the Gulf of Mexico.

Medical: It can transmit a form of Rocky Mountain spotted fever as well as canine hepatozoonosis

**Rocky Mountain wood ticks (Ixodidae - *Dermacentor andersoni*)**

Rocky Mountain wood tick immatures feed on rodents and rabbits. Adults feed on cattles, sheep, deer, humans and other large mammals. They are found from the western counties of Nebraska and the Black Hills of South Dakota to the Cascade and Sierra Nevada Mountains, and from northern Arizona and northern New Mexico in the United States to British Columbia, Alberta, and Saskatchewan in Canada. Medical: Rocky mountain spotted fever, tick paralysis and tularemia.

**Pacific coast ticks (Ixodidae - *Dermacentor occidentalis*)**

Immatures feed on small mammals, adults feed on larger domestic animals, deer and humans. This tick is found in Oregon and California. Medical: Rocky Mountain spotted fever, tularemia, bovine anaplasmosis, Colorado tick fever, 364D Rickettsiosis.

**American dog ticks (Ixodidae - *Dermacentor variabilis*)**

American dog tick immatures feed on small mammals, preferably rodents. Adults feed on domestic dogs and will readily bite humans. They are found throughout the eastern portion of the country as well as in Idaho, Oregon, Washington and California. Medical: Rocky Mountain spotted fever pathogen and bacterium causing tularemia. It may cause canine paralysis and bovine anaplasmosis and tick paralysis.

**Black-legged ticks (Ixodidae - *Ixodes* spp.)**

The female black-legged tick is red and brown, while the male is much darker. They are also known as deer ticks and bear ticks. Immatures feed on various small mammals, birds and lizards. Adults feed on the large mammals such as deer, elk and bears. They will bite humans. The western black-legged tick (*Ixodes pacificus*) is found in Washington, Oregon, California, Idaho, Nevada and Utah. The eastern black-legged tick (*Ixodes scapularis*) is found throughout much of the eastern United States.

Medical: Both black-legged ticks can transmit Lyme disease as well as anaplasmosis and babesiosis

**Brown dog ticks (*Ixodidae - Rhipicephalus sanguineus*)**

Brown dog ticks are found worldwide, mostly in warmer areas. It is small and reddish-brown in color. Females can lay up to 5000 eggs, depending on the amount of blood consumed. Immatures feed on a variety of animals. Adults feed on domestic dogs and occasionally bite humans.

Medical: In dogs, it can transmit canine ehrlichiosis and canine babesia. It has recently been identified as a reservoir for Rocky Mountain spotted fever in the southwest.

**TERMITES and WOOD-DESTROYING BEETLES**

The purpose of this manual is to help realtors and homeowners to be assured they have competent termite inspections and treatments, if treatments are necessary. There will be information on termite biology and how much damage they can do and information on other wood-destroying insects that may be present. Termites inspections are very important if you are buying a house and also, if you are a realtor. There was a recent situation where a buyer bought a house and didn't request a termite inspection and his realtor did not either. After closing and moving in, he was remodeling and found a severe termite infestation. He is suing his realtor for not requiring an inspection. In some states, it is not required that you have a real estate inspection when you buy a home although some mortgage companies require it. If you are buying a home, ask your realtor to arrange an inspection and if you are a realtor, it is in your best interest to recommend an inspection in every home sale.

Termites are very common and the inspector should also be able to tell you which species you have. One species is the arid land subterranean termite. They do minimal damage in most cases but occasionally they can do a lot of damage if they aren't treated. The Eastern subterranean termite is found throughout the eastern and central portion of the country and is found as far west as eastern NM. These termites are very destructive. The third kind is the drywood termite. They are common in California and frequently infest homes. They should also check for other wood destroying insects including powder post beetles, false powder post beetles, long-horned borers, metallic wood borers and carpenter ants. There was a case a number of years ago where a termite inspector didn't find any evidence of subterranean termites in a house and he cleared it, but he walked right by evidence of drywood termites. He wasn't aware of drywood termites and he ended up having to pay for the fumigation that was done on the house and he went out of business. Another fellow inspected and cleared a house and when the homeowner went up in the attic, he fell through the kitchen ceiling because of wood boring beetle damage. The inspector didn't recognize wood boring beetle damage or didn't go up in the attic. Make sure any inspector you hire is qualified.

When you hire an inspector, it is best to hire someone who is not in the termite treatment business, basically someone who has no vested interest in finding termites. If termites are found, make sure you hire a good company to treat for them. When they make a graph of your home, make sure they measure the depth of the footer as most termiticide labels require them to treat the soil down to the footer. Many companies just measure the house and base their price on using four gallons of termiticide per ten linear feet. In reality, they should use four gallons of termiticide per ten linear feet, per foot of depth of footer. If the footer is 2 feet deep, they should then use eight gallons of termiticide per ten linear feet. If they don't follow the label, not only are they not doing the job properly, they are doing it illegally as the label is the law.

Insist that the graph is completely legible. Many are drawn so poorly it is hard to determine what the treatment procedure is and where the termite damage is. It should be clear and easy to read and understand and should include all required measurements. If the graph isn't as it should be, call another company.

Most importantly, if you are a realtor, make sure any home you sell or buy has a termite inspection before the sale is closed. It could prevent a lot of problems in the future. In the case above, the buyer eventually had the home treated, but it was done improperly as the footer was much deeper than a foot. The buyer is now going to sue the termite company.

### **Termites (Isoptera)**

There are close to 2500 species of termites described worldwide. If you weighed all of the termites, they would weigh twice as much as all of the humans on the planet. There are over 50 species in the United States, but only a few species of subterranean termites and drywood termites are serious pests.

#### **Drywood termites (Kalotermitidae – *Incisitermes* spp.)**

Drywood termites do not need soil contact. They live in dry, sound wood, usually near the surface. They get what moisture they require from the wood they feed on and from the water formed during digestion of that wood. Drywood swarmers generally enter your home at night through unscreened attic or foundation vents or through cracks and crevices between exposed wood. Drywood termites are most commonly recognized by their distinctive fecal pellets (piles) that are often the color of the wood they are feeding upon. The fecal pellets are kicked out of the wood by the nymphs (workers) through “kick holes” that are visible. *Incisitermes minor* is found in much of California where it is a major pest. It is also found in Arizona, Utah and New Mexico. *Incisitermes snyderi*, *Incisitermes schwarzi* and *Kalotermes approximatus* are species found in the southeastern states that are of economic importance because of the damage they are capable of doing.

#### **Subterranean termites (Rhinotermitidae)**

Subterranean termites are social insects with very large colonies. They consist of a queen, sexual reproductives, workers and soldiers. The workers are grayish or white and wingless. They are the ones in the colony that forage for food. They also groom the queens, eggs, nymphs and soldiers and build the nest. Workers are the ones who do the damage to the wood. The workers have a mass of unique genera and species of oxymonad, trichomonad, and hypermastigote flagellates (protozoa) in their lower digestive tract and it is these protozoans that enable the termites to digest wood. When the protozoans are killed, the termites will quickly starve and the entire colony will die off as the workers feed the other caste members in the colony through a process call trophallaxis. Trophallaxis is food sharing between members of the same colony and is what makes products such as borates so effective.

#### **Western subterranean termites (*Reticulitermes hesperus*)**

Western subterranean termites are found from British Colombia south to western Mexico and is very common along the Pacific coastal areas. It occurs as far east as Idaho and Nevada. Their colonies can reach several hundred thousand individuals and the colony has to be about three years old before they can swarm. They do extensive damage and will attack fence posts, utility poles, any wood products on the ground and living plants and trees.

#### **Eastern subterranean termites (*Reticulitermes flavipes*)**

The eastern subterranean termite is the most destructive species in this group. It is found throughout the eastern United States and is found as far west as eastern New Mexico. It occurs in spotty areas of Utah and Arizona as well. It has very large colonies numbering ¼ million individuals. They go below the frost line during extreme cold weather. It builds earth-like shelter tubes over obstacles to get to food sources.

### **Arid land subterranean termites (*Reticulitermes tibialis*)**

The arid land subterranean termites are found in arid desert areas and higher elevations and ranges from Oregon and Montana, south to Mexico and eastward to Missouri, Arkansas and Texas. This is the most common termite in New Mexico. It is the least destructive of the termites in this group, although it can cause considerable damage in some situations.

### **Desert subterranean termites (*Heterotermes aureus*)**

The desert subterranean termites are found in desert regions of southern Arizona and California. It is common in the Phoenix area but not as common near Tucson. This termite is very destructive. It will attack sound dry wood, utility poles and posts. It will build earth-like tube shelters over obstacles to get to edible wood. The western subterranean and arid land termites rarely build these tube-like shelters.

### **Formosan subterranean termites (*Coptotermes formosanus*)**

Formosan termites are larger than our native subterranean termites. They were introduced from Asia on ships. They are very destructive and attack all kinds of wood and cellulose products. They will also attack living plants when moisture is not available anywhere else. They have been known to hollow a building wall in three months in Hawaii. They can also attack and become established on wooden ship hulls and in this way, be transported from port to port. Evidence of their presence are channels between pieces of wood. Passageways or dirt-colored tubes are usually built on foundations. They do not have to maintain ground contact if adequate moisture is available, so a normal subterranean treatment may not be effective. Colonies are large and contain several hundred thousand individuals.

Formosan termites are established in Hawaii and have been introduced in Texas, Louisiana and South Carolina and have had isolated cases found in California.

## **Subterranean Termite Control**

Over a half million homes are treated every year with toxic pesticides to control these insects. In nature, they are beneficial insects as they break down dead wood and consume it. If it weren't for termites there would be a lot of dead trees laying around. Unfortunately, termites can't differentiate a dead tree from the wood in your house.

If you have a home built on a slab and you have had a termite job performed recently, you may want to read this carefully and also make sure your guarantee is still available. Subterranean termites live in the soil and enter homes through the expansion joint between the foundation and the main slab or through a crack in the slab or around plumbing that penetrates the slab. Up until a couple of years ago, a termite crew would drill holes in the slab along the inside of the house and then treat the soil around the outside of the house. The purpose was to prevent termites from entering from the expansion joint or from coming up the outside of the house under the stucco. Recently, two termiticides, Termidor and Premise, have put out labels that allow the outside of the house to be treated as well as the area inside where the termites are active. They no longer have to drill the inside slab which often involves pulling carpet and drilling through tiles.

Many companies that do termite work drill holes in sidewalks, patios and other concrete areas that are next to the home, then they use a sub-slab injector to pump the termiticide into the holes. This is contrary to what the label says and the label is that law. Also it does not effectively protect your house from termites. The Termidor label says:

*Where physical obstructions, such as concrete walkways adjacent to foundation elements, prevent trenching, treatment may be made by rodding alone. When soil type and/or conditions make trenching*

*prohibitive, rodding may be used with rod holes no more than 12 inches apart. Exterior drilling and treatment of sub-soil is necessary for concrete structures adjoining the foundation such as patios, porches and sidewalks, to complete the exterior perimeter treatment zone. For driveways, exterior drilling is necessary only around building supports or wall elements that are permanently and physically located at driveway joints. Rod holes must be spaced so as to achieve a continuous treatment zone and in no case be more than 12 inches apart.*

The label is pretty clear that these areas have to be rodded and the termite folks should be making holes large enough to insert their ground rods. Otherwise they aren't going to be able to get the material to the footer as the label specifies. They are basically spraying the top of the ground beneath the concrete slab. If the material would leach down to the footer there wouldn't be any reason to trench and rod, they could just spray the surface around the house.

Treating outside concrete slabs with a sub-slab injector is similar to spraying baseboards, It is for show only and doesn't really do any good. The only way to effectively treat a slab would be with a four-foot ground rod inserted into the drilled holes. The purpose of getting the termiticide down to the footer is to prevent termites from coming in contact with it and then climbing up the inside of the footer and entering the home. If they only use a sub-slab injector the termites can and will crawl under the termiticide and be able to enter the home.

When you get a bid for termite control, make sure that the representative has determined the depth of the footer on your house. They cannot calibrate the amount of termiticide they will use if they don't know that information. If they give you a bid without knowing the depth of the footer, they are using the 4 gallons per 10 linear foot formula. However, that formula is for one foot of depth of footer. If the footer is 2 feet deep, then they have to use twice as much termiticide or 8 gallons per 10 linear feet. In other words, they will use the one-foot depth formula no matter how deep your footer is if they don't measure it. That is contrary to the label and illegal. If you have to remind them to measure the depth of the footer, then you probably ought to call another company

### **Drywood Termite Control**

Drywood termites are a major wood destroying insect that cost consumers many millions of dollars in damage and control. One estimate suggested Californians alone spend \$250 million dollars a year on this insect.

For many years the primary method of controlling drywood termites was to use sulfuryl fluoride (Vikane) as a fumigant. The house had to be wrapped and sealed and the gas injected. It was and still is a major inconvenience for homeowners as they had to do a lot to prepare for the fumigation as well as stay out of the house overnight. It was thought that once the house was cleared that the fumigant would dissipate harmlessly into the atmosphere. A recent study by the University of California at Irvine has destroyed that myth. It turns out that sulfuryl fluoride is a major greenhouse gas that can last about 30 years in the atmosphere and may last up to 100 years. This study can be found at (<http://www.sciencedaily.com/releases/2009/01/090121144059.htm>). Another study by the Scripps Institute of Oceanography confirms Irvine's findings. It can be found at (<http://scrippsnews.ucsd.edu/Releases/?releaseID=965>). The Scripps study says researchers calculated that one kilogram of sulfuryl fluoride emitted into the atmosphere has a global warming potential approximately 4,800 times greater than one kilogram of carbon dioxide. That is pretty impressive. With the amount of carbon dioxide in the atmosphere now and helping cause global warming, Also homes and commercial buildings are built differently now than when sulfuryl fluoride was in its

prime. The homes made today are constructed much tighter to control energy and that can impede the flow of gas throughout the building leaving some areas untreated. This is one reason why fumigation has a higher re-infestation rate than orange oil treatments.

Vikane is the trade name for sulfuryl fluoride gas. Vikane is extremely hazardous and carries the skull & crossbones poison label [1](#).

There are some incidents worth mentioning. The San Diego Union-Tribune, on March 10, 2005 reported that a 39-year old woman was in a tented building that was fumigated with sulfuryl fluoride. She screamed for help and was removed from the building but she died.

In another case two families (eleven people in total) in an adjacent house to the fumigation were not evacuated in advance of the fumigation and had no reason to suspect anything was amiss as sulfuryl fluoride, the highly toxic gas used, is odorless and colorless. The only person to have remained at home throughout the duration of the fumigation started to feel ill by the evening, experiencing nausea, vomiting, diarrhea, and itchiness. The 39-year old father of three was admitted to hospital the following day but after three hours stopped breathing and died of heart failure shortly after. The remaining ten people who had been in the adjacent building all experienced symptoms of poisoning.

Finally, two fatalities occurred when the owners of a home re-entered after the dwelling had been fumigated with 250 pounds of sulfuryl fluoride. The concentration to which the occupants were exposed was not determined. The man died within 24 hours, and the woman expired 6 days after exposure. Signs of intoxication included severe dyspnea, cough, generalized seizure, cardiopulmonary arrest (in the man), and weakness, anorexia, nausea, repeated vomiting, and hypoxemia.

These three incidents occurred over a number of years and only one was in California. However, the common denominator in all incidents was the use of sulfuryl fluoride to control drywood termites or a wood boring beetle. Sure the incidents are rare, but why would anyone want to take a chance on having their family exposed to this kind of extremely dangerous product when safer and effective alternatives are available?

There have been other methods of control tried but most only allow spot treatments. Microwaves, heat, cold and electro guns are a few. Heat has actually progressed to where it is considered sufficient to control termites in the entire house. There is a lot of preparation needed for heat treatment and the time and labor cost is reflected in your bill for the treatment. It takes six to eight hours to heat a piece of wood internally to 125° Fahrenheit. In addition, the pretreatment preparation required of the homeowner is extensive and, if not completed properly, heat can be extremely damaging to property, such as plastics, electronics, and many other items. and there was at least one instance of a house exploding because of the heat and propane gas. I can't recommend this treatment.

Approximately twenty years ago orange oil became a player in termite control and a very good player indeed. While there are several kinds of orange oil available to the pest control professional, one brand, XT-2000 stands out. It is the only orange oil formulation that can be used to treat entire homes. The others are only good for spot treatments. Orange oil is unique in that the capillary action of the product works in many ways like fumigation, but without the same risks! XT-2000 Orange Oil moves through wood like a gas, along the path of least resistance, filling up the treated piece of wood until the termites have no place to hide. Unlike fumigation, XT-2000 Orange Oil treatments are specifically targeted to the area of infestation, so you do not need to move out of your home during the treatment.

Because of sophisticated optical equipment such as the borescope, inspectors have the ability to locate otherwise hidden termite problems and treat them. Since orange oil has come on the scene, hundreds of thousands of buildings have been treated. This includes homes, churches, schools, apartment complexes and assorted commercial buildings. There has been a very low callback rate with this treatment which demonstrates the effectiveness of the orange oil.

If you think you have drywood termites, find a company that uses orange oil to inspect your home and treat it. It is much safer and more effective than fumigating your home. There are other wood destroying insects that can be problematic in homes. There are four groups of beetles and carpenter ants.

### **False powder post beetles (Anobiidae & Bostrichidae)**

There are a number of species of beetles in this family that attack wood. They will attack new and old hardwoods and softwoods, with a 12% moisture content. They are recognized by their hood-like thorax that hides the head when viewed from above. They have a cylindrical body shape and are reddish-brown to brownish-black in color. They are often found infesting wood joists and sill plates in crawl spaces under homes. Two common species are the deathwatch beetle (*Xestobium rufovillosum*), the furniture beetle (*Anobium punctatum*). The furniture beetle will infest furniture and pine flooring. Other beetles in these two families include the California deathwatch beetle (*Hadrobregmus gibbicollis*) which occurs along the Pacific Coast. *Xyletinus pelatus* (no common name) is found in the eastern United States and attacks cellar joists and flooring in damp buildings. *Nicobium castaenum* (no common name) is found in Virginia, South Carolina to Louisiana and attacks furniture and pine woodwork. The lead cable borer (*Scobicia declivis*) normally infests dead and seasoning oak and damage can be severe. It is found throughout the west and is most common in California. The best method of control for all wood-boring beetles is to treat all exposed wood with a sodium borate, which will prevent them from re-infesting the wood after they emerge.

### **Powder post beetles (Bostrichinae; Lyctinae – *Lyctus* spp.)**

Powder post beetles are small, elongate and almost always infest hardwoods. They frequently infest lumber, woodwork, furniture, tool handles, gun stocks and similar items. They produce very fine, powder-like frass when they damage wood. Frass from anobiids and bostrichids is not nearly as fine as these beetles produce. They are second only to termites in destructive capability. There are several destructive species nationwide. The brown powder-post beetle (*Lyctus brunneus*) found in most states and is frequently found infesting imported hardwood products. The western powder-post beetle (*Lyctus cavicollis*) is found throughout the United States and attacks oak firewood and hickory, orange and eucalyptus wood. The European powder-post beetle (*Lyctus linearis*) is found in the eastern United States and attacks hickory, oak, ash, walnut and wild cherry wood. The southern powder-post beetle (*Lyctus planicollis*) is found nationwide but does most of its damage in the southern states. It prefers seasoned or partially seasoned wood of oak, ash and hickory. The white-marked powder-post beetle (*Trogoxylon parallelipipedum*) is a common native species and has the same food preferences as the southern powder-post beetle. XT-2000 Orange Oil can be used to control powder post beetles. It has to be injected into the wood where the activity is. It is important to treat unfinished wood with a sodium borate to prevent future infestations.

### **Long-horned borers (Cerambycidae)**

Only a few species of long-horned beetles are pests of wood in homes. The old house borer (*Hylotrupes bajulus*) is probably the most destructive species in this family of beetles. It is found from Maine to Florida and west to Michigan to Texas. There have been some reports of this beetle in

California. They are between ½ and ¾ inches long and are slightly flattened. They are brownish-black in color. Each wing cover has a gray band on it.

They are usually built into a house with wood from storage as adults have been found at lumber mills in seasoned and unseasoned wood. The frass is slightly granular and composed of small, barrel-shaped pellets of digested wood and irregular shaped wood fragments that were not eaten. The larvae can feed on the wood from 2 to 10 years before maturing into adulthood, depending on environmental conditions. All unfinished wood should be treated with a sodium borate.

### **Metallic wood borers (Buprestidae)**

The larval form of these beetles are called flat-headed borers, because the exit holes in the wood are oval, not round as in most other wood boring beetle larvae. Only a few species will attack seasoned wood, so they aren't a serious pest. The adult beetles are often brightly colored and metallic. They are boat shaped in appearance. The most destructive species is the golden metallic borer (*Buprestis aurulenta*). The wings are greenish-blue with copper margins. They will attack flooring and woodwork of Douglas fir that isn't finished with paint or varnish. Wood should be finished or treated with a sodium borate. They also feed on pine and spruce lumber. These beetles are found throughout western United States.

### **How to Pick a Termite Company**

The first part of termite control is hiring a competent wood destroying insect inspector to see what kind of pests you may have. Proper identification of the pest is essential if control is going to be successful. They absolutely have to know exactly which species of termites are infesting your home, not just the general description of either "subterranean" or "drywood" termites. Different species have different habits, different size colonies and do varying amounts of damage. If you are going to pay a lot of money to control these pests, you should know exactly what they are. If your inspector doesn't know what they are, then hire someone else

### **In Summation;**

If the termite inspector doesn't go into a crawl space and/or attic when inspecting your house, don't let them bid on the work. If they don't make a clear and thorough graph and fail to give you a copy if they do make one, don't use them. As mentioned earlier, if the inspector doesn't measure the depth of your footer, then call another company. They can't determine the amount of termiticide they need without that information. And, if the inspector isn't dressed respectfully, I would recommend calling someone else as he doesn't have respect for his company, the industry or you, his client.

Never let a company, no matter how "nice" the representative may be, fumigate your house with sulfuryl fluoride. It is not safe, it is a major greenhouse gas contributor and it puts more carbon dioxide into the atmosphere than automobiles. Go with XT-2000. It is safe, it is effective and it is environmentally friendly.

## **PEST-PROOFING A HOUSE**

The purpose of pest-proofing your home is to help keep cockroaches, ants, scorpions, centipedes, spiders, rodents and other pests out. It will also allow you to not have to hire a pest control company to spray pesticides all around your home or in it. Along with pest proofing your house, you need to remember to keep all of your sink, tub and floor drains closed at night. This will prevent cockroaches from coming up the drains from the sewer system or septic tank. If you don't have a drain cover, you can fill a Ziploc bag with water and place it over the drain. That will keep the roaches out.

The first step is installing door sweeps on all outside doors that need them. If you can slide a piece of paper under a door, it needs a door sweep. Also add a door sweep to a door going into the garage.

Don't leave any debris laying around the house. This is a good hiding place for cockroaches, scorpions and centipedes. If you have firewood, stack it away from the house as it will attract black widows.

When you have branches touching the house or roof, it will allow acrobat ants and carpenter ants access. You should trim them back and keep them from touching the roof during the warm months. Also, you should sweep down any spider webs anywhere around the outside of the house.

When you get to the garage, you will probably find that the door doesn't close tightly and never will. There are almost always small areas at either side of the door when any insect or rodent can get in. As mentioned earlier, make sure there are door sweeps on the door entering the house. Put Niban Bait in any areas behind storage or shelves where roaches can hide. Niban will last three or four months, so you only need to apply it a couple of times a year. Niban is made from boric acid.

This procedure will keep most crawling insects and other arthropods out of your house. Keep anything that pests can hide in or under away from your house and don't leave outside lights on any longer than necessary as they attract insects. You still may get yellowjackets, wasps, or other pests outside that will require the help of a pest management professional. Check your home every few months to make sure all of the work you did is still in place and effective.

## **LAWN & ORNAMENTAL PESTS**

You can prevent pests in some cases by treating the soil around your garden plants with food-grade diatomaceous earth, ground pepper, talcum powder, Comet Cleanser or Tide laundry soap. Very few insects will crawl through any of those materials.

It is helpful to monitor your plants to see what pests may be present. If you have a night light in the area, that may attract some potential pest beetles and moths, which you might otherwise not know of their presence to they do damage. You can also put yellow sticky traps in various parts of your yards. They will attract various pest insects. I have had good luck using bright yellow, stiff paper and coating it with petroleum jelly. A white bucket filled with water and a cup of liquid soap to destroy the surface tension will also attract some pests and they will drown in the bucket.

Spraying infested plants with a mixture of half water and half isopropyl alcohol, mixed with a dash of dishsoap will also kill many insect pests. Make sure to test this product, and others mentioned, on some leaves of any plants that may be sensitive, so they aren't negatively affected.

It is also a good idea to put pieces of flat boards, about a foot by two feet, on the ground in various places in your garden. Many pests will use these boards to hide and you can find them in the morning and dispose of them.

Here are some other recipes you may want to try. Some of them are recommended for certain pests listed below.

**A)** If you have mites, try mixing 4 tablespoons of buttermilk with a cup of all-purpose flour and a gallon of water. This mixture will suffocate the mites.

**B)** Crush 3 oz. of garlic cloves and mix with 1 oz. of mineral oil. Let this mixture stand overnight, then strain. Mix 1 teaspoon of fish oil and one tablespoon of castile soap with a quart of water. Slowly combine the garlic mix with the fish oil mix. Then mix two tablespoons of this mixture with a pint of water in a sprayer. This is also effective on mites.

**C)** For most insects, you can mix ½ cup of Tabasco sauce with one onion and a half dozen cloves of garlic in a blender with 2 cups of water. Blend the material and let it stand for 24 hours. Then add two more cups of water and a tablespoon of liquid dishwashing soap.

**D)** It may be easier to mix one tablespoon of a mild dish soap plus one teaspoon of a vegetable cooking oil with one quart of water. This can be sprayed on all plants. Remember to spray both the top and the underside of the leaves.

You can mix 1 cup of flour with ½ cup of salt for caterpillars. Make sure you mist the plants before applying the flour/salt powder.

Some of these remedies are mentioned in the text on certain species, but most of them can be used on all pests, unless otherwise noted.

## THE PESTS

The list of pests below certainly doesn't include all known garden/lawn pests. I tried to include the ones the homeowner will most likely encounter in their garden. There are certainly some that may show up that aren't on this list. If so, I would recommend treatment methods that would be the same for closely related species.

### Mollusks

#### **Snails (Helicidae) & Slugs (Limacidae)**

Snails and slugs are terrestrial mollusks. Snails have shells while slugs do not. There are a great many species, but only a few are pests in gardens. They will feed on a wide variety of plants and are most active at night or after rains. They often leave large, jagged holes in the leaves of plants they are feeding on.

The best method of control is to put DE under and around all plants you want to protect as they will not crawl over it. You can also trap them with small pans of beer in the yard. The good news is the beer will also attract and kill any cockroaches in the yard. Never use a commercial snail bait that contains methaldehyde as this is very dangerous to dogs.

## Crustaceans

### Sowbugs (Porcellionidae) & Pillbugs (Armadillidiidae)

Sowbugs and pillbugs, which are also called woodlice, are crustaceans, not insects. They require a lot of moisture where they live. Sowbugs (*Porcellio laevis*) & Pillbugs (*Armadillium vulgare*) are actually beneficial as they are excellent decomposers. Pillbugs can roll up into a ball when threatened. My son use to call them baseballbugs. Sowbugs cannot roll up into a ball.

They aren't major pests, but will damage bean sprouts. They can be kept away from plants by putting DE on the ground around the base of the plants.

## Insects

### Springtails (Collembola)

Springtails are very small, wingless insects. Some are brown or gray, while other are brightly colored. They have a structure (furcula) on their underside that enables them to jump when suddenly straightened out.

Springtails are probably the most abundant non-social insect on the planet. There are approximately 650 species in the United States alone and they are found in both the Arctic and Antarctic. They can be very common in damp, organic soil where they feed on fungus. Large numbers in any area will show that the soil is healthy. They rarely cause any damage to plants, but will occasionally feed on young shoots. One species, the garden springtail (*Bourletiella hortensis*), is a potential pest in some situations including in houseplants.

Contrary to what some people believe, springtails are not capable of infesting human beings. This is a myth that is often found on the internet.

You can control them by mixing DE with the soil they are in. In houseplants it would be a good idea to dry the soil out to eliminate any mold or fungi that they may be feeding on.

### Grasshoppers & Crickets (Orthoptera)

Grasshoppers are primitive insects with a gradual metamorphosis. They lay eggs, which hatch into nymphs. The nymphs molt several times until adulthood is reached and they can reproduce. They vary in size and have enlarged hind legs that enables them to jump.

### Grasshoppers (Acrididae)

Grasshoppers are very common and there are numerous species, many of which will get into gardens and feast. They are most troublesome in semiarid areas as they are attracted to the watering of gardens and lawns. They are very common from Montana to Minnesota and south to New Mexico and Texas. This is normally a very dry area.

If you have grasshoppers you can spray your plants with formula C or you can mix 2 cups of DE with a gallon of water and spray the plants. Also put dry DE on the ground under and around all plants. If you prefer, you can bury a large can to the top, fill it about a quarter way with water and molasses. The grasshoppers will go in and be unable to get out.

## **True bugs (Hemiptera)**

The insects in this order used to be separated into two orders, Homoptera, which contained the aphids, scale insects and some others, and the Hemiptera, which were the True Bugs. They have recently been joined into a single order, Hemiptera.

### **Chinch Bugs (Lygaeidae – *Blissus leucopterus*)**

Although most of the bugs in this group feed on seeds, some, like the chinch bug, feed on sap. Chinch bugs are common pests in corn, grain, St. Augustine grass, fescue, bentgrass, Kentucky bluegrass and zoysiagrass. They cause brownish circular patches to develop in the grass. Chinch bugs are small, grayish-black insects with white wings. They are found in one form or another in the eastern two-thirds of the U.S. and in southeast Canada. You can tell if chinch bugs are present by pushing a coffee can with both ends removed, about two inches into the soil and filling it with soapy water. If chinch bugs are present, they will float to the top. One good method of controlling them is to soak the areas with a mixture of 2 cups of DE with a gallon of water. Spray all the areas where chinch bugs are present.

### **Tarnished Plant Bugs (Lygaeidae - *Lygus lineolaris*)**

The tarnished plant bugs (*Lygus lineolaris*) is common in the eastern and central states but is found nationwide. It is yellowish in color with black or brown mottling on its body. They are found in most of the eastern and central states. They feed on a wide variety of fruits, vegetables, legumes, and other plants, including alfalfa, cotton, strawberries and most fruit trees. You can use spray formula **D** in garden areas and then wet all the plants and dust them with DE. You can also put small boards, about one foot by two feet in various parts of your garden where potential pests can hide. In the morning, you can turn the boards over and dispose of any hiding pest.

### **Brown Marmorated Stink Bugs (Pentatomidae - *Halyomorpha halys*)**

One of the most serious pests in this family is the brown marmorated stink bug. This bug was introduced from Asia in 1998 and has spread to at least 34 states. They are brownish in color on top and bottom and have gray, whitish, blue, gray and black markings. It is a major pest of a variety of fruits and vegetables, including peaches, apples, cherries, raspberries, pears, green beans and soybeans. They also invade homes in the fall to overwinter in a nice, warm house.

Since this bug is so destructive, the Dept. of Agriculture has developed a pheromone that can be used in a trap. In a garden area, I would recommend dusting all of your plants with DE after misting them.

### **Harlequin Bugs (Pentatomidae - *Murgantia histrionica*)**

Another serious pest is the harlequin bug, which feeds on cabbage and related plants throughout the south where it is very common. The harlequin bug is bright orange with black markings. It is found throughout the south and has been found as far north as New England. The best method of control in the garden is probably to use row covers that cover the plant. Row covers are available in garden shops. Misting your plants and then dusting them with DE will also help.

### **Squash Bugs (Coreidae - *Anasa tristis*)**

Members of this family are large, thick-bodied and dark in color. The membrane of the front wing contains many veins, which is easy to see. Leaf-footed bugs are in this family and occasionally enter homes. They are not garden pests. The main garden pest in this family is the squash bug. This species feeds on squash, cucumbers and pumpkins and is a major pest. It is a good idea to put small, flat boards in the garden where these bugs live. They will hide out under the boards in the daytime,

allowing you to find them and dispose of them. This also works for cutworms as they hide during the day. I also recommend misting all the squash or other plants and then dusting them with DE to discourage the bugs. Or you can spray them with spray formula **D**, or Greenbug for Outdoors.

### **Kissing Bugs (Reduviidae – *Triatoma* spp.)**

We need to be aware of kissing bugs, AKA conenose bugs, assassin bugs and Mexican bedbugs. A bite from one of these bugs can result in anaphylaxis in sensitive individuals. There are about 15 species of kissing bugs (genus *Triatoma*) in the U.S. and they are found in the southwestern states. The true kissing bugs from South America will come into bed at night and bite a person on or around their lips. They are attracted to the carbon dioxide we exhale.

Adults are ½ to 1 inch long, brownish-black, broad, flat, but stout-bodied, with 6 reddish-orange spots on each side of the abdomen, above and below. It has an elongated, cone-shaped head, from which it derives its nickname, conenose bug. The beak is slender and tapered and almost bare. Its wings are normally folded across the back while resting or crawling and not usually noticed by the casual observer. These insects will feed on any animal, including humans, but they prefer rodents, particularly packrats in our area. If a packrat has a midden (nest) near your house, the kissing bugs may find their way inside and hide under furniture, between mattresses or in closets during the day. At night, they venture out in search of a blood meal, which may be a sleeping pet or human.

The bite of the kissing bug is painless because its saliva contains an anesthetic. People are usually awakened by itching, swelling, rapid heart beat, or other reactive symptoms caused by the bite and not when they are bitten. A full blood meal requires an average of ten minutes, and the numerous bites the victim sees may be due to a disturbance during feeding, which causes the insect to reinsert its proboscis, the tubular feeding structure. As mentioned earlier, anaphylactic reactions may occur, with weakness, sweating, nausea, abdominal cramping, vaginal bleeding, and vascular collapse. It should be noted that individuals who are bitten often develop a greater sensitivity to the bites. In South and Central America, kissing bugs are vectors of chagas disease. Some people find the bites on their bodies and assume they have bed bugs.

In order to control these insects, you need to inspect your property periodically. During the daytime the kissing bugs seek dark places to hide, so look beneath flower pots and outdoor furniture, especially those that sit nearly flush with the ground. Check your sheds, garage, and under porches. All cracks and openings into buildings should be sealed as completely as possible. Entry into the home does not require a large opening. They are attracted to light, so keep your curtains closed at night so they aren't attracted to your indoor lights. Make sure your doors close tightly and your windows and screens are not loose.

If you find a packrat nest you should remove it. Use a shovel and put the nest material in a trash bag and dispose of it. Then treat the area with a safe product such as Greenbug for Outside. You can also put a light layer of diatomaceous earth over the area. This will not only kill any kissing bugs in the nest, but also any other ectoparasites that may be present. What other ectoparasites do they carry? There are 107 species of fleas in NM and packrats can be host to up to 37 species.

After removing the nests, put some cotton balls soaked in peppermint essential oil in the area to discourage the packrats from rebuilding their nests in the same area. Hopefully they will just leave your property.

### **Aphids (Aphididae)**

Aphids are very small, soft-bodied insects. Some of adults may have wings, others are wingless. The winged forms are produced because of environmental developments such as temperature or moisture. Aphids are sometimes called plantlice and their common names often reflect the plants they prefer. They produce a honeydew secretion that is very popular with ants, particularly *Crematogaster* spp. (nicknamed acrobat ants). Aphids feed on the plants by sucking sap and they can spread viral diseases, cause galls to form and in some cases, cause the leaves to curl.

One important pest species is the greenbug aphid (*Schizaphis graminum*). This species is a major pest in Kentucky blue grass and will feed on many other grasses. It also feeds on oats, rice, rye and wheat crops. This aphid also has developed a resistance to several pesticides. It is found throughout the United States and much of Canada. It is also found in South America, Europe, Asia and Africa. You can control greenbugs in lawns by using Greenbug for Outdoors in your irrigation system.

Other common pest aphid species are the green peach aphid (*Myzus persicae*), the cotton aphids (*Aphis gossypii*) and rose aphid (*Macrosiphum rosae*). The green peach aphid feeds on various vegetables including lettuce, spinach, potatoes, tomatoes and others. The cotton aphid feeds on cotton, citrus, asparagus, beans, clover, spinach, strawberries, tomatoes and other food plants as well as begonia, ivy, violets and even weeds. The rose aphid feeds on roses and will also attack house plants.

Many other species of aphids will get on most garden crops. The best control is to routinely spray the plants with a pressure wash to dislodge the aphids which will fall to the ground and become prey for spiders and other predatory arthropods. You can mix two cups of food grade diatomaceous earth in a gallon of water and spray the plants as well. Another good spray consists of ½ water and ½ Listerine mouthwash. This spray will discourage lots of pests on your plants. This mixture is also a very good mosquito repellent.

You can also put some soapy water in a yellow bowl and attract aphids which will drown. They are attracted to the color yellow. You can also trap them by putting petroleum jelly or honey on yellow index cards. You don't want to spray pesticides as you will kill many insects that like to feed on aphids, such as praying mantids, ladybird beetles, green lacewing larvae, Syrphid flies, soldier beetles and some wasps. Spiders, small wrens and other birds feed on aphids and will be endangered by pesticides.

### **Spittlebugs (Cercopidae)**

Spittlebugs are small, hopping insects that are usually brown or gray in color. They are not pests in gardens, but they can damage some grasses, particularly bermudagrass. They also feed on a variety of weeds, shrubs and some trees. They are called spittlebugs because the nymphs are covered in a mass of white spittle-like froth, which provides them with necessary moisture and hides them from predators. The two-lined spittlebugs (*Prosapia bicincta*) is primarily a pest on bermudagrass but also feeds on other woody plants. It is found in the eastern half of the United States.

Spraying the areas where they are found with a solution of 2 cups of DE per gallon of water, should help keep them under control. It would be a good idea to use Greenbug for Outdoors in your irrigation system as well.

### **Brown Soft Scales (Coccidae - *Coccus hesperidum*)**

Female scale insects are oval in shape and usually convex, but some species are flat. They have a hard cuticle that is either smooth or covered with a wax-like material. Most scale insects feed on plants and

some are serious pests of crops. They are not a major pest in home gardens, but there is one species that is very common on houseplants. The brown soft scale (*Coccus hesperidum*) is found in houseplants all over the world. It is found on some outside plants in tropical and subtropical areas. It will feed on a variety of flowering plants and ornamental foliage but is particularly fond of ferns.

Because of their scale-like body wall, they can be difficult to treat. If you have plants that are heavily infested, it would be best to discard them. You can remove them individually from plants by swabbing them with a mixture of alcohol and water or dish soap and water.

### **Mealybugs (Pseudococcidae)**

Mealybugs are basically the same as scales, without the armor. The females and nymphs are covered in a white, soft waxlike substance. They suck the sap out of plants. Some species are pests on houseplants and in greenhouses and some feed on crops such as sugarcane, citrus, grapes, pineapple, gardenias, cacti and others. One species, the rhodesgrass mealybug (*Antonina graminis*), is a pest of several grasses including St. Augustine, bermudagrass, rhodesgrass, fescue and centipedegrass. The longtailed mealybug (*Pseudococcus longispinus*) is a common pest on houseplants.

If you have mealybugs in a greenhouse or on houseplants, you can spray them with spray formula **D**. You can also use a mixture of half water and half alcohol. Check the mix on a few leaves of your plants first.

### **Whiteflies (Aleyrodidae)**

Whiteflies are small, flying insects covered with a white powdery waxlike material that makes them resemble very small moths. The nymphs suck the sap out of host plants. They are not major pests in most gardens, but the greenhouse whitefly (*Trialeurodes vaporariorum*) is very common in greenhouses and is found in some plants in the garden in the southern portion of the country. The sweetpotato whitefly (*Bemisia tabaci*) has a spotty distribution in the United States but feeds on a wide variety of plants, so will eventually be found throughout the country. It will feed on avocados, broccoli, cauliflower, cucumbers, eggplants, green beans, hibiscus, lettuce, poinsettia, pumpkin, soybeans, squash, sweetpotatoes, tomatoes, watermelon, zucchini and many others.

When you control whiteflies, you need to spray formula **D**, or Greenbug for Outdoors. Make sure you spray the underside of the leaves. Also use yellow sticky traps near any plants with whiteflies.

### **Leafhoppers (Cicadellidae)**

Leafhoppers are small, often brightly colored, jumping insects. They feed on the sap of plants and can transmit viruses to the hosts. One species, the beet leafhopper (*Circulifer tenellus*) feeds on beets, sugar beets, tomatoes and other plants. The glassy-winged sharpshooter (*Homalodisca vitripennis*) is a pest on grapes, citrus, oleander and almonds and is occasionally found in home gardens.

You can control leafhoppers by spraying the plants with formula **B** or **C**, or with Greenbug for Outdoors.

### **Thrips (Thysanoptera)**

Thrips are very small, elongated insects that are either wingless or have two pair of wings. Most thrips feed on various plants and some species are serious pests. A few are predaceous on mites and small insects. Various species will feed on grasses, corn, cotton, alfalfa, melons, pears, plums, cherries, beans, cabbage, tobacco, gladiolus, iris and greenhouse plants.

The western flower thrips (*Frankliniella occidentalis*) is a major vector of plant diseases caused by tospoviruses. Some thrips, such as the onion thrips (*Thrips tabaci*) will swarm and bite people.

Thrips are attracted to yellow and blue, so hanging some construction paper those colors with a sticky substance on it will attract thrips and they will get stuck. You can coat the stems of your plants with a sticky substance to prevent thrips from climbing up the plant.

## **Beetles (Coleoptera)**

### **May and June Beetles (Scarabaeidae – *Phyllophaga* spp.)**

White grubs found in lawns usually belong to different species of May and June beetles. They feed on the root system of the grasses. There will be irregular patches of yellowing grass where the grubs are active. The adults are reddish-brown in color and are attracted to lights. If you have grubs in the lawn, the best remedy would be to use nematodes, which are available in garden stores. You can also drench all the areas with a spray consisting of 2 cups of DE to a gallon of water.

### **Japanese Beetles (Scarabaeidae - *Popillia japonica*)**

Japanese beetles are large beetles with copper covered wing covers and a greenish head and thorax. Japanese beetles larvae are pests in grasses and are particularly destructive parks, golf courses and pastures. The adults will feed on the foliage, flowers and fruit of many different plants and can cause a lot of damage when they occur in large numbers. Japanese beetles in the adult stage can be handpicked from plants or you can spray them with spray formula C, or with Greenbug for Outdoors. You can treat the grubs the same way as you would treat the white grubs above.

### **Hoplia Beetles (Scarabaeidae - *Hoplia callipyge*)**

Hoplia beetles (*Hoplia callipyge*) feed on the young leaves, blossoms and fruit of grapes, peaches, strawberries and almonds as well as other plants. The adults are about ¼ inch long, brownish in color and appears iridescent silvery green in sunlight. Hoplia beetles in the adult stage, like Japanese beetles, can be handpicked from plants or you can spray them with spray formula C, or with Greenbug for Outdoors. You can also put a five gallon white bucket full of water in the garden. Put a cup of dish soap in it to break the surface tension. The beetles will be attracted to the white bucket and will drown.

### **Spotted Cucumber Beetles (Chrysomelidae - *Diabrotica undecimpunctata*)**

This species is also nicknamed the southern corn rootworm. Although it prefers corn and cucumbers, it will feed on many other plants. The adult is greenish-yellow with six large black spots on each wing cover. The larvae are wormlike and yellow in color. Misting the plants and dusting the leaves with DE will help control them. Make sure to get on the underside of the leaves. Treating the soil around the plants with DE will also help.

### **Striped Cucumber Beetles (Chrysomelidae - *Acalymma vittata*)**

This beetle has two yellow stripes and three black stripes on its wingcovers. The underside is black. It feeds on squash, muskmelons, cantaloupes, watermelons, pumpkins and squash. Control methods would be the same as for the spotted cucumber beetle.

### **Asparagus Beetles (Chrysomelidae - *Crioceris asparagi*)**

This species is a common pest on asparagus all around the country. The beetle is about a ½ long, metallic blue/black in color with yellow spots on the wing covers. The wing covers also have a reddish band on their border. Dusting the plants with DE after misting and putting DE around the base of the plants on the ground will help control them.

**Colorado Potato Beetles (Chrysomelidae - *Leptinotarsa decemlineata*)**

The Colorado potato beetle is found over most of the U.S., and is recognized by 10 black stripes on its yellow wing covers. The larvae is reddish in color with two rows of black spots on each side. It is a major pest on potatoes. Spraying the plants with Greenbug for Outdoors or misting and dusting them with DE will help control them.

**Elm Leaf Beetles (Chrysomelidae - *Pyrrhltia luteola*)**

Although this beetle isn't a garden pest, it does infest elm trees which are very common, and they will enter homes in large numbers when it gets cold out. You have to pest proof your house to keep them out.

**Flea Beetles (Chrysomelidae, subfamily Alticinae)**

There are a number of flea beetles that feed on the foliage of garden plants. They have the habit of jumping away when disturbed. They are very small beetles, usually uniformly dark in color. Flea beetles can be controlled to some degree when they are sprayed with spray formula C, or Greenbug for Outdoors. It would be a good idea to put diatomaceous earth or ground pepper around the base of the plants to discourage larvae and other pests.

**Weevils (Curculionidae)**

Weevils are small beetles with a long, narrow snout. Some species have are broad-nosed. They feed on plants in the adult and larval stage. This is a very large family of beetles with many species. The larvae of some species cause galls on roots and some species live inside the plant's tissues. Some species feed on flowers, buds, or fruit and a few will burrow into wood. There are a number of pest species. Here are a few of them:

**Carrot Weevils (*Listronotus oregonensis*)**

The adult carrot weevil is dark brown in color. They will feed on carrots, parsley, celery, dill and parsnips. Most of the damage is done by the larvae to the roots. This weevil is found in the eastern U.S. The best way to prevent them would be to cover the vegetables with floating row covers. You can also put some DE round the base of the plants. This will work with the following weevils as well.

**Vegetable Weevils (*Listroderes costirostris obliquus*)**

These are small, gray or brown weevils with a V-shaped mark at the tip of its wings. They do not fly. This weevil feeds on carrots, lettuce, turnips, potatoes, tomatoes and other vegetables. The adults feed on the foliage at night while the larvae feed on the root systems.

**Sweet Potato Weevils (*Cylas formicarius*)**

This weevil is ant-like in appearance. It has a shiny blue-black abdomen and red thorax and legs. The head is the same color as the abdomen. The larvae of this species bores into the vines of sweet potatoes and through the roots, eventually killing the plants. It is found in the southeast states from North Carolina to Florida, west to Texas.

**Cabbage Curculios (*Ceutorhynchus rapae*)**

This little weevil is black with blueish or yellow hair. It is found throughout the U.S. This weevil is a pest of cabbage, cauliflower, turnip, mustard, horseradish and peppergrass plants. Control methods mentioned above will work.

### **Bluegrass Billbugs (*Sphenophorus parvulus*)**

These are grayish, brown or black weevils who sometimes look mottled because of dried mud sticking to their bodies. They have fine, even pits on their thorax and rows of pits on their abdomen. It is found throughout the U. S., with the exception of Maine and the tip of Florida. This weevil and related species feed on grasses and other plants. You don't want these beetles around if you have chickens or turkeys. If a chicken or turkey eats one, the beetles will grip the bird's throat or tongue with the spurs on its legs. The bird will be unable to swallow it or its normal food and will starve to death.

Drenching infested areas with a mixture of 2 cups of DE with a gallon of water will help control them. Using an irrigation system with Greenbug would work better. There are many other pest species in this family, including the infamous boll weevil (*Anthonomus grandis grandis*), which is a well known pest of cotton.

### **Butterflies & Moths (Lepidoptera)**

Butterflies and moths come in various sizes and colors. Most are completely harmless, but a few can be pests in the larval (caterpillar) stage. Caterpillars are distinctive as they have three pairs of legs, but also they have prolegs, which are short, fleshy projections on their underside. The prolegs help them climb the plants more effectively. Moths are far more common than butterflies. In North America there are approximately 700 species of butterflies and about 13,000 species of moths.

### **Cutworms (Noctuidae)**

Cutworms and armyworms are pests in lawns and in gardens. They are the larval (caterpillar) stage of the miller moths that we often see gathered around our lights at night. There are several species found throughout the United States that are pests. The larvae are thick-bodied, hairless and marked with stripes. They never have spots as the webworms do. There are many beneficial insects that feed on these caterpillars. Cutworms are mostly nocturnal, hiding in shallow holes or under stones near the host plants. They will also climb fruit trees at night to feed on the leaves. One species, the variegated cutworm (*Peridroma saucia*) feeds on a variety of plants, including grasses, vegetables and ornamental plants. If you suspect you have cutworms, you can put out corn meal. They will eat it but won't be able to digest it and they will die. Also put barriers of diatomaceous earth, talcum powder or Comet around plants you want to protect. Also put Tanglefoot around the trunk of trees to prevent cutworms and other pests from climbing the trees.

### **Sod Webworms (Pyralidae)**

Sod webworms are grass infesting larvae of grass moths. The larvae construct webs and bore into the roots, crowns and stems of grasses. They are found throughout the country. Most of the adult moths are gray or tan in color. They are small in size, about ½ inch long and a wingspan of about an inch. The larvae vary in color from green to brown or gray. Most have small black spots scattered on their body. You will see small, dead, brown areas in the lawn where they are active. You can soak any areas where you see evidence of webworms with a mixture of 2 cups of diatomaceous earth per gallon of water. Also, using Greenbug in an irrigation system will discourage these moths.

### **Codling Moths (Tortricidae - *Cydia pomonella*)**

The codling moth is a small moth that has gray or brown front wings with dark crosslines and a large copper colored patch. The hind wings are light brown with a fringed border. They feed on apple and pear trees.

There are pheromone traps available for these moths, and in a home garden, that may be sufficient. They certainly aren't in an apple orchard. You can also hang a trap and collect codling moths in your yard. Mix ½ cup honey, ½ cup molasses, and 1 tablespoon fresh yeast in 4 1/2 cups of water. Put in gallon jug and hang from tree. The moths will go in and not be able to get out.

### **Cabbage Whites (Pieridae - *Pieris rapae*)**

Imported cabbageworm or, as it is sometimes known, the cabbage white can be a pest on cabbage, radish, broccoli, kale, Brussels sprouts, cauliflower, collard and horseradish. The butterfly is small with white wings. The front wings have a black marking on the tip. There are also one or two black spots of the front wing and one black spot on the hind wing on the anterior margin of the wing. The larvae are green, smooth and slender. It has 3 faint yellow lines. Spraying infested vegetables with Greenbug for Outdoors will help. Also, dusting the plants with DE or using a mixture of 1 cup of flour with ½ cup of salt. Make sure you mist the plants before applying the DE or flour/salt powder.

### **Potato Tuberworms (Gelechiidae - *Phthorimaea operculella*)**

Gelechiid moths are very small and they have narrow hind wings. The larvae feed on many plants that are important, but only a couple will get in a garden. The potato tuberworms(*Phthorimaea operculella*) is a pest in potatoes in the southern half of the country, although it strays north. The wings of the adult moth are grayish with brownish coloring between the wing veins. There are tiny, dark spots on the front wings. It would help to prevent these tuberworms by treating all of the soil around your plants with DE or ground pepper.

### **Tomato Pinworms (Gelechiidae - *Keiferia lycopersicella*)**

The tomato pinworms larvae will mine the leaves of tomatoes and eventually feed on the fruit or stems. The adult moth's front wings are grayish with orange or brown longitudinal stripes. The hind wings are yellowish and heavily fringed. The larvae are yellowish brown early and turn darker as they mature, eventually becoming purple. This moth is found in the southern portion of the country. Treating the plants with Greenbug for Outdoors and dusting the leaves with DE after misting will help control them.

### **Tomato Hornworms (*Manduca quinquemaculata*) & Tobacco Hornworms (*Manduca sexta*)**

Sphinx moths are medium to large in size and are frequently seen hovering around flowers around dusk. They eventually inject their long proboscis into the flowers to get the nectar. The larvae are large, colorful and have a hornlike spinal projection on their rear end, hence their name hornworms. They often have oblique stripes on the sides of their body. Several species of these moths are pests on plants. The tomato hornworm and the tobacco hornworm are both pests on tomatoes, potatoes and tobacco. The spinal projection on the tomato hornworm larva is black and the projection on the tobacco hornworm is red. Handpicking the hornworm caterpillars is probably the most effective method of control.

### **Fiery Skippers (*Hylephila phyleus*)**

Skippers are small to moderate sized butterflies. They are stout bodied and usually have brown or orange wings. One species, the fiery skipper, is a pest in some grasses, particularly bermudagrass, St. Augustinegrass, bentgrass and even weedy grasses such as crabgrass. The adult fiery skipper is orange, yellow and brown in color. The males being yellow/orange and the females brownish. The caterpillars are greenish yellow with a granular appearance. There are small, bare round spots in the lawn where the larvae have eaten the blades. Drenching the area with a solution of 2 cups of DE per gallon of water will be helpful in controlling them.

## Flies (Diptera)

Flies are different from other insects in that they have only one pair of wings as opposed to two pairs that other insects have. The second pair of “wings” on flies are reduced to knoblike appendages called halteres. Although there are a very few other insects with only one pair of wings, they all lack halteres, except for flies. Fly larvae (maggots) are legless unlike most other insect larvae. Flies aren't major garden pests, but a few types may be encountered. Many species are predatory or are pollinators so it is good to know which ones you have if you find flies in traps in your garden.

### Fungus Gnats (Sciaridae & Mycetophilidae)

Fungus gnats are pests in houseplants. There are several species, so they can vary in color from yellow, reddish, brown or black. They all have the same habit of laying eggs in potting soil. The larvae hatch out and feed on fungus in the soil. The best way to control fungus gnats is to cut back on watering almost until the point of wilting. That will kill the larvae. Then put a one inch layer of aquarium gravel on the potting soil to prevent gnats from laying any more eggs in the soil in the future. You can catch the adults with yellow sticky traps, which are available at garden stores.

### Carrot Rust Flies (Psilidae - *Psila rosae*)

The carrot rust flies is found over much of the United States and southern Canada. The brown larvae burrow in and feed on roots of carrots, celery and parsnips. They then work their way up the plant to the crowns.

The best way to protect plants from these flies is to keep DE and ground pepper on the ground around the base of the plants. This will also deter other potential pests.

### Root Maggots (Anthomyidae)

Root maggots are the larvae of what are called, anthomyid flies. Adults of most species resemble houseflies. The maggots are stocky and about 1/3 inch long. The adult fly lays eggs at the base of plants. When the maggots emerge, they eat their way downward toward the root system. They can destroy entire plants if left alone. They will infest a wide variety of plants, including onions, cabbage, broccoli, cauliflower, turnips, brussel sprouts, radishes, celery, hedge mustard, corn, peas, barley, wheat, melons, spinach, beets, berries, roses and others. The spinach leafminer (*Pegomya hyoscyami*) is in this group. It mines the leaves of spinach and beets. Some common species are radish maggots (*Hylemya radicum*), Cabbage maggot (*Hylemya brassicae*), Onion maggot (*Hylemya antiqua*), Seedcorn maggots (*Hylemya platura*) and the Raspberry cane maggot (*Pegomya rubivora*).

You can discourage root maggots from laying their eggs near your plants by spreading DE or ground pepper on the ground around the base of your plants.

## Mites (Acarina)

Mites are very small, microscopic arachnids, closely related to spiders. There are a great many species and probably a great many unknown species because of their size. There are several groups of mites that are the prominent pests in your yard and garden. The main ones are the spider mites (Tetranychidae). They will infest a wide variety of plants.

### Spider Mites (Tetranychidae)

Spider mites are very common pests on a variety of plants. They suck the sap out of their host plants. These mites also spin protective webbing on the plants surfaces. Spruce spider mites (*Oligonychus ununguis*) are considered one of the most destructive species as it will attack a large number of conifer

trees, including spruce, arborvitae, pine, hemlock, juniper and Douglas fir. Several other pest species include the carmine spider mites (*Tetranychus telarus*), the Banks grass mites (*Oligonychus pratensis*), the linden spider mites (*Eotetranychus tillarium*) and the two-spotted spider mites (*Tetranychus urticae*). There are many others as well.

When you have to control spider mites in your garden, try spray formulas **A** and **B** as they are both effective against mites.

### **Clover Mites (Tetranychidae - *Bryobia praetiosa*)**

Clover mites are pests in various grasses and they often enter homes in large numbers as they can be concentrated in the grass next to a building. They are pests of Kentucky bluegrass and perennial ryegrass as well as clover. These mites will invade homes, but they do not bite, transmit any diseases or do any damage. They can be wiped up in a house with a soap and water rag. Treating the grass around the house with a mixture of DE and water will help keep them under control.

### **Tomato Russet Mites (Eriophyidae - *Aculops lycopersici*)**

Eriophyid mites are very small. It takes a 20X magnification hand lens to see them. They are not serious pests, but they can cause abnormalities of plant tissues, galls, leaf curling, blisters, rusts and other problems. Some eriophyid mites are host specific, while others will feed on a variety of plants. The tomato russet mite is a pest on tomatoes and other plants in the nightshade family Solanaceae. The apple rust mite (*Aculus schlechtendali*) can cause leafcurl and other problems on apple trees. There are many other species.

If you have a severe infestation, you may want to remove your plants or prune the infested part of a tree so the mites don't spread. If not severe, you can spray all the infested areas with Greenbug for Outdoors, which is effective on mites.

### **Pollen Mites (Erythraeidae - *Balaustium* spp.)**

Most mites in this family are predators of other mites or small insects. The pollen mites (Erythraeidae - *Balaustium* spp.) are predators and they also feed on pollen so when we have moderate or high pollen counts, they come out in large numbers. You can see them running around on sidewalks and patios feeding on pollen. They will be found on all surfaces where pollen lands, including lawns. Pollen mites also bite and they can cause a rash. They will also enter homes if there is a lot of pollen next to a house. When you go outside and are being bitten, you may want to spray your patios and sidewalks with a high-pressure hose to wash them off the concrete. You can also spray your grass with spray formula **A**.

## **Beneficial Insects and other Arthropods**

There are numerous beneficial organisms in every yard and this is the main reason, plus your safety, for not using synthetic pesticides. They can be beneficial in different ways. Some are pollinators and we certainly need them. Others feed on decaying or dead plant or animal matter and they are important as well. The most important for a gardener are the predators who feed on plant pests.

Spiders, predatory mites and centipedes feed on numerous pests. It is hard to think of a centipede as beneficial, but the soil centipedes (Geophilomorpha) and stone centipedes (Lithobiomorpha) are very small centipedes that could not hurt a human or pet, but feed on numerous insects in a yard and many pest insects.

Some beneficial insects include praying mantids (Mantidae), which prey on a lot of insects and even kill and eat black widow spiders.

Ladybird beetles (Coccinellidae), AKA ladybugs, are a major predator of aphids and other small pests. Ground beetles (Carabidae) are large, black beetle that feed on grubs and insect pupae. Many soft-winged flower beetles (Melyridae) are predators on pest species. Rove beetles (Staphylinidae) feed on grubs, insect pupae and root maggots, and in some cases, aphids. There are other beetles that are beneficial. Recently someone sent me a bunch of beetles he had “infesting” his desert willow. It turned out the beetles were soft-winged flower beetles in the genus *Trichochrous* and they were doing good work on the tree helping control real pests. If in doubt about a bug, get it identified, so you don't kill something that is a good bug.

The hover fly (Syrphidae) feeds on nectar in the adult stage, but in some species, the larval stage is a predator of aphids. Some true bugs (Hemiptera) are beneficial, such as assassin bugs (Reduviidae), which hide under leaves and ambush caterpillars. Minute pirate bugs (Anthocoridae) are very small and prey on thrips and other small pests. Some seed bugs (Lygaeidae) are beneficial. The big-eyed bugs (*Geocoris* spp.) will prey on tarnished plant bugs and chinch bugs.

Lacewings (Planipennia) are predators of aphids, thrips, spider mites, leafhoppers and other small pests. There are many species of parasitic wasps (Hymenoptera), most quite small, that will parasitize many pest insects and offer good control. There are many beneficial arthropods in our yards and we should try to protect them from pesticides

## Weed Control

Here are two recipes for controlling weeds in your yard so you don't have to use dangerous herbicides.

Mix a solution of 80% table vinegar and 20% rubbing alcohol and a dash of dish soap and spray weeds in cracks or along fences. Or you can mix ½ gallon of Apple Cider Vinegar with ¼ cup of salt and a teaspoon of liquid dish soap. This mixture will kill dandelions and other weeds. The soap removes the protective oils from the weeds so the vinegar can work. These recipes are for weeds only, so be careful as they will damage plants you want. A good non-toxic commercial herbicide is Avenger. There are others also. Never use Roundup or any toxic herbicides.

## VERTEBRATES

### Mice (Rodentia - Muscidae)

The deer mouse is one of the most common rodent species found throughout most of the United States . They are 4” - 9” long, are reddish-brown in color with a white chest, white feet, and a bi-colored tail: brown on top and white on bottom. Their natural habitat is in rural and semi-rural areas, where they inhabit fields, pastures, and various types of vegetation found around homes and outbuildings. This mouse commonly invades garages, attics, sheds, wood piles, crawl spaces, as well as general living quarters of homes.

Mice can enter 1/4” openings - or they can be carried inside. They may get in through broken windows, poorly screened attic and foundation vents, openings through any walls created by cable, oil, propane, electric, gas, water and/or sewage services, and through any other openings or cracks or crevices in foundations, walls or roofs. They can also chew holes directly through siding and/or window or door frames.

While house mice (*Mus musculus*) aren't linked to Hantavirus, they are very prolific and very unpleasant to have infesting your home. Under optimum conditions, house mice breed year round. Out-of doors, house mice may tend toward seasonal breeding, peaking in the spring and fall. Females may produce as many as ten litters (about 50 young) in a year. At very high densities, however, reproduction may nearly cease despite the presence of excess food and cover.

Although mice primarily are active at night, some day activity occurs. Movements of house mice are largely determined by temperature, food, and hiding places.

Mice are very curious and tend to travel over and explore and re-explore their entire territory daily, investigating each change or new object that may be placed there. They are very aggressive. They show no fear of new objects. They dart from place to place, covering the same route over and over again. This behavior can be used to advantage in control programs. Disturbing the environment at the beginning of a control program by moving boxes, shelves, pallets, and other objects can improve the effectiveness of traps, glue boards, and bait. Mice will investigate the changed territory thoroughly. This is why (live catch) traps work so well.

House mice prefer cereals over other items, although they will feed on a wide variety of foods. Mice sometimes search for foods high in fat and protein, such as lard, butter, nuts, bacon, and meat. Sweets, including chocolate, are taken at times. Mice get much of their water from moisture in their food, but they will drink if water is readily available. Mice in buildings catch and eat flies, spiders, centipedes, cockroaches, beetles, millipedes and other arthropods. Outdoors house mice consume a wide variety of weed seeds, grass seeds, various grains and vegetation. In addition they consume many insects and other invertebrates, e.g., slugs, spiders and centipedes. When caught in a live trap, mice trapped later may eat the first, weaker captive(s).

Here are some recommendations for managing mice in your home or business. Keep rodents out of garages, sheds or barns by keeping access to water, food and nesting materials and harborage areas away from them, especially within 100 feet of your occupied buildings. Repair all holes in buildings that would allow rodents entry. Open doors and windows before cleaning areas where rodents have been living. If possible, run an electric fan for at least half an hour to clear out dust. Leave the areas while the fan is on. Disinfect sites where you have seen rodents or their droppings. General-purpose disinfectants will kill the virus. A mixture of three tablespoons of household bleach in a gallon of water can also be used. Spray the area and mop, rather than sweeping or vacuuming. The wetter the area, the better because dampness will keep the dust down. Remember that the territory of mice rarely extends further than 30 feet from the nest, and more often is about 10 feet. If mice are sighted throughout a building, it means that there are numerous discrete locations where you will have to set traps. When using live traps, oatmeal is a very effective bait. On snap traps, a piece of Slim Jim is almost irresistible to mice. It is much more effective than cheese or peanut butter. When you find a mouse in a snap trap, spray it with a disinfectant and put it in a plastic bag before disposing of it.

Never use rodenticides for several reasons. First, if a mouse dies where you can't find it you will have an odor problem. Also, if the mouse (particularly deer mice) have ectoparasites such as fleas or mites, they will leave the dead carcass and may attack the human occupants of the house. Mice should always be controlled with snap or live traps. If you have a crawl space under your house, you should have it mouse-proofed. Trapping with snap traps or live traps will work for rats as well. Basically the control methods are similar with both animals.

If you live in an area where mice or other rodents like to get under the hood of your vehicle and chew on the wires, then you should read this. The best way (and only way I am aware of) to keep them from under the hood, is to get some cotton balls, soak them in peppermint essential oil, place them in little paper cups and put them in various places under the hood, especially around wiring. Rodents will not go under the hood of a vehicle that smells like peppermint. Much better than rodenticides or traps which rarely work at all in this situation.

### **Gophers (Rodentia - Geomyidae)**

Pocket gophers construct burrows under the ground using their strong forelegs, enlarged claws and even their teeth. Their vision is poor because of their habitat as is their hearing. When the gopher digs, it kicks the dirt behind it with its hind feet. When a lot of loose dirt has accumulated, it turns around and pushes the dirt to the surface using its forepaws and face. The resulting mounds are an indication of their presence in your yard.

Gophers feed on the underground portions of plants, but will occasionally come to the surface and pull green vegetation underground. They live alone in their tunnel system, but males will enter female tunnels during mating season, usually early in the year. Female gophers will have one to seven young at a time. The baby gophers will disperse on the ground when they are mature enough to leave their mother and often fall victim to predators at this time. They usually have only one litter per year.

Actually, they are very beneficial animals. A single gopher can move approximately a ton of soil to the surface every year. Their tunnels are constructed and then fill up with dirt as they are abandoned. The old tunnels contain the nests, waste material and partially filled pantries well below the surface where they become important as fertilizer. Soil that has been compacted by cattle trampling, grazing and machinery is benefited by the tunneling process of gophers. In the mountains, snow and rainfall are temporarily held in gopher burrows instead of running across the surface causing soil erosion. The mounds the gophers make also bury vegetation deeper, thus increasing soil quality over time. Additionally, fresh soil in the mounds provides a fresh seeding area for new plants, which may increase the variety of plants on a site. Gophers are also in the food chain and are fed upon by large birds, other mammals and snakes. Other animals such as lizards and toads take refuge in the cool, moist burrows.

As much as I am trying to make the case that gophers have a place in our area, there are times when we have to control them. Poisons are available but I never recommend them. Most of the gopher baits contain strychnine, diphacinone, chlorophacinone, or zinc phosphide. None of these rodenticides are very pleasant and accidents can result with other animals digging them up. These products shouldn't even be allowed to be sold in stores

A fumigant, aluminum phosphide, is sometimes used to control gophers but it isn't recommended. Two children were killed by it in Utah when an exterminator used aluminum phosphide in their yard to kill voles.

There are traps available that can be placed in the burrows, but they are not easy to use and have only limited success. I have found that the best method of gopher control is simply asking them to move. You can do this by pouring a foul-smelling liquid into their tunnel system. Fish oil emulsion works well and castor oil is also effective. Since gophers generally live alone, once they move, they are not likely to return unless they are forced to move again, so a repellant can be very effective.

When using a repellant, you will have to probe the dirt to find their tunnels. Generally a tunnel will run straight between two mounds and they are normally about 18" below the surface. You can use a metal rod or even a pool cue to probe the dirt. Once you hit the tunnel, the probe will fall through. Then take a long-stem funnel such as used to put oil in cars and place it in the hole created by the probe. Pour the repellant into the funnel and move on to the next tunnel. You can use the same method if you have moles in your yard. Actually for moles, you can uncover the burrow, bury a large can in the ground where the top of the can is level with the mole's burrow. Then put a board over the tunnel so the mole doesn't know there was activity. It will crawl through its burrow and fall into the can. Check the trap every day so the mole doesn't suffer. Take it out and release it somewhere out of your area.

There isn't any reason to kill them. Gophers and moles, like all organisms, are just trying to make a living

### **Prairie Dogs (Rodentia – Scuridae – *Cynomys* spp.)**

Prairie dogs are beautiful animals and they are absolutely harmless. They live in little villages and mind their own business. They do not destroy any crops and do not carry any diseases even though they are constantly blamed for spreading the plague. In reality, plague fleas (genus *Oropsylla*) can live on other animals such as squirrels, pack rats and other rodents and even breed in their burrows. When plague fleas get into prairie dog villages they kill the prairie dogs. If you have a colony of prairie dogs near your home, they are healthy and do not have plague fleas. That is a myth perpetuated by people who do not know any better or who just want to kill them. The people from the GunNut shop also claim they save ranchers and farmers horses and cattle from breaking their legs in prairie dog holes. This is another myth. Horses and cattle both watch where they are walking and can easily avoid prairie dog burrows. It is when they are chased by someone or ridden fast by someone who didn't check the area that an accident will happen. It is not the prairie dogs fault, it is the person chasing or riding the horses too fast in uncharted areas. The gun people are not doing anyone any favors.

They do not cripple horses and cattle as some other people claim. Most horses and cattle watch where they are walking and can easily go around a very visible prairie dog village. If a horse is ridden fast through an unknown area, an accident could happen. It is the responsibility of the horse owner to know where they are going on the horse. It isn't the prairie dogs fault.

Prairie dogs are very smart and can vocalize different sounds, which identify many of the animals that feed on them. They have one of the most sophisticated of all animal languages. They recognize hawks, eagles, coyotes, snakes and, of course, humans. All of the other animals kill them for food, which is the way nature is supposed to work. Humans kill them for fun and profit. Prairie dogs like to socialize and constantly visit other prairie dogs and even groom each other. When two prairie dogs meet they nuzzle and kiss each other. Prairie dogs share their villages with other animals, including some that are federally protected such as the burrowing owl. The owl is protected under the Migratory Bird Treaty Act (MBTA). In 1972, the Raptor Protection Act added all raptors, including eagles, hawks, owls and others to the MBTA. Gunnison's prairie dog, which we have here in NM is also a candidate for the Endangered Species Act as it is getting very rare due to the unmitigated thrill killing of them by people who are absolutely heartless.

If you have prairie dogs on your property and you have to get rid of them, there are organizations that wills humanely relocate them. That is the only method of control I would recommend.

Here is a letter I wrote to Sunport and the FAA regarding prairie dogs at the airport. It was also posted

on Facebook.

*“My name is Myra and I am a prairie dog. I live in one of the isolated prairie dog villages in Albuquerque. For some reason, many members of your species hates my species. I think it is probably because they don't understand us. We are not dangerous and we do not carry diseases. We simply live in little villages and mind our own business. Some people think we kill trees but that is not true. We do not feed on tree roots unless there is absolutely nothing else to eat. We find most of our food above ground. Other little animals such as gophers will feed on the roots of trees and bushes. Other people think we carry the plague and can spread it to your species. This is also not true. When the fleas that carry the plague invade our villages, we die just as humans do. If our village is full of healthy, fun loving prairie dogs, then I can assure you that the fleas that carry the plague aren't in our village. Unlike some other small animals, we are not a prolific species. I may have four pups a year but generally only two will survive. We are lucky to be able to maintain a population if we are left alone. For whatever reasons, fear, misunderstanding or just plain meanness, your species likes to persecute us. Recently some friends of mine who lived in a prairie dog village close to a church in northeast Albuquerque had their village covered by the church because the church officials were expanding their parking lot. One church official, when questioned, said he doesn't give a "rat's ass" about prairie dogs. Doesn't he understand that the same Being that created your species created us? Doesn't he understand that all species can live in peace? Why does your species with your superior intelligence find it necessary to destroy other species? Over at Sunport, the people are gassing many of my friends. The gas that they use is very painful and very slow working. My friends will suffer in great pain for as long as 72 hours after being gassed, before they finally, mercifully, die. Other people like to shoot us with high-powered rifles so they can see us "explode" when the bullet rips us apart. Some people like to feed us rat poison. Rat poison destroys our capillaries and we bleed to death internally and very slowly. Is there no limit to your imagination when it comes to destroying not only other species, but your own? We have been gassed, poisoned and shot at to such an extent that we now only represent about 1 % of our original numbers. We are not stupid little animals. We have one of the most sophisticated of all animal languages. We can vocalize different sounds, which identify many of the animals that feed on us. We recognize hawks, owls, eagles, coyotes, snakes and, of course, humans. All of the other animals kill us for food, which is the way nature is supposed to work. You folks do not kill us for any good reasons, except that you can. You may think you are killing us for good reasons, but you really don't understand us or know anything about us. We like to socialize and we constantly visit other prairie dogs and even groom each other. When two prairie dogs meet we nuzzle and kiss each other. If we are in your way and you can't live with us, then hire someone who will help relocate us. We all live on the same planet and we can all live together. We will not infect you with any exotic or domestic diseases. We will not destroy your landscaping and we will not harm your children. We will live our little lives as best we can in an ever-changing world. If you can't relocate us, you can ask us to move. We obviously don't speak the same language, but all you have to do is pour some castor oil or that stinky fish oil emulsion in our burrows and we will happily relocate, hopefully to a place where we won't bother you. If we leave this world, it will not be the same, just as it is not the same when any species becomes extinct. Many other species are dependent on our activities and they will follow our fate. When enough of the animal and plant species become extinct, then your species will soon follow them into oblivion. We were all created to help each other survive on this planet and as long as species are rapidly disappearing, then the future of the planet is pretty bleak. Thank you for taking time to read this letter of introduction to our species. Hopefully we can all get along. I hope the people in the Sunport can learn to get along with us. We are not a threat to them or to anyone else.”*

There is an excellent non-profit organization in Albuquerque that promotes the well-being of prairie dogs. It is Prairie Dog Pals and it is run by Yvonne Boudreaux and Ed Urbanski. They have been doing a wonderful job for the last ten years or so helping these little angels. Their goal is to preserve the species and its environment and to provide information and education about prairie dogs to the public. They try to ensure their survival by providing them with supplemental feeding in barren areas and capturing and re-locating them where loss of habitat or human conflict threatens their existence.

They want to preserve appropriate areas of land for prairie dogs that naturally exist in the Greater Albuquerque area, to ensure all counties with naturally existing prairie dogs preserve areas of natural habitat for them and to have public lands which are leased to allow prairie dogs and other native wildlife to co-exist with humans and domestic animals. Their website is <http://www.prairiedogpals.org/> They can always use donations to continue their excellent work.

### **Coyotes (Carnivora – Canidae (*Canis latrans*))**

Coyotes feed primarily on rodents, squirrels and other small animals. They may feed on a larger animal if it is dead or severely hurt from something else and can't defend itself. When we go out and kill coyotes for the fun of it, which is ridiculous, we are creating an environmental problem that can cause serious problems for people and their pets. In NM, we have approximately 107 species of fleas and about a third of them are known possible vectors of the plague. When we kill off one of the main predators of rodents in an area, the rodent population will increase exponentially. A large number of flea species feed on rodents and many of them are possible vectors of the plague. I know of 26 species of possible plague vectors that feed on rodents (listed below). When the rodent population explodes they are more likely to invade human habitation looking for food and water and they bring their fleas with them. Then a lot of people will put out rodenticides to kill the rodents. When the rodents die, any fleas on their body will leave as it cools down and look for another food source, which can be a family pet or even a person and plague could become a serious issue. Or a pet will chase and kill a squirrel or pack rat and pick up the fleas. If we left the coyotes alone, they would continue to prey on rodents and squirrels that can vector the plague.

The following species of fleas are known possible vectors of the plague in New Mexico.

*Aetheca wagneri*, *Pleochaetis exilis*, *Thrassis bacchi*, *Thrassis fatus*, *Foxella ignota*, *Peromyscopsylla hesperomys*, *Anomiopsyllus nudatus*, *Megarhroglossus bisetis*, *Megarhroglossus cavernicolus*, *Megarhroglossus divisus*, *Megarhroglossus procus*, *Megarhroglossus wilsoni*, *Stenistomera alpina*, *Catalogia decipiens*, *Epitedia stanfordi*, *Eumolpianus eumolpi*, *Malaraeus sinomus*, *Opisodasys keeni*, *Orchopeas leucopus*, *Orchopeas sexdentatus*, *Orchopeas neotomae*, *Oropsylla montanus*, *Oropsylla hirsuta*, *Rhadinopsylla sectilis*, *Atypholceras echis*, and *Hytrichopsylla dippiei*. There are other species of plague fleas, but the ones above all feed on rodents and squirrels, the main food of coyotes.

Hunters will say that coyotes hunt in packs and bring down cattle, which is not true. Coyotes usually hunt alone, but occasionally mated pairs will hunt together. They are not social as are dogs and wolves.

Many ranchers and farmers hate coyotes because they believe coyotes are responsible for killing their livestock. Although the occasional calf may be the victim of a hungry coyote, coyotes are not going to put any rancher out of business. Basically, they do far more good in keeping nature in balance than any harm. Of course, if anyone has a problem with coyotes on their private property, they can do what they want, but coyotes should not be killed on public land, either state land or federal land. This is important because it is a very serious health issue.

If you live in an area where coyotes are normally present, but have declined because of hunters or those coyote bait stations, then you will probably have more rodents. If so, don't use any rodenticides. When the rodenticides kill the rodents, then the fleas will leave the dead rodent and bite a pet or a person and the plague could develop. Also, never let a pest control company use rodenticides on your property for that reason and they should never be used on city, county or state properties either. Leg traps should never be used either. Let the coyotes maintain the rodent population and everyone will be better off. Keep your pets indoors at night.

### **Pigeons (Aves - Columbidae)**

Someone asked me today if pigeons are hazardous to our health. I told her that alcohol and tobacco cause more death and grief in a single day than all the pigeons on the planet have since the beginning of time. When I look at the pigeon-infested roof of a fast-food restaurant, I can still tell myself that the pigeons on the roof are far less hazardous to human health than the cheeseburgers coming off the grill.

They are frequently called rats with wings. The term "rats with wings" came from a 1980 play, "Stardust Memories" starring Woody Allen. Allen used the term in the movie and apparently someone with a vested interest in misleading the public decided to use it in a campaign to drum up business for pigeon control. The facts are just the opposite. Yes, there are some diseases that can be transmitted by pigeons, but no more so than any other bird, including such popular pets as parakeets, canaries, etc. Consider what some experts have said about pigeons and disease;

*"...diseases associated with [pigeons] present little risk to people..."* Dr. Michael McNeil, Centers for Disease Control (CDC) in Atlanta .

*"The New York City Department of Health has no documented cases of communicable disease transmitted from pigeons to humans."* - Dr. Manuel Vargas, New York City Department of Health.

*"I am not aware of any reported cases of diseases that were transmitted by pigeons in Mohave County ."* - Larry Webert, R.S., Mohave County Environmental Health Division

So much for the health problems caused by pigeons. They do have their attributes. During World War I, pigeons carried thousands of messages that saved many hundreds of lives. In World War II pigeons continued to be used. Radios were frequently not working due to damage or when unfavorable terrain rendered them almost useless. Pigeons continued to fly through enemy fire, and amazingly 95% of them completed their missions. One pigeon in particular, named "Cher Ami" was a World War I Carrier Pigeon, one of 600 birds owned and flown by the U.S. Signal Corps. Cher Ami was originally bred by the British Signal Corps. He was transferred to the Americans after the war on Oct. 27, 1918.

Cher Ami delivered 12 important messages within the American sector at Verdun , France . On his last mission, Cher Ami, shot through the breast by enemy fire, managed to return to his loft. A message capsule was found dangling from the ligaments of one of his legs that had also been shattered by enemy fire. The message he carried was from Major Whittlesey's "Lost Battalion" of the 77th Infantry Division that had been isolated from other American forces. Just a few hours after the message was received, 194 survivors of the battalion were safe behind American lines. Cher Ami was awarded the French "Croix de Guerre" with Palm for his heroic service between the forts of Verdun . He died in 1919 as a result of his battle wounds. Cher Ami was later inducted into the Racing Pigeon Hall of Fame in 1931 and received a gold medal from the Organized Bodies of American Racing Pigeon Fanciers in recognition of his extraordinary service during World War I.

Pigeons continued their valiant service during World War II and the Korean War. The Dickin Medal for Valor, an award only for animals, was given to 31 pigeons in World War II, more than any other animal. (The next closest animals were dogs, with 8 medals).

Pigeons also have religious significance as well. Noah thanked God for them and Christ defended them. Doves are the symbols of love and peace. Are pigeons and doves the same? The dictionary defines doves as . 1. Any of various widely distributed birds of the family Columbidae, which includes the pigeons, having a small head and a characteristic cooing call. 2. A gentle, innocent person. 3. A person who advocates peace, conciliation, or negotiation in preference to confrontation or armed conflict.

Pigeons deserve the same respect and affection that we give to our companion birds, such as parakeets, parrots, canaries and the rest. When they live on our buildings and deface it, we can remove the birds by excluding them from the area, but we don't need to kill them. The best way to remove pigeons from a building is to trap them and relocate them in an area where they can live and breed without disturbing anyone. When you trap pigeons, you have to pre-bait the area first with whole kernel corn and then set the trap with the corn in it. You will have to check the traps at least once a day. Once you have removed the pigeons, you need to enclose any open areas on the roof such as air conditioning units, with screening to prevent other pigeons from moving in. Before you enclose these areas, you should inspect for nests and remove any that you find. You can also have spikes, wires or repellant gels placed on certain areas of the roof, depending on the design. Normally this is done by a professional pest control company, but you can do it yourself if you like.

## **PESTICIDES**

***“The EPA's Science Advisory Board concluded in 1990 that, when compared with dozens of other risks, pesticides presented one of the country's more widespread and severe environmental problems.”***

Let me tell you my experience with pesticides and why I am totally against them now. I started in the pest industry in Florida in 1972. We used to drive cars and not trucks and keep all the chemicals on the front seat next to us. They were toxic products such as DDT, chlordane, heptachlor, malathion and many others. When somebody called an exterminator for any pest, we went out, had them empty their kitchen cabinets and then we sprayed the cabinets with chlordane. Then we fogged the kitchen with an oil-based pyrethrum. Then we sprayed all the baseboards with malathion. We used malathion because it smelled bad and we didn't want the customer to think we were spraying water. Then we dusted the attic with DDT dust and finally we put heptachlor granules all around the house. I have no idea how many people we made sick or killed doing what we did. I do know I saw a lot of pest technicians develop cancer and other sicknesses early in life, undoubtedly because of their exposure to pesticides. One time I got a call from a butcher shop in Miami. He had mice. So we went in the shop while it was open and dusted the whole store with DDT. DDT got into everything and even on the customers. The owner was happy and he paid the bill (\$20). I used to crawl under houses and power spray the whole area with chlordane for termite control. Never wore a mask as safety equipment wasn't required in those days. I have seen pest control people offer to spray people's pets to kill fleas and ticks and some people bought that because they were told the pesticides are safe. All of this was typical pest control at the time.

I left Florida and moved to Houston, Texas in 1975. It was the same there. We practiced mosquito control in Houston. We often just drove down the streets at night and fogged malathion all over the place. One time we got a call from the Houston Astrodome about mosquitoes inside and they had a game scheduled that night. We went out and sprayed the whole interior of the astrodome with malathion to kill the mosquitoes. We got a call a few days later about people coughing and not feeling good and they wanted to know if it was the pesticide. Our manager told them it couldn't be, because malathion only affects bugs. He said it must have been pollen or something. It was about this time that I was starting to get a little concerned about the industry I was in. I didn't want to leave because pests can be a problem, but there had to be better ways to deal with them. My wife Sandi and I moved to Albuquerque in 1978. I went to work for another pest control company, and another, and another because they were all in the same mindset, spray and pray. Spray pesticides and pray you kill something. I was trying to get away from that. I finally got away from the pest companies and went to work for UNM as their IPM technician in 1995 and all I did was non-toxic pest management and the university loved it.

The fact is that pesticides have been misused for many years and in many cases they still are. If a company is just spraying the baseboards in a house it is a gimmick, as it just spraying around the outside. Who cares how many praying mantids, other insects or birds they kill. Nobody will notice is their theory. Mosquito spraying is still very common and just as dangerous and just as useless as it has always been and they use pesticides now that are more toxic than malathion.

Some companies have gotten away from generic pest spraying and have adopted safer methods. Unfortunately, many companies are still in that spray and pray mindset. It is sad when government agencies adopt these nonsensical methods and use them in public areas. Mosquito spraying from airplanes, spraying toxic pesticides on private property to kill some "terrorist" Asian pysllids and using toxic herbicides everywhere because they can because it is easier than using safe and effective methods. Of course that is nonsense. When I was IPM Manager for the City of Santa Fe, we never used Roundup on weeds and I personally took care of 81 city buildings for pests and never used a drop of pesticide. Everyone loved it.

We have to work with government agencies to get them to quit using dangerous methods and we have got to stop using pest control companies that practice spray and pray methods in and around our homes.

A recent study also shows that children exposed to pesticides are much more likely to develop leukemia or lymphoma than children who are not exposed. Here is a link to that study.

<http://www.cnn.com/2015/09/14/health/pesticide-exposure-childhood-cancer/index.html>

Another study says the pregnant women who are exposed to certain pesticides are more likely to have autistic children. Here is a link to that study.

[http://thechart.blogs.cnn.com/2014/06/24/pesticide-exposure-during-pregnancy-may-increase-autism-risk/?hpt=hp\\_t2](http://thechart.blogs.cnn.com/2014/06/24/pesticide-exposure-during-pregnancy-may-increase-autism-risk/?hpt=hp_t2)

Why are children at more of a risk than adults? There are many reasons. Children put their toys and other objects in their mouth and they often crawl on the ground and come in contact with pesticides. Children often wear fewer clothes resulting in dermal poisoning by many toxicants. Children breathe differently than adults. A one-year old child will breath 50% more air each minute relative to their body weight than adults do. This, of course, gives them the opportunity to inhale more pesticides. Children will pick up pesticides at home, at school, from their food and from being around pets who

have been treated for fleas or ticks. If they live in an agricultural community where pesticides are heavily used, children are in even greater danger.

Pesticides are a mixture of chemicals used to kill, repel or otherwise control various pests, including insects, mites, rodents, birds, fish, weeds, fungi and other perceived pests. Pesticides are comprised of a number of different compounds, including the “active ingredient” and “inert ingredients” as well as other contaminants and possible pollutants.

Active ingredients are the only components of the pesticide listed on the label. These are the chemicals that kill and repel the pests. Active ingredients also contain synergists, such as piperonyl butoxide (PBO) to help the pesticide work more effectively. Piperonyl butoxide, a very commonly used synergist, can be toxic to the liver and is a possible human carcinogen. Pesticides that contain pyrethrin and pyrethroids are pesticide products that most often use piperonyl butoxide.

The inert ingredients are the carrier or sticking agent in the pesticide and may include solvents, stabilizers, surfactants, preservatives, sticking agents, spreading agents or defoamers, depending on the need of the product. Some inert ingredients are more toxic than the active ingredient in the product and often make up the largest percentage of ingredients in a pesticide product.

The *Federal Insecticide, Fungicide and rodenticide Act* (FIFRA) only requires manufacturers to list the active ingredients on the label. They allow the “inert” ingredients to be a trade secret leaving the consumer and the applicator unaware of the possible danger they are exposed to. Many inert ingredients are considered to be “hazardous pollutants”, “extremely hazardous”, “suspected carcinogens” and “occupational hazards.”

Contaminants and other pollutants are byproducts of the manufacturing process and they can often contribute to a pesticide’s toxicity.

The suffix –cide, literally means to kill. Pesticide, suicide, homicide, genocide all have one thing in common - death. Are there any safe pesticides? Emphatically, no there are not. Can pesticides be used safely? Yes they can if they are used by people who are knowledgeable about the pesticide they are using and if they use the product carefully and if they have respect for the environment where the pesticide is going to be placed. Unfortunately, more often than not, the respect portion of the equation is lacking.

Children, the elderly, pregnant women, and those who have allergies, asthma, chemical sensitivities or other immune, respiratory, or neurological impairments are especially vulnerable to the toxic effects of pesticides.

## **Safe Products**

Here is a list of some products you find around the house or that you can easily purchase that will help you manage your pest problems. There are many others, but these may be the easiest to find and use.

### **Aspartame**

Aspartame is the ingredient in Equal and NutraSweet, two artificial sweeteners. I am not sure I would consider this material safe, but we ingest it regularly if we use artificial sweeteners. In the 1970s the FDA refused to approve aspartame for human consumption due to studies linking it to brain tumors and neurological disorders. Some politicians pulled some strings and it was approved by the FDA.

You can mix a couple of packets of Equal in a glass of fruit juice to control yellowjackets.

### **Baking Soda**

Baking soda or sodium bicarbonate is a mined alkaline mineral. When it is eaten by insects it releases carbon dioxide bubbles that are fatal. A paste made from baking soda will also give quick relief to an insect sting. You can sprinkle baking soda around your home inside and out and around pet food dishes. It will repel ants and roaches. If your dog gets sprayed by a skunk, you can bathe him/her in a tub of warm water with a cup of lemon juice and a box of baking soda with a ½ cup of shampoo. That should neutralize the odor

### **Beer**

Believe it or not, beer is very effective at controlling some pests. If you soak a rag in beer and put it in the middle of your garage floor at night, it will be covered in drunken cockroaches the next morning waiting for you to dispatch them. You can put some pie pans filled with beer around your home and they will attract and catch a lot of roaches who will drown in the beer. And they don't check IDs.

### **Borax / Boric Acid**

Borax is a combination of sodium, boron and oxygen and is mined from the soil. Boric acid is a crystalline material made from borax. 20 Mule Team Borax is very effective in controlling a wide variety of insects.

Boric acid is a powder that removes the waxy coating on the exterior of the insect's body when they crawl over it. The waxy coating is used to retain water and without it the insect quickly dies from dehydration. When mixed in baits it can control ants, cockroaches and some other insects. The insects also ingest the material while grooming and subsequently die. Boric acid will remain effective indefinitely in a dry environment. Boric acid can be mixed with any food the roaches or ants are eating including peanut butter, jelly, sugar, syrup or honey. You can mix it in ground hamburger meat to control wasps.

While boric acid doesn't cause cancer, birth defects, allergies or other ailments that pesticide can cause, it should not be taken internally as it is toxic if eaten. Keep any baits you make out of the reach of children and pets.

### **Catnip**

Catnip will not only repel insects such as cockroaches, ants, mosquitoes others, but it will prevent rabbits, deer and squirrels from eating plants sprayed with it.

### **Diatomaceous Earth**

I frequently recommend using diatomaceous earth (DE) for controlling a variety of pests. If you use this product, be sure it is food-grade quality. Diatomaceous earth is mined from the fossilized silica shell remains of microscopic diatoms. Diatoms are animals that are related to crustaceans of today. They produced shells that are now ground up and used as a powder or dust for insect control. Diatomaceous earth absorbs the waxy layer on the surface of insect skins, causing the insect to desiccate (dry out). Diatomaceous earth also effectively controls slugs and snails.

This least-toxic insecticide is considered harmless to humans and is used in stored grains. Mix ¼ cup of food-grade DE in a gallon of vinegar and spray pests with the mix or pour into ant mounds as a drench. You can make a very good pest barrier by applying Tanglefoot or petroleum jelly to the area, e.g.,

trunks of trees, and then lightly dusting the adhesive with food-grade DE. Do not buy or use DE sold for swimming pool filters. This form is not effective as an insecticide and, when inhaled, can cause silicosis, a deadly lung disease. Diatomaceous earth is abrasive to lung and eyes - so use proper personal protection when using this product.

### **Garlic Oil**

Garlic is very effective in killing and repelling insects. Simmer about a dozen finely chopped cloves of garlic in cooking oil for about an hour, cool, strain it and spray your plants. It will work on many plant pests including whiteflies, thrips, spider mites, grasshoppers, leafhoppers and aphids.

### **Rosemary**

Powdered Rosemary leaves are used as a flea and tick repellent. Simply dust the powder onto the pet or areas where the pet sleeps. Rosemary oil will control lice

### **Salt**

Salt will kill any vegetation and is a good herbicide for killing weeds in a sidewalk, along a fence or similar areas. Salt mixed with water will also kill snails and slugs. Salt will kill many insects and can be used in crawl spaces or other areas to deter termites and cockroaches.

### **Soap**

Soaps can effectively kill insects because of fatty acids in the product that destroy cellular membranes in the bugs. It also produces a coating on the insect that prevents it from breathing through its spiracles. An effective soap spray consists of 40% water, 40% alcohol and 20% dish soap. You can mix 1 cup cooking oil with 1 tablespoon non-detergent liquid soap as an insecticide. Use 1 tablespoon of this mix to each cup of water and you can control aphids, scales, mealybugs and spider mites. It will kill the eggs as well as the adults of these pests. Do not use it if the temperature is over 85 degrees F. as it may damage the plants. Sprinkle or spray Tide laundry soap around the foundation of your home to keep ants out.

### **Sugar**

Sugar is a very popular insect attractant that can be used to control many insects if mixed properly with other ingredients. You can catch wasps and yellowjackets by cutting the top off a 2 litre plastic bottle, invert it inside the bottle to make a funnel and put two or three inches of sugar water mixed with a few drops of soap in the bottle. A good ant bait can be made by soaking paper towels with 2 tablespoons of boric acid, 2 tablespoons of sugar and a cup of water. You can put the paper towels in jars with several holes punched in the lid.

### **Vinegar**

White vinegar is effective against ants. Vinegar, particularly apple cider vinegar will attract and catch fruit flies, fungus gnats and wasps. You can mix 3 parts vinegar with 1 part dishwashing soap to kill weeds. If you have cats wandering in your yard to go potty, you can spray the ground with white vinegar to repel them.

### **Green Bug All Natural Pest Control Products**

There is a very good commercial product available made from cedar. It is very effective. There are several brands out but the one I wholeheartedly recommend is Greenbug. It has several formulations including one for outdoor use, one for indoor use and one for use on people and pets. These are very good products and they are available at [www.greenbugallnatural.com](http://www.greenbugallnatural.com).

## Essential Oils

It is possible to repel and control pests using certain essential oils. This is much safer than using standard, synthetic pesticides. You do have to be careful with essential oils as some people have a reaction to them if it is applied to their skin as a repellent. You do not want to use essential oils on any of your pets as they can have bad reactions as well. If you are going to use the oils as an insect repellent on your body, just add a few drops (5 to 10 drops) to an ounce or two of extra virgin coconut oil, jojoba oil, almond oil, sesame oil or avocado oil. You can make a good tick repellent by adding lemongrass oil to water, mix it well and apply the mixture to clothing in unnoticeable areas, such as the inside of the pants legs and socks.

Here are a few essential oils that are good insect repellents: Cedarwood, Eucalyptus, Lavender, Lemongrass, Peppermint, Rosemary, Sage and Spearmint.

When using essential oils, one way to apply them is to use a pistol-grip squirt bottle. Mix a few drops of the oil with some water, shake it up, and start spraying the pests. If you are treating for ants wipe out kitchen cabinets with a damp sponge and 6-8 drops peppermint essential oil. Then place 3-5 drops of the oil on windowsills, doorway cracks, and in the corners of the cabinets under your kitchen sink.

Centipedes, cockroaches, booklice, earwigs, and silverfish can be controlled by placing several drops of peppermint or eucalyptus essential oil in areas that collect moisture, such as damp basements, garages, and cabinets that house plumbing fixtures.

For mice place several sprigs of fresh peppermint between pantry items in your cabinets, or make a solution of 2 cups water and 3 teaspoons of peppermint essential oil and spray wherever you find mouse droppings. You can also soak some cotton balls in peppermint essential oils and place in areas where you don't want mice, inside or outside.

If you have aphids or thrips on your plants, you can spray the leaves and drive the insects away with no harm to your plant.

Essential oils may be the future of the pest management in homes and our schools, day care centers, hospitals, medical facilities and other public buildings. You can get some essential oils in health food stores or you can get them online. One good supplier is [www.mydoterra.com/dewberryhill/](http://www.mydoterra.com/dewberryhill/). Click on Shop for Products and then on Single Oils and you will see the various types of essential oils they carry.

## INVISIBLE BITING BUG SYNDROME (IBBS)

Q:

*I am being eaten alive by mites. I think these teeny-weeny, black/grey specs are bugs. I thought bed bugs but I see no blood anywhere (except on my body, where I scratch myself in the morning. (yes I put cortizone on.) There are no poop and only a few specs about this size "I" and they are almost invisable. I have to use a lamp and glasses to see them. I also found the running my hand lightly over the bedsheet in the morning allows me to feel white specs this size "I" with two or three grey I's. I remove them with scotch tape. How can these teeny bugs do so much harm? What are they? My husband thinks I'm being neurotic - he doesn't have any bites nor itches and sleeps next to me. He laughs at my complaints. I am wearing perfune to bed and spreading baby powder around but no relief.*

A:

Twenty years ago, I would get a call a month about someone with “imaginary” bugs crawling on them. Most pest control people would get these occasional calls as well. We called it Delusional Parasitosis (DP) and recommended a psychologist. About ten years ago the calls increased to one a week or so and now I am getting them almost on a daily basis. This is no longer a psychological problem, but a real physical problem and it is reaching epidemic proportions in this country. I coined the term Invisible Biting Bug Syndrome (IBBS) for this condition. It is also known as Morgellon's Disease (MD).

There are several possible causes of this condition and one of them may be mites. Occasionally people have pigeons or starlings or other birds nesting on their homes. If the birds leave and don't return, the mites that may be in their nest will find their way into your home and will bite the inhabitants. If you have rodents in your house, the same thing will happen if the rodent dies from poisoning or just doesn't come back to their nesting area. The rodent mites will migrate into your living area. The one bug that doesn't affect humans although it is said to do so by some companies is the springtail (Collembola). Springtails feed on decaying vegetation and do not bite or infest humans. To treat for the mites, you should fog your bedroom and any other room you suspect they may be. To fog, utilize 1 quart Greenbug for People for up to 1200 sq ft. Starting at the far side of a room, aim the fogger directly at all potential hiding spots making sure the mist penetrates thoroughly. Pry fabric apart, point into electrical outlets, blast up under heavy furniture, fog all nooks and crannies as you move your way out of the room. Continue to direct at hiding spaces until there is a dense fog in the room. All mites will quickly die from exposure. Allow the fog to penetrate 4 hours to overnight. Never use synthetic pesticides as they can make matters worse if you react badly to the chemicals. Greenbug is made from cedar and is available online at [www.greenbugallnatural.com](http://www.greenbugallnatural.com)

Another possibility is follicle mites (*Demodex* spp.) The adult mites are only 0.3–0.4 millimetre (0.012–0.016 in) long, they have a semitransparent, elongated body that consist of two fused segments. Eight short, segmented legs are attached to the first body segment. The body is covered with scales for anchoring itself in the hair follicle, and the mite has pin-like mouth-parts for eating [skin cells](#), [hormones](#) and oils ([sebum](#)) which accumulate in the hair follicles. The mites can leave the hair follicles and slowly walk around on the skin, at a speed of 8–16 centimetres (3.1–6.3 in) per hour, especially at night, as they try to avoid light. Mating takes place in the follicle opening, and eggs are laid inside the hair follicles or sebaceous glands. The six-legged [larvae](#) hatch after three to four days, and the larvae to develop into adults in about seven days. The total lifespan of a *Demodex* mite is several weeks. The dead mites decompose inside the hair follicles or sebaceous glands.

Older people are much more likely to carry the mites; about a third of children and young adults, half of adults, and two-thirds of elderly people are estimated to carry the mites. The lower rate of children

may be because children produce much less sebum. It is quite easy to look for one's own *Demodex* mites, by carefully removing an eyelash or eyebrow hair and placing it under a [microscope](#).

The mites are transferred between hosts through contact of hair, eyebrows and of the sebaceous glands on the nose. Different species of animals host different species of *Demodex*.

In the vast majority of cases, the mites go unobserved, without any adverse symptoms, but in certain cases (usually related to a suppressed [immune system](#), caused by stress or illness) mite populations can dramatically increase, resulting in a condition known as "Demodicosis". It can be characterized by itching, inflammation and other skin disorders. [Blepharitis](#) (inflammation of the eyelids) can also be caused by *Demodex* mites. Some evidence links *Demodex* mites to some forms of the skin disease [rosacea](#), possibly due to the bacterium [Bacillus oleronius](#) found in the mites.

There are other possible causes of Morgellons. Pollutants in the air can be reacting with skin and flesh cells in some way. Pesticides may be a factor. I asked a group of folks who have MD about this and if they are exposed to pesticides. Many said they were and the few that said they weren't did admit they go into public buildings such as restaurants. Anyone who goes into any public building that uses pesticides will be exposed. While the active ingredient in the pesticide may break down, there are a number of inert ingredients (usually comprising 98% or more of the pesticide) that may be more resilient in the atmosphere. Pesticides have been linked to Parkinson's disease as well as some genital abnormalities in babies. It is perfectly logical to come to the conclusion that exposure to pesticides can cause many of the symptoms people who suffer from Morgellons are complaining about.

There is evidence coming out now that Morgellons might be caused from eating genetically modified (GM) foods. Go to <http://www.naturalnews.com/023004.html> for more information. This is going to require a lot more study, but the implication is that the chemicals in the GM foods can cause your nervous system to send messages to your brain that something is biting you or crawling on your skin. This is certainly not a psychological disorder, but a physical disorder caused by the chemicals. You may want to start eating organic foods and stay away from any GM foods if possible. Realistically it may not be possible to avoid them all as the food makers aren't required to label their foods as genetically modified at the present time. Shop at health food stores whenever possible and avoid any meat that comes from factory farms as it is loaded with chemicals. Never let pest control person spray pesticides in your home. Around the outside is fine, but not indoors where you will be exposed to it. I am convinced after studying this syndrome for many years that it is caused by chemicals in our bodies, not by bugs or fungi. Many chemicals can interact with our nerves and send false messages to our brains. For instance, some chemicals can tell our brain something is crawling on us or biting us, and then we react by scratching, and worse yet, spraying ourselves with pesticides or chemically loaded skin products, which just exacerbates the problem. Some people describe it as a feeling of bugs or parasites scuttling around beneath their skin, accompanied by open lesions that heal slowly and ooze out blue, black or white fibers that can be several millimeters long. These fibers appear like pliable plastic. They can be as fine as spider silk, yet they are strong enough to distend the skin when pulled and elicit shooting pains when you try to remove them. Some of these fibers have been analyzed and they contain along with other substances, bovine DNA. That means the chemicals causing the fibers probably came from drinking milk or eating beef from chemically fed cattle. Vitaly Citovsky, Professor of Biochemistry and Cell Biology at Stony Brook University in New York, discovered that the fibers also contain the substance Agrobacterium, a genus of gram-negative bacteria capable of genetically transforming not only plants, but also other species, including human cells.

Here is what you need to do to try to solve this problem. First, never expose yourself to pesticides or insect repellents that contain DEET. These products have a lot of chemicals that can harm you. If you

use them, they can destroy your immune system making you susceptible to other products. Don't let pesticides be applied in your home or your workplace and try not to frequent any public building like a restaurant that has recently been treated with pesticides.

Never eat meat from a factory farm. This means almost all meat found in a supermarket or Walmart. If you have to eat meat, eat only meat from small farms or ranches. Never eat vegetables or fruits that have been sprayed with pesticides. If the vegetables and fruits don't say 100% Organic on the label, don't eat them.

Don't eat any food that contains genetically modified organisms (GMOs). One expert, Jeffrey Smith, links GMOs to toxins, allergies, infertility, infant mortality, immune dysfunction, stunted growth, and death.

Don't consume anything that contains aspartame, such as Equal or Nutrasweet. As a result of its unnatural structure, your body processes the amino acids found in aspartame very differently from a steak or a piece of fish. The amino acids in aspartame literally attack your cells, even crossing the blood-brain barrier to attack your brain cells, creating a toxic cellular overstimulation called excitotoxicity. Also wheat, dairy, and soy contain exceptionally high levels of glutamic and aspartic acid, which makes them all potentially excitotoxic. It is quite possible these chemicals are communicating false messages to your brain, indicating biting bugs that aren't there.

Don't eat food out of cans or drink water or other beverages from plastic bottles. The lining of most metal cans has a thin plastic liner that contains bisphenol-A. Bisphenol-A, or BPA, is a chemical thought to increase the risk of infertility, cancer, diabetes, and even heart disease. This chemical is also in plastic bottles. While bisphenol-A may not be directly related to IBBS, it is a chemical that can have an adverse effect on people. There is no reason to weaken your immune system with any chemicals that can be avoided.

Avoid cotton products if at all possible, particularly tampons if you are a woman. In the United States alone, approximately 600 thousand tons of pesticides and chemical fertilizers are applied to cotton fields each season. To bring this fragile plant to harvest, it is heavily sprayed 30 to 40 times a season, in extreme cases, with pesticides so poisonous they gradually render fields barren. Some of this cotton is used to make furniture, mattresses, tampons, swabs, and cotton balls. The average American woman will use 11,000 pesticide treated tampons or sanitary pads during her lifetime. Use only natural tampons.

Don't use cleaning products such as soaps that contain triclosan or triclocarban. These chemicals are endocrine disruptors. They are widely used in antibacterial soaps, body washes, lip glosses, deodorants, dog shampoos, and even toothpastes. Some brands that contain them are Dial, Colgate, Lever 2000 and Vaseline.

There is no guarantee that avoiding all of these products will solve your problem, but it certainly may help. It may take awhile for the chemicals to be removed from your system, so don't expect an overnight reaction. You may have to give it several months before you see the symptoms of IBBS start to disappear.

In some cases, the symptoms may not go away. There are three possible scenarios to IBBS (or Morgellons). One could be mites in the house. If you treat the house with a non-toxic product such as Greenbug, and the problem doesn't go away, then it is most likely chemically related as stated above. If that doesn't produce results, then it is probably psychological, which is possible in rare cases.

## MULTIPLE CHEMICAL SENSITIVITY (MCS)

Multiple Chemical Sensitivity (MCS) is a real disease that affects a large segment of our society. Many more people may not know they have MCS until they are exposed to pesticides or other chemicals. Sharyn Davidson worked for a veterinarian clinic and was exposed to pesticides used on our dogs and cats. This exposure triggered MCS in her. She can describe in her own words her battle with Multiple Chemical Sensitivity.

*People with Multiple Chemical Sensitivity (MCS) often refer to themselves as canaries, or biological sentinels, who signal impending danger from toxic exposures. Recent epidemiological research revealed that as many as 16% of the population considers themselves sensitive to some chemicals. MCS has become like a half-ton canary that no one can any longer ignore. Many people with MCS are intolerant of pesticides, solvents, and many other synthetic products that never existed until humans created them.*

*Some would have you believe that there is nothing wrong with these synthetic products, but that there is something emotionally wrong with those who report reacting to these products. Can thousands and thousands of people who report intolerance to toxic chemicals be suffering from mass psychogenic illness? The opponents of MCS would like you to believe that if designer poisons interfere with the life processes and kill life forms lower on the food chain, why is it a stretch of logic to understand that these same chemicals interfere with the life engendering metabolism of humans and make them ill?*

*Most people with MCS do not have antibody mediated allergies. Most toxic chemicals are not allergens. They are chemicals that interfere with the natural metabolic processes. Immune suppressive toxins have been found in the fats of dead whales in Puget Sound and in the fat biopsies of humans with MCS, cancers and other toxic induced disorders. Unlike the highly impacted wildlife, those of us with chemical sensitivity can verbalize the emotional and physiological distress triggered by the many synthetic toxins. These supposedly "safe" synthetic chemicals created by man have reached the top of the food chain and are now creating a health crisis. Although many people appear to tolerate many of these synthetic products, there are many of us who are made ill by them.*

*Although we don't completely understand the mechanism of MCS, we are getting closer. We would like those who do not experience chemical sensitivity but who understand that the fragile web of our common environment has now been diminished to advocate for research to shed greater understanding of this issue. There can be no resolution of any problem without first acknowledging and understanding the problem. Please become informed about the impact of toxins on the quality of your life. The most important thing we can do is to find understanding through research and explain the mechanism of the disorder so that the problems can be resolved*

*My chemical sensitivity this past 19 years has been like a bad dream in which the Emperors have all their clothes on but they cannot see, hear or think clearly. In this nightmare, a small canary is yelling wake up Bellingham, dioxins are dangerous!. Wake up Washington State, pesticides are poisons . Wake up America, your canaries are ill! Wake up Earth, toxic chemicals impair life! Are those of us with MCS the only ones who can see, hear, and understand the canary?*

## **HOW TO PICK A SAFE & EFFECTIVE PEST CONTROL COMPANY**

### **Scary Pest Control**

The problem with the pesticide industry is that a large number of pest control operators (PCOs) are poorly trained and not well regulated. Many of them are not familiar with the label or Material Safety Data Sheet (MSDS) of the chemical they are applying.

If a PCO tells you the pesticide he is spraying is perfectly “safe”, you may have a problem. It would be a federal violation to make that kind of statement. If he says it is so safe you can drink it, offer him a glass! If the PCO is spraying your baseboards with a pesticide, it means he doesn’t know what he is doing and you need to be concerned. If you see a pest control truck on the street and it has hand sprayers and other small equipment loose in the back so anyone can grab it, stay away from that company. If they haven’t got enough sense to lock up their equipment, they are in the wrong business.

One of the most egregious incidents of pesticide misbehavior occurred in Mississippi in 1996. Two unlicensed and untrained make believe exterminators sprayed 300 homes and businesses with methyl parathion, an agricultural pesticide intended for outdoor use only. There were complaints of foul odors, staining of walls and carpets and pets dying for no apparent reason. Many residents fell sick with flu-like symptoms. These so-called “pest management professionals” sprayed the walls and floor with this pesticide. Tests confirmed that the levels of contamination were at least five times the level that requires immediate evacuation of humans and animals. Hundreds of families were evacuated from their homes and several businesses had to be shut down until all the sites were decontaminated. This episode of pest control negligence cost the taxpayers of Mississippi over \$50 million and put thousands of people in a very serious situation. Fortunately, the people who perpetuated this act were tried and convicted for their crimes. Methyl parathion had a DANGER label and is no longer permitted to be used in the U. S. It was used as a foliar spray on cotton as well as an insecticide and miticide on many other plants.

I got a letter with some bugs in it from a lady in Alto, NM. She said she had the local exterminator out four times at a cost of over \$1000 to control them and she still had them. He said they were the larvae of some sort of flying beetle. The specimens she sent were actually duff millipedes, a completely harmless little millipede that will shortly die of dehydration once it enters the home. No pesticides were necessary to control it. In fact this fellow tried every pesticide in his truck and failed to control it because he didn’t know what it was. The only thing he succeeded in eradicating was the lady’s bank account.

There was another instance where one of the major companies treated a home several times for carpet beetles, without success. Actually they mistook duff millipedes for carpet beetle larvae. The misidentification of pests is common in this industry and the results can be devastating in the money spent and the pesticides incorrectly used.

Then there was the fellow who went out to a house and identified the pest as fleas and did a flea job, which consisted of spraying the carpets and furniture and fogging the house. He did it three times and was unsuccessful each time in controlling the bugs. The customer called another company who properly identified the pests as harmless springtails that did not need control. Fortunately, the owners of this house were attorneys and they sued the first guy out of business.

Consider the story of the Immovable Secretarial Object and the Irresistible Pesticide Man. She wouldn't get up from her desk when he arrived to spray the office. (*"He wasn't very nice about it. He just said, 'Lady, you have to get up for a minute. If he had asked me instead I would have moved...'"*). He sprayed anyway, "around" her feet. She was wearing sandals and ended up at the emergency room with welts on her toes, being one of the increasing numbers of the population that is allergic to synthetic pyrethroids. Along the same line, my sister Linda, in Florida, told me their company exterminator came in the office and sprayed the baseboards and then sprayed all of their chairs! Was he spraying for some kind of butt bug? No one knows why as my sister ran him off and told him never to return.

During the outbreak of false chinch bugs in New Mexico a couple of years ago, the pest control companies' phones were ringing off the hook. One lady called one of the largest pest control companies in the country. A salesman went out, identified the pest as Johnson beetles feeding on her Johnson grass and wanted \$450 to control them. She called me to confirm the diagnosis. Of course it was wrong as there is no such thing as Johnson beetles and very few people have Johnson grass growing in their yard. She had false chinch bugs which required no control at all.

There was the case of a pest control company spraying a home for carpenter ants several times because he said he found carpenter ant poop on the floor. The "poop" didn't go away with the spray. Actually they were very small beetles that feed on mold and were present because the homeowner had a plumbing leak that caused some mold. The exterminator couldn't tell a beetle from ant poop.

In another case, a woman called because she had weird worms in her house, particularly on the kitchen floor. The pest control operator came out, identified them as boll weevils, said they would get in the closet and eat her clothes, so she needed the whole house fumigated. The lady was skeptical and got another opinion. It turns out they were blow fly maggots falling from the ceiling where a dead animal was being consumed. Now the question is; is the PCO a crook scamming this lady or was he just so stupid and uninformed that he really believed his diagnosis? In either case, that is Scary.

In a similar case a man was told he had codling moths in his clothes closet. Since codling moths only eat apples, that would only be possible if he had an apple tree in the closet. The customer was smarter than the PCO and didn't let him treat the house.

If you have pets, you should never use pesticides of any kind or use an exterminating service that sprays pesticides in the house. Recently a lady called me and told me she hired a pest control company to eradicate some crickets from her home. Rather than use bait, which would be safe if properly applied, the PCO sprayed the baseboards. He ended up killing \$2500 worth of her son's snakes, yet didn't kill any crickets. She successfully sued the company.

In another case a pest control (non)-professional sprayed the baseboards in a pet shop. The pesticide was sucked up into all the aquariums and he killed all the fish in the store.

There was a pest control company power spraying around a school in Chama, NM, when children were standing close by waiting for a bus. One kid got sick and passed out and was rushed to a hospital. He survived, but the company was correctly sued. This company is still in business and has their office in Santa Fe.

In another incident reported in *Proceedings, Association of Avian Veterinarians*, an organophosphate chlorpyrifos was used in a home where pet birds were bred and raised for six years. The target pests

were cockroaches but after five applications, fledglings began to die off, followed by a cessation of egg production. Finally the adults deteriorated and died. The owner realized that this tragedy meant he was also in danger and that was the basis of his lawsuit against the pest control company. The final report read: "The case was settled to cover the cost of the birds and for creating a health hazard for the occupant of the house."

Of course, who can forget the fellow who just finished up a termite job and had a little bit of the termiticide left in his tank. He offered to spray the family's cat and dog for fleas with the leftover chemicals and wouldn't even charge them.

In a case in California in 2001, a person who is now a pesticide lobbyist, treated a warehouse with pesticides and didn't post notification. Six policemen responded to a call and had to enter the warehouse. All of them got sick and had to go to the hospital. They all survived, but the pesticide lobbyist was fined \$1000. This fellow is still on the discussion boards telling everyone how safe pesticides are for bees and how dangerous automobiles are, as, according to him, they kill more bees than chemicals.

A lot of the horror stories that I related to you have one thing in common; the inability of the pest control person to properly identify the pests. Many of them use the Spray and Pray method. That is if you spray enough pesticides and pray it kills something, you won't get a callback from the customer.

Aluminum phosphide is an inorganic phosphide used to control insects and rodents in a variety of settings. While it is used primarily as a grain fumigant, it is also used as an outdoor fumigant for burrowing rodents and moles. This product is frequently misused. In one case that recently took place in Los Lunas, New Mexico, a pest control company fumigated a colony of prairie dogs on church property. They didn't follow normal procedure and inspect the burrows for burrowing owls, which are federally protected under the Migratory Bird Treaty Act and the Raptor Protection Act. A witness to the fumigation told the pest control person that owls were present in the burrows, but he continued gassing them anyway.

This fellow was reported to the proper authorities, but because of lack of physical evidence (dead birds, feathers, feces, etc.), he was not prosecuted but he was severely warned. I wrote to the church to get their rationale for hiring this fellow to gas the prairie dogs. If you have a healthy prairie dog colony nearby, it is plague free. This pastor's fear of prairie dogs, plus the incompetence of the pest control person lead to the gassing of federally protected birds if the witness was correct and there is no reason to think he wasn't.

Unfortunately, in New Mexico, you do not need a fumigation license to gas burrowing rodents with a fumigant. You would need such a license to fumigate a building, a truck or a vault, but for some reason, burrows don't count. It is clear the fellow that fumigated the burrows wasn't competent and shouldn't have been allowed to use the product. The odd thing is that this company specializes in the control of mammal pests judging by its name. They should change their name to Scary Pest Control.

How toxic is aluminum phosphide? It is highly toxic when ingested or through inhalation of the gas. Symptoms of mild to moderate acute aluminum phosphide toxicity include nausea, abdominal pain, tightness in chest, excitement, restlessness, agitation and chills. Symptoms of more severe toxicity include, diarrhea, difficulty breathing, pulmonary edema, respiratory failure, rapid pulse, and

hypotension (low blood pressure), dizziness and/or death. Recently two children in a house in Utah were killed by aluminum phosphide that an exterminator used in their yard to control voles. The owner of the company apologized for the mishap.

Recently there was an article in a NM paper about how a pest control company injects pesticides into the walls of homes to control all the pests that hide in the walls. Someone asked me if this was something they should consider. The answer is NO.

First, there are very few pests that nest in our walls. Some ants will come in from the outside and if they find ample food and water in the home, they may nest in a wall. This would include odorous house ants (*Tapinoma sessile*), little black ants (*Monomorium minimum*) and one or two other species. All you have to do is get the ants properly identified and then put out a bait they like. They will take it back into the wall and kill the queen and colony. Pesticides aren't necessary. Who else nests in walls? German roaches in urban/ghetto areas may nest in walls, but the American and Oriental roaches we have here in NM prefer areas with access to water. A wall would be too dry for them to nest. Centipedes, scorpions, spiders and other pests may get into a wall, but they won't stay there very long. The only real pest that you will find in walls are subterranean termites, and the treatment method they use won't affect them. It may be possible to get a wasp nest in a wall, and if that is the case, this method may help. However it wouldn't be necessary to treat all the walls in the house.

Why else is this a bad idea? If there were bugs in the walls they could get into your house. If the bugs could get into your house, so will the pesticides. Do you really want someone pumping pesticides in your walls that will come into your home and threaten the health of your family and pets? Nobody may get sick right away, but the pesticides can build up in your body or your children's bodies and comprise your health.

So why would anyone want to pump pesticides into your walls if there aren't any pests there? The answer is the same as why we sprayed baseboards in homes for many years. It is perceived value. The industry sprayed baseboards to supposedly kill all the bugs that ran along the baseboard. Of course very few bugs actually ran along the baseboard. The real reason that baseboards were sprayed was to kill time in the customer's home to make it look like they were getting their money's worth. Most companies don't spray baseboards anymore, although a few still do. Power spraying the perimeter of a house was also widely used, but now is frowned upon as it has no real value and they tend to kill more beneficial insects than pests. It is particularly silly when the pest company sprays around your home in the middle of winter.

If baseboard spraying, power spraying and pumping pesticides into walls isn't effective pest control, then what is? In reality, pesticides should never be used in a home unless you have an infestation of a pest. In many cases, pesticides aren't necessary then. If someone wants to spray your baseboards or pump pesticides into your walls, ask them to sign a paper stating that they will accept financial responsibility if anyone in your family or your pets get sick from the pesticides. If they agree to that (and they won't), then you can consider it.

Never let a company use rodenticides to control mice. The reasons are clear in my book, P (or G). In the majority of cases, you can control your own mice using snap traps or Tin Cats. Rodenticides can kill non-target animals, including pets and if a rodent with a disease such as hantavirus dies and you can't retrieve the body, it can create a health hazard. Don't let them use glue boards either as a mouse will urinate and defecate for hours before it dies and that is how hantavirus is spread.

## How to Pick a Pest Company (Household Pests)

I have said many times that most people can control their own pests without using pesticides or a pest control company. Most of this information is available in this book. Of course there are many people who prefer to hire someone for this and that is fine.

Just be careful and get several companies to give you a proposal. First, make sure they can properly identify the pest you have when they inspect your home. If they are true professionals, they will know the scientific name of the pest and give it to you so you can Google it for more information. If the representative that comes to your home or business doesn't recognize your pest and offers to treat your home anyway, do not let him. If they offer to take the bug back to their office for identification, that is fine.

A professional pest management specialist will inspect your home or business, identify any pests and offer to treat the infested areas safely and effectively. Most companies want to make regularly scheduled visits to your home. That is okay as long as they just don't spray pesticides inside your home and call it pest control. It is, in reality, pesticide pollution. They should come to your house periodically and inspect your home or business for pests, for conditions conducive to pests and for possible entrance ways for pests to come into your home. If you have a crawl space under your home, they should go under your house and look for leaks or areas where pests can get into the main portion of your home. They should carefully inspect around the outside and look for wasp nests or other potentially dangerous pests near your home or business. They should even check any spider webs attached to your home to see if swarming termites are in the web. Pesticides should only be applied if there is a pest present that requires it. In the winter, they can inspect your house as they normally do and then also offer suggestions on how to pest-proof your home or business. Maybe install door sweeps, fix holes around plumbing and even trim branches from trees that are touching your home. This is IPM (Intelligent Pest Management).

Many companies and certainly all the larger ones have a clause in their contract that prohibits you from suing them. The clause reads something like this: *“Any dispute arising out of or relating to this agreement or the services performed under this agreement or tort based on claims for personal or bodily injury or damage to real or personal property shall be finally resolved by arbitration administered under the commercial arbitration rules of the American Arbitration Association.”* In 1995, the U. S. Supreme Court established that mandatory arbitration clauses could be used in contracts between companies and consumers. Since that time, the clause has been widely used by the pest control industry. One of the problems, and there are several, is that it is not free. It could cost the consumer up to \$2,000 up front in order to start the arbitration process. Very few people have that kind of cash lying around. If you are asked to sign a contract with a pest control firm, look for that clause. If it is present, you can cross it out and ask the company representative to initial it. If they refuse, don't sign the contract. There are plenty of pest control operators who do not require contracts to conduct their business.

There are basically three degrees of professionalism in the industry. There are the “antiquated” companies, who still go in homes and spray baseboards even though they have no idea what kind of pest the customer has or even if they have a pest. Mostly it is old-timers who still do this and it will eventually disappear. In the antiquated companies in the industry, all they know is they kill roaches and ants. One supervisor told me many years ago that there were only two kinds of ants, inside ants and outside ants! He was the service manager! That company didn't do well over the years. Other antiquated companies recognize sugar ants, grease ants and piss ants.

The next level of professionalism is the “mediocre” group of companies. They all have the same habits and follow the same routines, regardless of how unprofessional it may be. This is usually a result of lack of training. The folks start companies and develop their methods based on what they did in previous companies they worked for, even if those methods are no longer viable. While this may work for many customers and is easy to do, it still puts them behind the true “Professionals”, who take this industry very seriously. Professionalism at the highest degree should be the mission of every company, but it is not even close.

The most common level of knowledge is represented in the mediocre companies around the country. They use common names for insects that make no sense. They refer to “crazy” ants. Why are they crazy? Have they been to an insect psychiatrist? They are called crazy ants because they run around in circles. Lots of ants do that. My kids did that. It is a ridiculous name. “Acrobat” ants do not swing from chandeliers in the customer's house and pavement ants don't live exclusively under pavement. I have never sniffed an “odorous” house ant, so don't know if they smell funny, but I am told they do. I have never met a customer with an ant problem who has squished and sniffed their ants. Of the 48 species of “field” ants that live in NM, only two of them actually live in fields! We have “carpet” beetles in homes without carpets. It goes on and on. Every company should strive to reach the upper level of competency and achieve true professionalism in the industry when it comes to technical knowledge and use the scientific names of the pests.

The antiquated companies will treat the baseboards of their customer's homes. Period. The mediocre companies will spray pesticides inside and out in a general manner, and will spray pesticides in the dead of winter when bugs are hibernating. This is, of course, for show only, except all they are showing is their lack of technical knowledge.

The true professionals will only use crack and crevice materials in a building, or baits like Niban which works very well. They will treat around the outside using a pin-stream application so they can get the pesticide in cracks and crevices where potential pests hide. They will put Niban bait in water meters as they always have roaches. They will check spider webs they see for signs of swarming termites. In the winter, when there is no pest activity, they will inspect the house and offer to seal any cracks in the foundation, repair any vents, cut back any tree branches touching the roof and other things that can help prevent bugs from entering the house when spring comes around. This makes far more sense than spraying pesticides when the ground is frozen! Some so-called professionals will say Niban doesn't work. Actually it works very well, but since it is made from boric acid and available to the public, they don't want to use it as they think the customer may decide to do it themselves.

A true professional will post a pest control notification if they are going to treat any commercial account with synthetic pesticides, whether it is required or not. They will want to let the public know what they may be exposed to. Many years ago when I was in Houston, I always posted notifications when I was a Truly Nolen manager and it worked great. We had a lot of people call and ask for our service. There is nothing wrong with pesticide notification if you are using a legal product safely and according to the label.

If you do hire a company, ask them to give you a copy of the label and the MSDS of any pesticides they use. Read the label carefully. A professional will wear the proper gear as required by the label when applying pesticides. The mediocres will sometimes not wear the safety gear as they don't want you to think their products are dangerous.

**In Summation:**

If they aren't wearing a uniform or neatly dressed, ask for identification and to see a copy of their license. Only amateurs would come to your home dressed in T-shirts or shorts.

If they don't thoroughly inspect your home, inside and outside and under it if you have a crawl space, then call someone else.

If they say they will spray your home regularly inside send them on their way. You are looking for safe and effective pest management, not pesticide pollution.

If they don't recognize your pest to species or otherwise seem like they aren't aware of what they are doing, send them on your way. Some companies hire car salesman and other types of salesmen to sell pest control and that is not professional. Everyone in the company, salespeople, service technicians and managers should be properly trained in all aspects of pest management.

Choose your pest management professional carefully. Use the same criteria you would use in choosing a doctor or any other professional.

**How to Pick a Termite Company**

The first part of termite control is hiring a competent wood destroying insect inspector to see what kind of pests you may have. Proper identification of the pest is essential if control is going to be successful. They absolutely have to know exactly which species of termites are infesting your home, not just the general description of either "subterranean" or "drywood" termites. Different species have different habits, different size colonies and do varying amounts of damage. If you are going to pay a lot of money to control these pests, you should know exactly what they are. If your inspector doesn't know what they are, then hire someone else. There was a case in Albuquerque where a termite inspector walked over drywood termite pellets while inspecting the house. He wasn't familiar with drywoods so didn't make a note of them. It was a real estate inspection, so he was libel for missing the drywoods and had to pay for the subsequent fumigation. He went out of business and the last I heard he was in Alaska panning for gold. Hope he is better at that than he was at inspecting homes for termites.

In another case, an inspector checked a home in Clovis, NM and didn't find any termites. He didn't realize there were powder post beetles in the ceiling. When the buyer went into the attic, he fell into the kitchen through the ceiling. The inspector was libel as he should have been.

In a similar case, a company inspected a wooden cabin in Cimarron, NM and didn't find termites. He didn't see all of the bostrichid beetles on the window sills and ended up paying for a fumigation.

## **Pest Management using the Precautionary Principle in Commercial Establishments**

The purpose of this section is to help commercial establishments control pests without exposing anyone, particularly children to toxic pesticides. The section can be used in school buildings as well.. Except in extreme situations, toxic pesticides are not necessary. What is a toxic pesticide? Most pesticides have Signal Words on the label. They are either DANGER (very toxic), WARNING (moderately toxic) or CAUTION (less toxic). In every case, they are toxic to some degree and can be hazardous to children. There are pesticides without Signal Words and they are Environmental Protection Agency (EPA) exempt, which means they are safe. These products and some natural items can be used to control pests safely and effectively.

The first section lists the non-toxic products that can be used to control pests. The second section explains how to pest proof a commercial building or home to minimize the chances of any pests coming in. The third section lists the most common pests that may to visit you. There will be information on each pest on how to control it safely and effectively. The fourth section describes the Pesticide Precautionary Principle philosophy. The fifth section is about pesticide application rules. If you use a pest control company, they should be required to follow these guidelines. The final section talks about the hazards of pesticides and how dangerous they are.

### **Safe Products for Pest Management**

#### **Baking Soda**

Baking soda or sodium bicarbonate is a mined alkaline mineral. When it is eaten by insects it releases carbon dioxide bubbles that are fatal. A paste made from baking soda will also give quick relief to an insect sting. You can sprinkle baking soda around your home inside and out and around pet food dishes. It will repel ants and roaches. If your dog gets sprayed by a skunk, you can bathe him/her in a tub of warm water with a cup of lemon juice and a box of baking soda with a ½ cup of shampoo. That should neutralize the odor

#### **Beer**

Believe it or not, beer is very effective at controlling some pests. If you soak a rag in beer and put it in the middle of your garage floor at night, it will be covered in drunken cockroaches the next morning waiting for you to dispatch them. You can also put pie pans filled with beer in your yard around your home or building. Make sure it isn't accessible to people. Roaches are attracted to the beer and will drown in the pans and they don't check IDs. The beer will also attract snails and slugs.

#### **Borax / Boric Acid**

Borax is a combination of sodium, boron and oxygen and is mined from the soil. Boric acid is a crystalline material made from borax. 20 Mule Team Borax is very effective in controlling a wide variety of insects. Boric acid is a powder that removes the waxy coating on the exterior of the insect's body when they crawl over it. The waxy coating is used to retain water and without it the insect quickly dies from dehydration. When mixed in baits it can control ants, cockroaches and some other insects. The insects also ingest the material while grooming and subsequently die. Boric acid will remain effective indefinitely in a dry environment. Boric acid can be mixed with any food the roaches or ants are eating including peanut butter, jelly, sugar, syrup or honey. Boric acid is available in some stores or can be obtained online.

### **Catnip**

Catnip will not only repel insects such as cockroaches, ants, mosquitos and others, but it will prevent rabbits, deer and squirrels from eating plants on school property that sprayed with it. Catnip spray can be obtained online. Amazon carries it. It is also available in some stores

### **Diatomaceous Earth (DE)**

If you use this product, be sure it is food-grade quality. Diatomaceous earth is mined from the fossilized silica shell remains of microscopic diatoms. Diatoms are animals that are related to crustaceans of today. They produced shells that are now ground up and used as a powder or dust for insect control. Diatomaceous earth absorbs the waxy layer on the surface of insect skins, causing the insect to desiccate (dry out). Diatomaceous earth also effectively controls slugs and snails.

This least-toxic insecticide is considered harmless to humans and is used in stored grains. Mix ¼ cup of food-grade DE in a gallon of vinegar and spray pests with the mix or pour into ant mounds as a drench. Do not buy or use DE sold for swimming pool filters. This form is not effective as an insecticide and, when inhaled, can cause silicosis, a deadly lung disease. Diatomaceous earth is abrasive to lung and eyes - so use proper personal protection when using this product. It can be purchased at feed stores.

### **Salt**

Salt will kill any vegetation and is a good herbicide for killing weeds in a sidewalk, along a fence or similar areas. Salt mixed with water will also kill snails and slugs.

### **Soap**

Soaps can effectively kill insects because of fatty acids in the product that destroy cellular membranes in the bugs. It also produces a coating on the insect that prevents it from breathing through its spiracles. An effective soap spray consists of 40% water, 40% alcohol and 20% dish soap. You can also mix 1 cup cooking oil with 1 tablespoon non-detergent liquid soap as an insecticide. Use 1 tablespoon of this mix to each cup of water and you can control aphids, scales, mealybugs and spider mites that may be on school plants. It will kill the eggs as well as the adults of these pests. Do not use it if the temperature is over 85 degrees F. as it may damage the plants.

### **Sugar**

Sugar is a very popular insect attractant that can be used to control many insects if mixed properly with other ingredients. A good ant bait can be made by soaking paper towels with 2 tablespoons of boric acid, 2 tablespoons of sugar and a cup of water. You can put the paper towels in jars with several holes punched in the lid. The ants will go in but won't be able to get out.

### **Vinegar**

Vinegar, particularly apple cider vinegar will attract and catch fruit flies and fungus gnats. You can mix 3 parts vinegar with 1 part dishwashing soap to kill weeds. If you have cats wandering on school property to go potty, you can spray the ground with white vinegar to repel them.

### **Green Bug All Natural Pest Control Products**

There is a very good commercial product available made from cedar. It is very effective and safe for people and pets. It is only available online at [www.greenbugallnatural.com](http://www.greenbugallnatural.com). Every school building should have a bottle of this on hand to kill any occasional invader insect or spider.

**Niban Bait**

Niban is a granular bait made from boric acid. It is very effective against cockroaches, crickets, carpenter ants and other insects. There is also a fine grade that is effective for silverfish. It should be applied under and behind appliances, in janitor closets and other areas where roaches can hide. It is effective for several months. It is only available online. One supplier is [www.pestcontrolsupplies.com](http://www.pestcontrolsupplies.com).

**Terro Bait**

Terro Bait is a commercial bait found in stores and is safe to use. It is a liquid bait made from boric acid in small, plastic bait stations. You put the bait stations where you see the ants foraging inside. There are larger Terro Bait Stations you can put outside if you can find where the ants are coming in. Terro Bait is available in some stores or can be obtained online.

**Amdro Bait**

This bait is not organic or natural, but it is very effective against harvester ants and if used properly outside it will pose no danger to anyone. Pets won't go near it while the ants are feeding on it, as the ants will sting them.

**Pheromone Traps**

There are pheromone traps for several different pests, including clothes moths and flour moths, neither of which are normal pests in schools. German cockroaches can occur in schools and there is a German Roach Pheromone Trap available that will attract and catch the roaches. Put them where you see roach activity. They are available online.

## **Pest Proofing Commercial Buildings**

The purpose of pest-proofing a commercial building is to help keep cockroaches, ants, scorpions, centipedes, spiders, rodents and other pests out.

The first step is installing door sweeps on all outside doors that need them. If you can slide a piece of paper under a door, it needs a door sweep.

When there are branches touching the side of the building or roof, it will allow several species of ants access as well as some rodents and other pests. They should be trimmed back and kept from touching the roof, particularly during the warm months.

Inspect the outside of each building and seal or caulk any cracks in the foundation or voids around pipes or any other areas which will give bugs access to the school. Make sure all screens are in good repair.

Don't leave any debris laying around a building. This is a good hiding place for cockroaches, scorpions and centipedes. If you have firewood, stack it away from the building as it will attract black widows.

Inspect the inside of each building and patch any holes in walls where pipes are penetrating. Make sure all drain covers are in place and inspect walls for any cracks or damaged areas where pests could hide.

These procedures will keep many crawling insects and other arthropods out of most buildings. Keep anything that pests can hide in or under away from a building and don't leave outside lights on any longer than necessary as they attract insects. Check each building every few months to make sure all of the pest proofing is still in place and effective.

## **Pests that occasionally come to visit**

There are a number of pests that may show up in a home or commercial building or around the outside. In almost every case they can be managed without the use of toxic liquid or aerosol pesticides. Chances are that no matter what you do, you will see an occasional insect or spider or something else. There are several things besides pest proofing that you can do to minimize the chances of seeing these intruders. First, proper sanitation is important. Make sure there is no debris on your property. This includes dead leaves, weeds, grass clippings, and anything else that isn't necessary and that bugs would find attractive. Raise any trash containers off the ground and place them on concrete pads, bricks or pallets. Every office in a commercial building should have a spray bottle with the water, alcohol and soap mix in it so a staff member can spray any insect that wanders in during class.

### **Silverfish**

Silverfish are small insects, up to  $\frac{3}{4}$  inch long and silvery in color. They are covered in scales, which will be hard to see with the naked eye, and they have three appendages protruding from their abdomens. They feed on fungus, sugar and starch products such as flour, glue and paste. They can feed on some synthetic fabrics and cellulose which includes paper, books, photographs and cardboard boxes. They will also feed on dead insects. Silverfish are attracted to moisture so their presence in a school indicates a possible plumbing problem.

You can trap them by putting some flour in a glass jar and wrapping it with duct or masking tape so they can climb up the sides. They will get in the jar but will not be able to get out. Fine grade Niban Bait is a good commercial bait for controlling silverfish.

### **Cockroaches**

You can prevent cockroaches from coming into a school by inspecting all incoming food products, all boxes, and any used furniture or appliances for the presence of cockroaches or their egg capsules. Do not store paper bags anywhere in the kitchen. Seal any holes or crevices around plumbing under sinks and behind toilets. Regularly vacuum and clean floors under the kitchen appliances. Keep all of the drains closed at night to prevent them from coming up from the sewer system. There is a good commercial bait available for controlling cockroaches. It is Niban Bait and it is made from boric acid. When using Niban, put it under and behind appliances, around hot water heaters, and other places roaches will hide. You can also put down some duct tape, sticky side up. The glue on the tape will attract cockroaches and they will get stuck on it.

There are three species of cockroaches that commonly show up in commercial buildings and home. The American cockroach feeds on a wide variety of plant and animal material and it is commonly found in sewer systems. It will come up the drains at night and enter the schools. This is the largest of the pest roaches in the country. It will reach a little over 1  $\frac{1}{2}$  inches in length. It is a dark brown with yellowish band around its thorax (section behind head).

Oriental cockroaches or "waterbugs" are found throughout the United States but they aren't seen very often in the southeastern states. They are about an inch long. The female is all black and the male has two brown wing tips, but it cannot fly. These roaches are common in sewer systems and will come up the drains into buildings. These roaches are normally black in color.

The German cockroach is the most prolific of the roaches. It is small, dark brown with two distinct black stripes on its thorax. It will feed on almost anything edible and a lot of things we wouldn't

consider edible. They go from egg to adult in as little as 45 days and, if left unchecked, can severely infest a building. Usually they are most commonly found in kitchens and bathrooms. The best method of controlling German roaches is by using German Roach Pheromone Traps. These traps attract and catch the roaches. Put them in areas in the kitchen where the roaches have been found. If you use these early you can prevent an infestation from happening. Commercial establishments will only get German roaches from vendors. Make sure to check all incoming supplies as they come in. German cockroaches are also believed capable of transmitting *staphylococcus*, *streptococcus* and *coliform* bacteria and are known to be responsible for many allergy and asthma problems.

### **Ants**

There are more than 20,000 species of ants around the world and about 570 species in the United States. Of those, about 30 species are common household pests. There are several things you can do to prevent ants from entering a building. The first step is exclusion. Go around the outside of the building and inspect it very carefully from an ant's point of view. Ants can sense cool air and aromatic odors emanating from a school and will try to gain access. Check around the building at ground level and look for cracks in the foundation, voids around pipes, areas under stucco, peepholes in bricks and similar areas that ants can use to gain entrance. All these areas need to be sealed, caulked, screened or otherwise altered to prevent ants from using them to get into your home. Check around windows and doors to make sure they close tightly. If there are bushes or shrubs next to the building, periodically inspect them for aphids, scales and similar bugs as ants are attracted to the honeydew they produce. The ants will get on the plants and may eventually find their way into the building. On the other hand, mound-making ants will generally stay outside. They rarely leave their complicated and efficient colonies in the mound to enter buildings. There are a couple of mixtures you can use to help control ants. If you don't want the ants making mounds on your property, you can flood the nests with club soda or with white vinegar or food-grade diatomaceous earth (DE). If you use the DE, mix 4 tablespoons per gallon of water. Another mixture that you can also use is to mix 1 gallon of orange juice diluted with 2 gallons of water and a dash of soap. When using either mixture, insert a small funnel into the ant mound and pour the mix in. Then cover the hole with a rock. If you prefer, you can also spread dry instant grits on the mound. The ants will eat it and not be able to digest it and die. Pesticides are not necessary. If you have harvester ants on your property, the most effective bait is Amdro. It is not natural or organic, but it is very effective.. They are not aggressive, but they can sting if someone is in their area.

The best way to control ants when they get in a building is with baits. Terro Bait is made from boric acid and is a gel bait in a small plastic container. This bait is very effective against most species of indoor pest ants.

### **Paper wasps**

A paper wasp queen is the lone female reproductive, who begins her nest by attaching a thick paper strand to an overhanging structure or protective site. She then builds hollow paper cells by chewing wood or plant fibers (cellulose) mixed with water and shaped with her mouthparts. Paper wasps nests are often found near doorways and other human activity areas.

If you have paper wasp nests attached to a building or other area, you need to deal with them at night when all the wasps are in the nest. If you can reach the nest, spray it with Wasp Freeze or a similar product. If the nest is high up, spray it with a high pressure hose which will knock them to the ground where you can spray them with a wasp spray. Then remove the nest and dispose of it. Then, get a small brown paper bag, stuff it with crumpled paper, tie the top closed and then tape or fasten it to the

area where the wasp nest was. Other wasps will see it and think it is a wasp nest and avoid the area. Wasps aren't very social outside of their own colonies. You can hang these little bags anywhere you don't want wasps to build nests.

### **House flies**

House flies have a gray thorax (part where head is connected and wings are attached) with four dark stripes, and a mottled abdomen (posterior portion). These flies are considered "filth flies" and will feed on excrement, garbage, carcasses, and even human secretions from wounds and mucous membranes. If you accidentally eat the larvae (maggots) in contaminated food, they can survive in your intestine. They can harbor over 100 different pathogenic organisms and are capable of transmitting more than 65 diseases and bacteria that can cause duodenal and stomach ulcers. If there are flies infesting any part of a building, you need to find the food source and clean it up. The best trap for flies is the Rescue Fly Trap. It will catch several thousand flies. Just use it outside as it is smelly.

### **Moth flies**

Moth flies will occasionally breed in drains. They are small flies with hairy wings that resemble small moths. They are also called filter flies and drain flies. They are usually found in the bathroom but can breed in any floor drains in a building. They are poor fliers and seem to just hop around. The larvae live in gelatinous material in sink and floor drain traps, in sewer treatment plants and in septic tanks. They will also breed in damp crawl spaces under a house. In a building you can put duct tape sticky side down on drains to see which ones they are breeding in. You need to keep the drains clean to control these flies. They have a very short life cycle and can go from egg to adult in a little over a week in some areas.

### **Fungus gnats**

Fungus gnats are very small flies with long legs and long antennae and distinctly patterned wings. They are dark brown or black in color. They are generally found in over-watered house plants where the larvae feed on fungus in the potting soil and moist organic material. The best way to control them is to let the plants dry out almost to the point of wilting before re-watering. That will kill the larvae in the soil. Then put an inch of aquarium gravel on the soil to prevent female fungus gnats from laying anymore eggs in the potting soil. You can also place a yellow sticky trap on a stick in the soil to catch the adult gnats.

Fruit flies are usually found in a kitchen where they feed and breed on food spilled in out of the way places such as behind or under appliances or similar areas. These small flies have distinctive red eyes, which you can see with a hand lens. They are tan or brown in color and about 1/8" long. They are also known as pomace flies and vinegar flies. They can be serious pests when found as they breed in and feed on fruits, vegetables and any moist, decaying organic material. They have been known to cause intestinal problems and diarrhea when fruit containing their larvae are eaten. They will also breed in discarded fruit juice and soft drink cans. They are also very prolific as the female can lay about 500 eggs which will hatch and reach adulthood in as little as eight days.

In a kitchen, you can control fruit flies by totally eliminating all breeding material. They are attracted to acetic acid (vinegar), so put some drops on duct tape or glue boards. Or you can just fill a small paper cup with vinegar and the flies will dive in.

## **Scorpions & Centipedes**

Scorpions and centipedes are two groups of arthropods that nobody wants near their home or office. Both of these animals have the capability of stinging (scorpions) you or biting (centipedes) you with painful results. Only one species of scorpion in this country is dangerously venomous. It is the bark scorpion which is found mostly in Arizona but also southwestern New Mexico. It has killed a few people in Arizona, but not in the last 40 years. Centipede bites are painful, but not deadly in this country. However, anyone can be allergic to anything, including the bite or sting of an insect or some other arthropod. Even if the bites or stings aren't fatal, they can certainly be painful.

Centipedes and scorpions are usually found in areas of high moisture such as loose bark, in rotting logs, under stones, boards, railroad ties, trash, piles of leaves and grass clippings and similar areas. They are nocturnal or active at night and hide by day in the earth, wandering forth by night to hunt. They occasionally invade structures and will feed on cockroaches, crickets, spiders, etc. Although they may be found anywhere in a building, the usual places are damp basements, bathrooms, and any crawl space under the building. Exclusion to keep them out of structures is most important, and this begins with ensuring that no tree or shrub branches are touching the structure. The branches can be pruned away to eliminate this common pathway. You also can carefully examine the entire exterior, including up to the eaves as scorpions and other pests may crawl up rough surfaces, and you want to permanently fill in any openings found and ensure all vent screens are in place and in good condition. In the yard you can eliminate many potential harborage sites for scorpions and centipedes such as rocks, boards, and other objects resting on the soil. Scorpions will also hide under bark on trees, so these can be dusted with food grade diatomaceous earth where loose bark is found.

## **Spiders**

Although most spiders possess venom glands, most are too small to break the skin with their fangs and have no desire to do so. All spiders will bite in self-defense if they are handled carelessly, such as being squeezed. Most bites occur when people roll over in bed on one and get bitten or when they put on their clothes and a spider inside the clothing bites when it is pressed against the skin. Not all spiders are harmless. Black widows are certainly capable of producing a serious bite and any such bite by this spider should be considered a major medical emergency. The brown recluse is also dangerously venomous. Sac spiders and wolf spiders can give serious, though not fatal bites, particularly if you are allergic to any of the components of the venom. Daddy longlegs (aka harvestmen) are not at all dangerous despite their reputation to the contrary. Jumping spiders are interesting to watch but are not dangerous although a large one can bite if mishandled. Most of the small hunting spiders, such as ground spiders are incapable of hurting anyone. The toxic venom of the black widow is neurotoxic, but the spider injects very little material and the death rate is about 1%.

The brown recluse spider is shy, sedentary and builds an irregular web that is often not even recognized as a spider web. It has a fiddle-shaped pattern on its cephalothorax. Females lay eggs in flattened egg sacs that are frequently attached to the underside of objects. When they are indoors, they can usually be found in dark places, beneath or behind furniture, in boxes or storage areas, among stored books and papers and similar areas. Outside they live under rocks, boards and other dark areas. The natural habitat of the brown recluse includes the underside of rocks, loose bark, and crevices in decaying logs. Brown recluse bites are not painful at the time of the bite. After an hour or so there may be intense pain where bitten. There is usually a dark depressed area at the site of the bite which will turn darker in a day or so. The dead tissue will slough away and the bite area will scar over. Death seldom if ever occurs, but the bite is extremely debilitating and traumatic.

Spiders won't infest a building unless there are plenty of bugs for food. They will occasionally wander in looking for food. Keep a spray bottle with the soap, water and alcohol mix or a bottle of Greenbug in every classroom to deal with any spider that wants to attend class.

### **Mice**

Mice can enter 1/4" openings - or they can be carried inside. They may get in through broken windows, poorly screened attic and foundation vents, openings through any walls created by cable, oil, propane, electric, gas, water and/or sewage services, and through any other openings or cracks or crevices in foundations, walls or roofs. They can also chew holes directly through siding and/or window or door frames.

While house mice aren't linked to Hantavirus, they are very prolific and very unpleasant to have infesting a school building. Under optimum conditions, house mice breed year round. Although mice primarily are active at night, some day activity occurs. Movements of house mice are largely determined by temperature, food, and hiding places. Deer mice can be carriers of hantavirus.

Mice prefer cereals over other items, although they will feed on a wide variety of foods. Mice sometimes search for foods high in fat and protein, such as lard, butter, nuts, bacon, and meat. Sweets, including chocolate, are taken at times. Mice get much of their water from moisture in their food, but they will drink if water is readily available. Mice in buildings catch and eat flies, spiders, centipedes, cockroaches, beetles, millipedes and other arthropods. Outdoors house mice consume a wide variety of weed seeds, grass seeds, various grains and vegetation.

Here are some recommendations for managing mice. Repair all holes in buildings that would allow rodents entry. Open doors and windows before cleaning areas where rodents have been living. If possible, run an electric fan for at least half an hour to clear out dust. Leave the areas while the fan is on. Disinfect sites where you have seen rodents or their droppings. General-purpose disinfectants will kill the virus. A mixture of three tablespoons of household bleach in a gallon of water can also be used. Spray the area and mop, rather than sweeping or vacuuming. The wetter the area, the better because dampness will keep the dust down. Remember that the territory of mice rarely extends further than 30 feet from the nest, and more often is about 10 feet. If mice are sighted throughout a building, it means that there are numerous discrete locations where you will have to set traps. When using live traps, oatmeal is a very effective bait. On snap traps, a piece of Slim Jim is almost irresistible to mice. It is much more effective than cheese or peanut butter. When you find a mouse in a snap trap, spray it with a disinfectant and put it in a plastic bag before disposing of it.

Never use rodenticides for several reasons. First, if a mouse dies where you can't find it you will have an odor problem. Also if the mouse (particularly deer mice) have ectoparasites such as fleas or mites, they will leave the dead carcass and may attack your staff or visitors. Mice should always be controlled with snap or live traps. Trapping with snap traps or live traps will work for rats as well. Basically the control methods are similar with both animals.

Rodent infestation can affect indoor air quality. Mouse urine contains a protein material that can produce symptoms such as running nose and skin rashes in exposed individuals. When rodent wastes are present inside HVAC system components, an unfiltered ventilation system can distribute these materials throughout the area it feeds. Proper filters need to be installed in the HVAC system to reduce the potential for this problem. A 3-step approach is necessary to remediate/eliminate rodent infestation. Remove rodents, clean waste products from the interior of the building and reduce/eliminate

pathways/food sources that attract rodents. Removal of rodents and follow-up cleaning may not provide immediate relief, since allergens can linger for several months afterward; however, once the infestation is eliminated, a combination of cleaning and increased ventilation and filtration should serve to reduce rodent-associated allergens. If the school buildings are properly pest-proofed, rodents should never be a problem.

### **Weeds**

This is the system I convinced the Las Cruces School District to use and I haven't seen anyone spraying Roundup or other toxic herbicides in over a year now. You may want to convince Santa Fe and other school districts in the area to adopt this next year. I also required this when I was IPM Manager in Santa Fe.

This is how we should be controlling weeds in public areas in my opinion. A “weed” is commonly defined as a plant growing in a place where it is not wanted. On school grounds, there is usually consensus on the weedy nature of certain plant species that spring up where they are not wanted. Weeds need to be monitored periodically. The purpose of monitoring is to determine if, when, where, and why weeds are growing or posing a problem, and to assign priorities for least toxic weed methods of control. The first step in monitoring is to map areas where weeds are growing. This need not be a detailed, time consuming process—a rough map will do. It is important to accurately identify the most common weed species on public property in order to determine appropriate management methods. It is important to record the time of year a particular weed species appears, its abundance, and its impact on the landscape. This information will determine which weeds can be tolerated in a given area and which ones need to be removed and whether new species of weeds are showing up. Without this knowledge, it is impossible to determine the effectiveness of managing methods.

City budgets rarely stretch far enough to suppress all weeds, even if that were desirable. Aesthetic standards should be adjusted to take this into account. Assigning tolerance levels helps prioritize budget allocations, facilitate long-term plans, and provide justification for weed management action or lack of action. Identify areas where weeds pose potential health or safety hazards or threaten damage to facilities, and distinguish these locations from those where weeds are considered aesthetic problems alone. For example, puncturevine can cause itching and even pain in some cases, and weeds growing in playing fields or running tracks can pose tripping hazards. Assign low tolerance levels to weeds in such areas, and place high priority on their management. On the other hand, assign higher tolerance levels to weeds growing in areas where nobody goes or along fence lines and consider them low priority for management. Weed tolerance levels are subjective and it would be a good idea to invite a group, such as the city or county officials, maintenance supervisor and a group of citizens that live in the area to tour the area and decide what weed levels are acceptable and where they are not acceptable at all. Of course these tolerance levels can be re-evaluated annually if necessary.

One method of controlling a lot of weeds in an area is with soil solarization. This amounts to a covering of clear plastic to raise soil temperatures high enough to kill the weeds and their seeds. This is most effective when the temperature is 85 degrees and above. Solarization can kill annual and perennial weeds as well as any pathogens in the soil. The plastic should stay in place for 3 to 4 weeks. This can only be used in areas where nobody will mess with it.

When non-chemical weed management methods are not sufficient to solve weed problems, herbicides are available for integration into the program. There are non-toxic herbicides available that are very effective. Vinegar works very well on puncturevine. Whenever possible, apply herbicides as spot-

treatments to the target weeds. Don't just spray the herbicide everywhere and hope it kills something. Spot spraying will reduce human exposure and helps to protect non-target vegetation and beneficial soil organisms that can be damaged or killed by herbicide residues.

If your school district uses these methods; touring and identifying weedy areas, using solarization where possible and spot treating with herbicides where necessary, it will be a lot more cost effective than just spraying toxic herbicides everywhere and it will be a lot safer for the children and all citizens, which is the primary reason for adopting this kind of program.

## **Pesticide Precautionary Principle**

The Pesticide Precautionary Principle (PPP) simply means that any pesticides used for any purpose have to be proven safe for people and the environment. There are three sections of the PPP that are important.

First, before any insecticides or herbicides are used, the target pest needs to be positively identified, including the pest's scientific name. It needs to be demonstrated why this is a pest and why it needs to be controlled. Does it carry diseases? If so, which ones. Is it otherwise dangerous? Is it just unsightly? If the applicators can't positively identify the insect pests or the weeds they want to control, they should not be using pesticides.

Second, once the pest has been positively identified and why it is a problem, then all possible methods of control should be studied and the least toxic one should be utilized. How is it beneficial to society to use toxic herbicides to control a weed that is simply unsightly? Can the weeds be manually removed? Can insect pests be excluded from a building without pesticide applications? If a pesticide is supposedly needed, we go to the third section.

Third, any pesticide (insecticide, herbicide) that they want to use has to be proven safe. The applicators need to provide documentation that the pesticide is safe for people and the ecosystem. Documentation does not mean a statement from the distributor, the manufacturer or even the EPA. It means a scientific, peer-reviewed document that has studied the pesticide. In reality, you can Google almost any pesticide and find this kind of documentation. The problem they may have is that there is virtually no documentation proving that any pesticide is safe for humans exposed to it or to the environment. If the applicators can't produce scientific documentation that their pesticide is safe, then they should not be permitted to use it anywhere on public property or in public buildings.

Pesticides will only be applied in or on the outside of commercial buildings when a pest is present and will not be applied on a regular or "calendar" basis unless it is to treat an infestation and is a part of a pest management system being implemented to address a particular target pest. A pest is considered to be present when it is observed directly or can reasonably be expected to be present based on evidence such as droppings, body parts, or damage that is typically done by the pest.

Basically they need to give you documentation identifying the pests, listing all viable options for control and data showing their methods and what they are using is positively safe.

Exceptions. There can be exceptions in the case of an emergency when, for instance, a large swarm of yellowjackets invade an occupied building. In this case, toxic pesticides may be used because of the danger potential. This is very rare and situations like this may never happen in most areas.

This Pesticide Precautionary Principle should be adopted by all city, county and state agencies that apply pesticides. Business owners should also require this from any exterminators they may use in their businesses where people may unknowingly be exposed to whatever is used. Schools should also use this if they hire exterminators and homeowners can require it when they use exterminators.

## Conclusion

If anyone has any pest concerns not covered in this manual, you can contact me, and I will help you to the best of my ability. If anyone has a pest they can't identify, you can either email me a photo of the specimen or mail me a sample. If you mail a sample for identification, put it in a vial with some cotton and pack it in a bubble envelope or box. Mail it to me at my address below.

My contact information is:

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Contact me first before mailing anything. Addresses can change.