SPIDER CONTROL

PROFESSIONAL DEVELOPMENT
CONTINUING EDUCATION COURSE

Technical Learning College

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Photograph on cover, *Aphonopelma anax*, adult. A common tarantula found throughout the Southwest US. This creature is easily found after a summer rain, and this one on the cover is the size of a person's hand.

Important Information about this Manual

This CEU course manual has been prepared to educate pesticide applicators and operators in general safety awareness of dealing with the often-complex and various pesticide treatment devices, methods, and applications. This manual covers general laws, regulations, required procedures, and accepted policies relating to the use of pesticides. It should be noted, however, that the regulation of pesticides and hazardous materials is an ongoing process and subject to change over time. For this reason, a list of resources is provided to assist in obtaining the most up-to-date information on various subjects.

This manual is not a guidance document for applicators or operators who are involved with pesticides. It is not designed to meet the requirements of the United States Environmental Protection Agency or your local State environmental protection agency or health department. This CEU course manual provides general pesticide safety awareness and should not be used as a basis for pesticide treatment method/device guidance. This document is not a detailed pesticide information resource or a source or remedy for poison control.

Technical Learning College or Technical Learning Consultants, Inc. make no warranty, guarantee or representation as to the absolute correctness or appropriateness of the information in this manual and assumes no responsibility in connection with the implementation of this information. It cannot be assumed that this manual contains all measures and concepts required for specific conditions or circumstances. This document is to be used solely for educational purposes only and is not considered a legal document.

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits and/or vegetables. Dispose of empty containers carefully. Follow label instructions for disposal. Never reuse containers. Make sure empty containers are not accessible to children or animals. Never dispose of containers where they may contaminate water supplies or natural waterways.

Do not pour down sink or toilet. Consult your county agricultural commissioner for correct ways of disposing of excess pesticides. Never burn pesticide containers. Individuals who are responsible for pesticide storage, mixing, and application should obtain and comply with the most recent federal, state, and local regulations relevant to these sites and are urged to consult with the EPA and other appropriate federal, state, and local agencies.

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Precept-Based Training Course

This training course is made of “micro-content” or “precepts”– small chunks of information that can be easily digested. Using bite-size pieces of technical information is considered to be one of the most effective ways of teaching people new information because it helps the student to retain knowledge easier.

Micro-learning or precept-based training doesn’t rely on the student to process a large amount of information before breaking it down. Our method includes short modules with clearly defined learning goals for each section. This method allows a student to hone in on a particular skill, then demonstrate their knowledge in the final assessment.

Many States and employers require the final exam to be proctored.

2017 Changes to EPA’s Farm Worker Protection Standard

In late 2015 the Environmental Protection Agency issued the long awaited revision to the Worker Protection Standard (WPS). This law it is now technically active and it will be enforced. Please keep in mind that the WPS covers both restricted use AND general use pesticides. This course is not for worker and/or handler training. Always follow the label and your State Pesticide Agency rules.

This course contains EPA’s federal rule requirements. Please be aware that each state implements pesticide regulations that may be more stringent than EPA’s regulations and these frequently are changed. Check with your state environmental/pesticide agency for more information.

Technical Learning College's Scope and Function

Welcome to the Program,

Technical Learning College (TLC) offers affordable continuing education for today's working professionals who need to maintain licenses or certifications. TLC holds several different governmental agency approvals for granting of continuing education credit.

TLC's delivery method of continuing education can include traditional types of classroom lectures and distance-based courses or independent study. TLC's distance-based or independent study courses are offered in a print - based distance educational format. We will beat any other training competitor's price for the same CEU material or classroom training.

Our courses are designed to be flexible and for you to finish the material at your convenience. Students can receive course materials through the mail or electronically. The CEU course or e-manual will contain all your lessons, activities and instruction to obtain the assignments. All of TLC's CEU courses allow students to submit assignments using e-mail or fax, or by postal mail. (See the course description for more information.)

Students have direct contact with their instructor—primarily by e-mail or telephone. TLC's CEU courses may use such technologies as the World Wide Web, e-mail, CD-ROMs, videotapes and hard copies. (See the course description.) Make sure you have access to the necessary equipment before enrolling; i.e., printer, Microsoft Word and/or Adobe Acrobat Reader. Some courses may require proctored closed-book exams, depending upon your state or employer requirements.

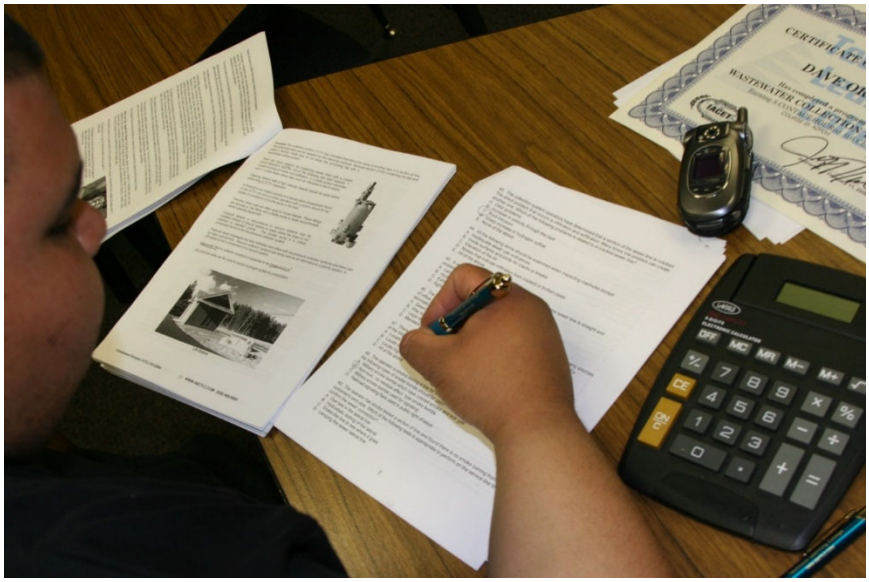
Flexible Learning
At TLC, there are no scheduled online sessions or passwords you need contend with, nor are you required to participate in learning teams or groups designed for the "typical" younger campus - based student. You will work at your own pace, completing assignments in time frames that work best for you. TLC's method of flexible individualized instruction is designed to provide each student the guidance and support needed for successful course completion.

Course Structure
TLC's online courses combine the best of online delivery and traditional university textbooks. You can easily find the course syllabus, course content, assignments, and the post-exam (Assignment). This student-friendly course design allows you the most flexibility in choosing when and where you will study.

Classroom of One
TLC offers you the best of both worlds. You learn on your own terms, on your own time, but you are never on your own. Once enrolled, you will be assigned a personal Student Service Representative who works with you on an individualized basis throughout your program of study. Course specific faculty members (S.M.E.) are assigned at the beginning of each course providing the academic support you need to successfully complete each course. Please call or email us for assistance.

No Data Mining Policy
Unlike most online training providers, we do not use passwords or will upload intrusive data mining software onto your computer. We do not use any type of artificial intelligence in our program. Nor will we sell you any other product or sell your data to others as with many of our competitors. Unlike our training competitors, we have a telephone and we humanly answer.

Satisfaction Guaranteed
We have many years of experience, dealing with thousands of students. We assure you, our customer satisfaction is second to none. This is one reason we have taught more than 20,000 students.



We welcome you to do the electronic version of the assignment and submit the answer key and registration to us either by fax or e-mail. If you need this assignment graded and a certificate of completion within a 48-hour turn around, prepare to pay an additional rush charge of $50.

We welcome you to complete the assignment in Word.

Once we grade it, we will mail a certificate of completion to you. Call us if you need any help.

Contact Numbers
Fax (928) 468-0675
Email Info@tlch2o.com
Telephone (866) 557-1746

CEU Course Description

Spider Control CEU Training Course

Arachnids are mainly terrestrial arthropods of the class Arachnida, including the spider, scorpion, mite, and tick, harvestman (daddy longlegs), and a few minor groups. The body is divided into a cephalothorax, with six pairs of appendages, and an abdomen. The first two pairs of appendages are used to kill and crush prey (most arachnids being carnivorous); the remaining two pairs are walking legs. Arachnids have simple eyes and no antennae, but are equipped with sensory bristles. Some respire with air tubes, but most possess primitive respiratory organs called book lungs. Arachnids are classified in the phylum Chelicerata, class Arachnida.

This course focuses upon spiders and is intended to serve as a source of basic information needed to implement an integrated pest management program for arachnid identification and control and to provide continuing education for the pesticide applicators. This course will review basic pesticide usage information and application methods. This course is general in nature and not state specific. No other materials are needed for this course.

Course Procedures for Registration and Support
All of Technical Learning College's (TLC) correspondence courses have complete registration and support services offered. Delivery of services includes, e-mail, web site, telephone, fax, and mail support. TLC will attempt immediate and prompt service.

When a student registers for a distance or correspondence course, he/she is assigned a start date and an end date. It is the student's responsibility to note dates for assignments and keep up with the course work. If a student falls behind, he/she must contact TLC and request an end date extension in order to complete the course. It is the prerogative of TLC to decide whether to grant the request. All students will be tracked by a unique number assigned to the student.

Instructions for Written Assignments
The Spider Control CEU training course uses a multiple choice and true/false style answer sheet. You need to download the assignment and complete the assignment from our website under the Assignment Page.

Feedback Mechanism (Examination Procedures)
A feedback form is included in the front of the assignment. You can find this on the Assignment webpage.

Security and Integrity
All students are required to do their own work. Lesson sheets and final exams are not returned to the student to discourage the sharing of answers. If any fraud or deceit is discovered, the student will forfeit all fees and the appropriate agency will be notified.

Grading Criteria
TLC offers the student either pass/fail or a standard letter grading assignment. If TLC is not notified, a pass/fail notice will be issued.

Required Texts
The course will not require any other materials. This course comes complete.

Pesticide Terms, Abbreviations, and Acronyms
TLC provides a glossary that defines, in non-technical language, commonly used environmental terms appearing in publications and materials. It also explains abbreviations and acronyms used throughout the EPA and other governmental agencies. You can find the glossary in the rear of this manual.

Recordkeeping and Reporting Practices
TLC will keep all student records for a minimum of five years. It is your responsibility to give the completion certificate to the appropriate agencies.

ADA Compliance
TLC will make reasonable accommodations for persons with documented disabilities. Students should notify TLC and their instructors of any special needs.

Course content may vary from this outline to meet the needs of this particular group.

Note to students: Keep a copy of everything that you submit. If your work is lost, you can submit your copy for grading. If you do not receive your certificate of completion or quiz results within two or three weeks after submitting it, please contact your instructor.

Students have 90 days from receipt of this manual to complete it in order to receive Continuing Education Units (**CEUs**) or Professional Development Hours (**PDHs**). A score of 70% is necessary to pass this course. If any assistance is needed, please email all concerns or call us. If possible, e-mail the final test to info@tlch2o.com or fax (928) 468-0675.

Course Objective: To provide training in spider identification, spider classification, spider control, effective and safe pesticide applications and treatment methods.

Table of Contents

Topic 4 Spider Control Section

Camel Spider *Myth or Truth*

The photo below reportedly comes from a soldier, stationed in Baghdad, who was bitten by a camel spider that was hiding in his sleeping bag. Fortunately, these critters aren't venomous... but they're big and fast (they can run around 10 MPH).

The photo shows two spiders attached together, and the camera angle makes them look a tad larger than they really are (they're about the size of an adult's hand). They also tend to seek out shade during the daytime, so it's not terribly unusual to see them charging across the desert at you -- only to come to a screeching halt when they reach your shadow.

See the last page for more information.

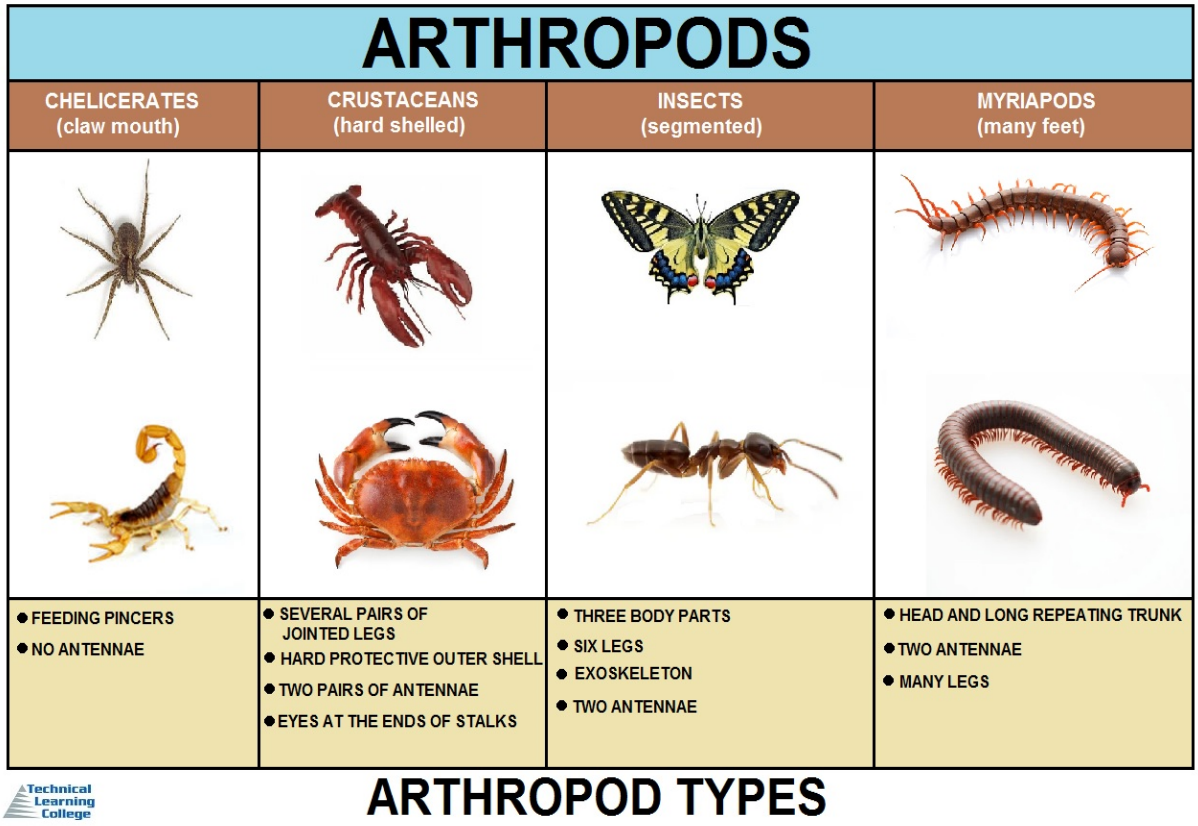
Topic 1 - Arachnid Introduction

Topic 1 - Section Focus

You will learn the basics of the arthropods, focusing on the arachnid order. At the end of this section, you will be able to understand and describe the arachnids. You will learn about the Arachnid family class, genera, life cycle and related subjects. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Topic 1 – Scope/Background

There are eleven orders of arachnids. These include the scorpions; mites and ticks; harvestmen; pseudoscorpions; whipscorpions; solpugids; and spiders. It's like the relation of beetles with insects: beetles constitute one order of insects, the Coleoptera, but not all insects are beetles. Similarly, not all arachnids are spiders.



Class Arachnida

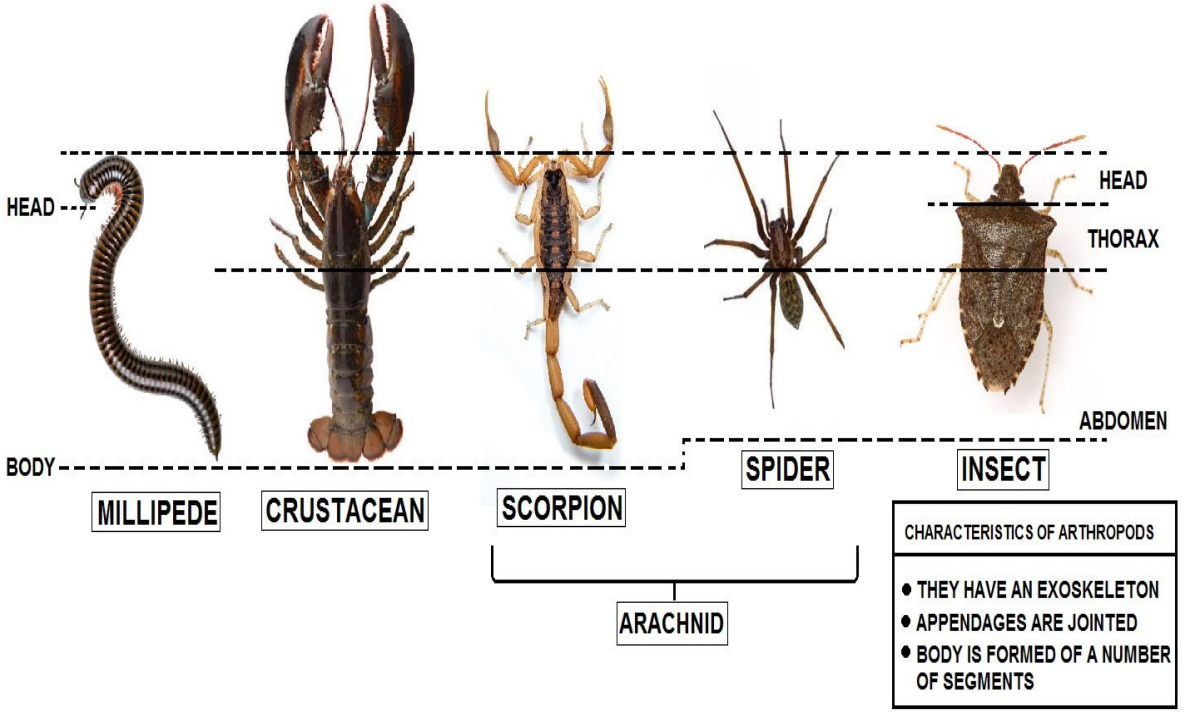
The class Arachnida is the most familiar of the arthropods outside of the ever-present insects. There are over 80,000 named species, and they are united by the possession of eight legs, chelicerae, and pedipalps, and the lack of biting and chewing mouthparts (food is ingested in most cases as a liquid, though some help is often given the food in becoming liquid by the secretion of, or regurgitating onto or into the food of, digestive enzymes from the stomach.

The arachnids are thought to have evolved in the sea, but now they are almost entirely terrestrial and have developed several important features to help them survive on the land. These include: a waterproof (waxy) exocuticle, internal fertilization, malphagian tubules as a metabolic excretory system, and internal organs for breathing and gaseous exchange. The class Arachnida is extremely diverse in form and in lifestyles, and little more can be said that includes them all. This diversity is reflected in the following classification scheme.

Arachnida Classes

The class Arachnida is divided into 13 subclasses, (or orders, depending on which classification scheme you are following), of which the Araneae (spiders) and the Scorpiones (scorpions) are the best known.

- Subclass Scorpiones (Scorpions)
- Subclass Pseudoscorpiones (Pseudoscorpions)
- Subclass Solifugae (Sun Spiders or Wind Scorpions)
- Subclass Palpigradi (Miniature Whip Scorpions)
- Subclass Uropygi (Whip Scorpions)
- Subclass Schizomida
- Subclass Amblypygi (Whip Spiders)
- Subclass Araneae (Spiders)
- Subclass Ricinulei
- Subclass Opiliones (Harvestmen)
- Subclass Acari (Mites) Acariformes, Notostigmata, and Parastiformes



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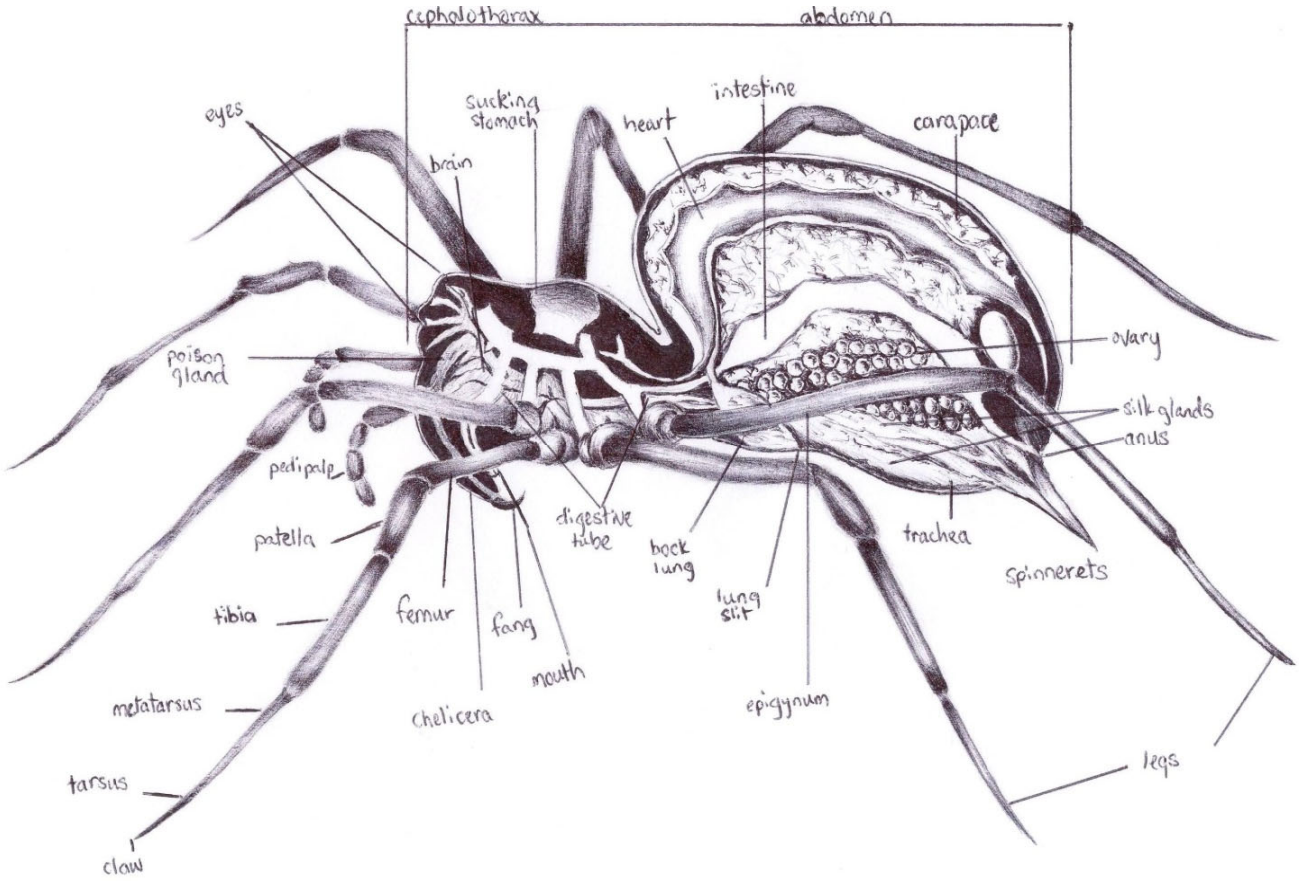
CHARACTERISTICS OF ARTHROPODS

Spider Introduction

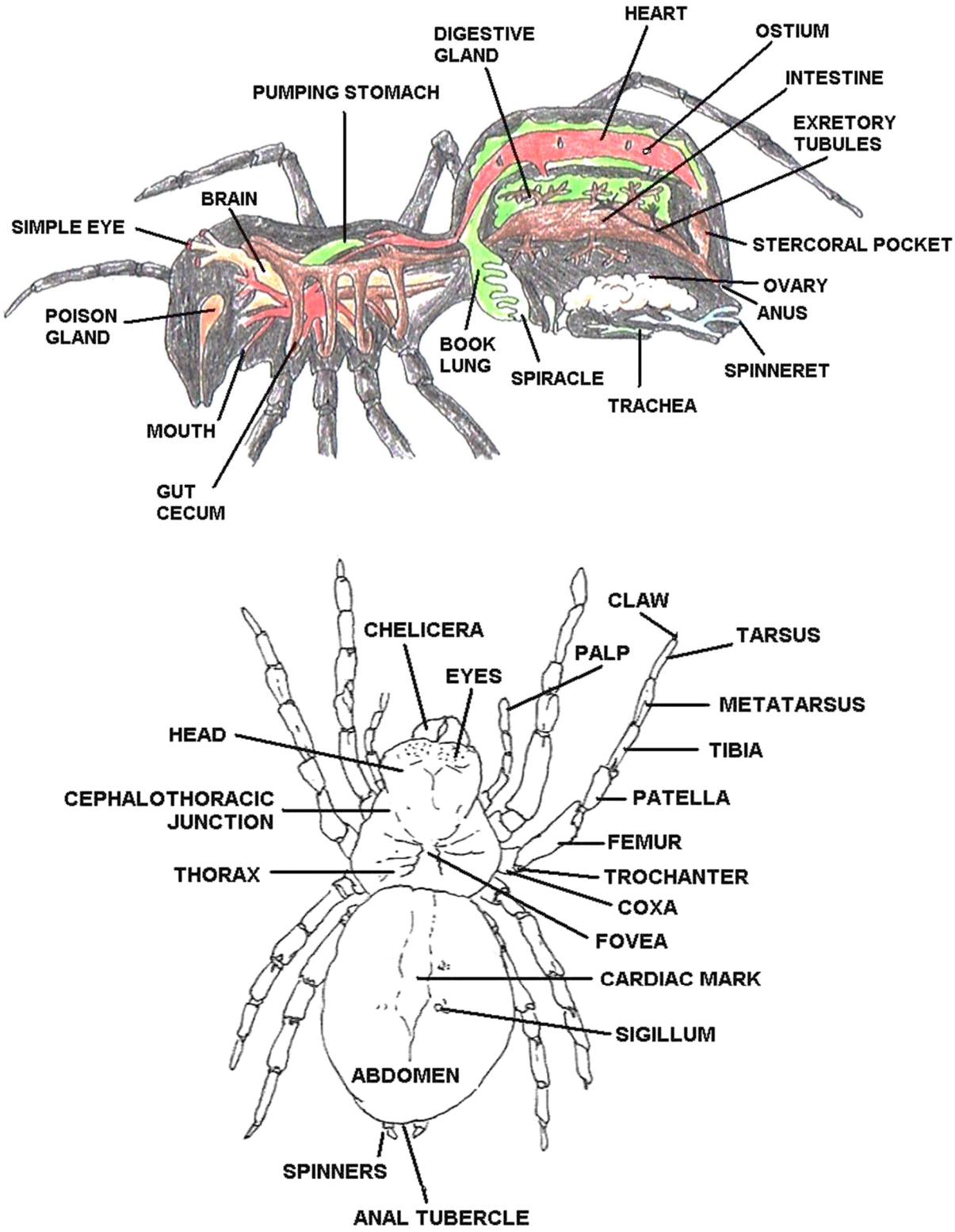
Spiders are mostly terrestrial, of the class Arachnida, order Araneae, with four pairs of legs and a two-part body consisting of a cephalothorax, or prosoma, and an unsegmented abdomen, or opisthosoma. The cephalothorax is covered by a shield, or carapace, and bears eight simple eyes.

On the underside of the head (the cephalic part of the cephalothorax) are two pairs of appendages, the anterior pair called chelicerae, and the second pair pedipalps, with which the spider captures and paralyzes its prey, injecting into it venom produced in the poison glands. The spider then liquefies the tissues of the prey with a digestive fluid and sucks this broth into its stomach, where it may be stored in a digestive gland. Breathing is by means of tracheae (air tubes) or book lungs, or both.

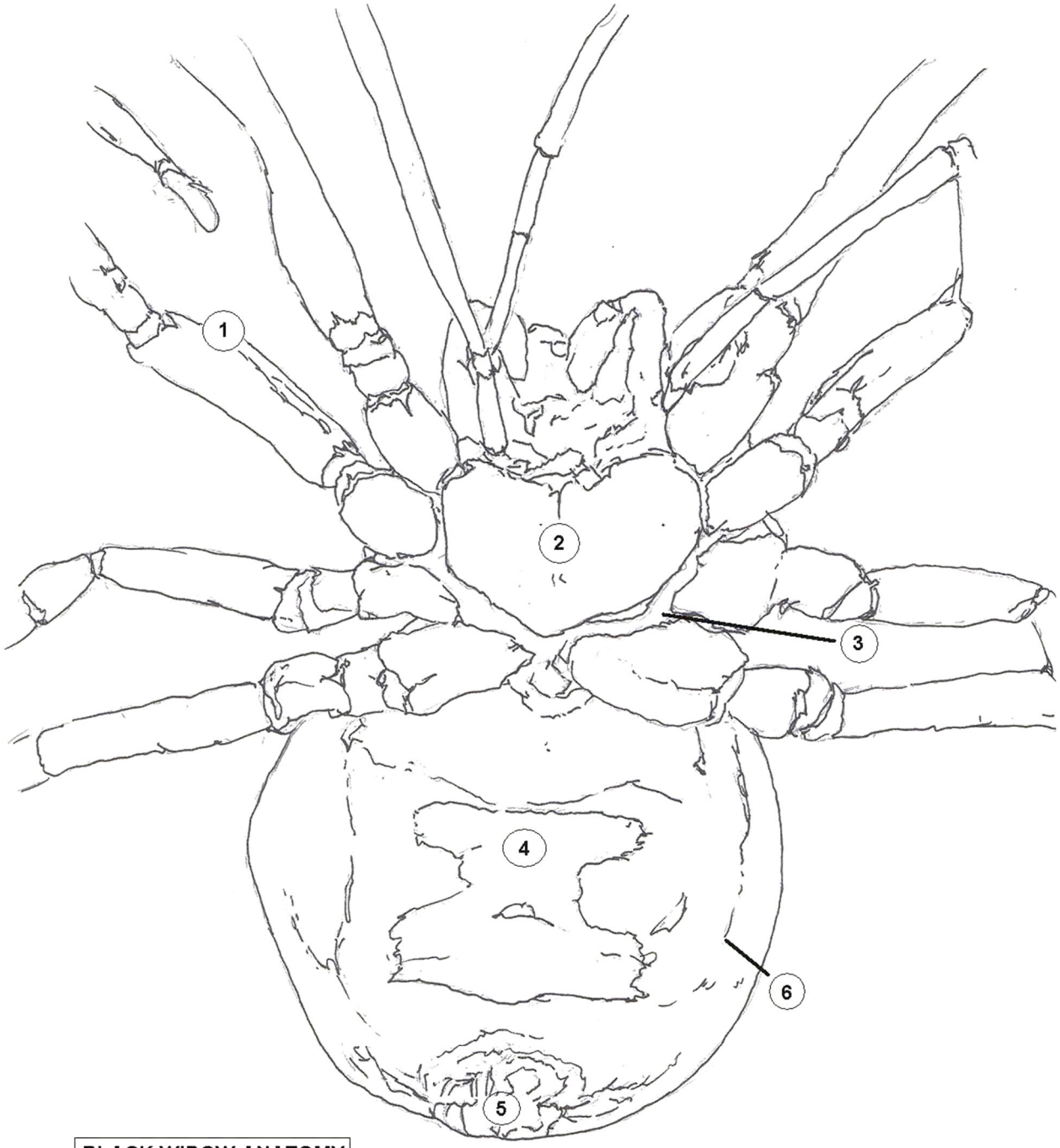
Arachnid book lungs are similar to the gill books of horseshoe crabs, but are internal and adapted to a terrestrial habitat. Three pairs of spinnerets toward the tip of the abdomen produce protein-containing fluids that harden as they are drawn out to form silk threads. Several kinds of silk glands and spinnerets produce different kinds of silk used variously for constructing cocoons or egg sacs, spinning webs, and binding prey; other light strands are spun out for ballooning, or floating, the spiders, especially young ones, long distances on air currents.



SPIDER ANATOMY DIAGRAM #1



SPIDER ANATOMY DIAGRAM #2



BLACK WIDOW ANATOMY

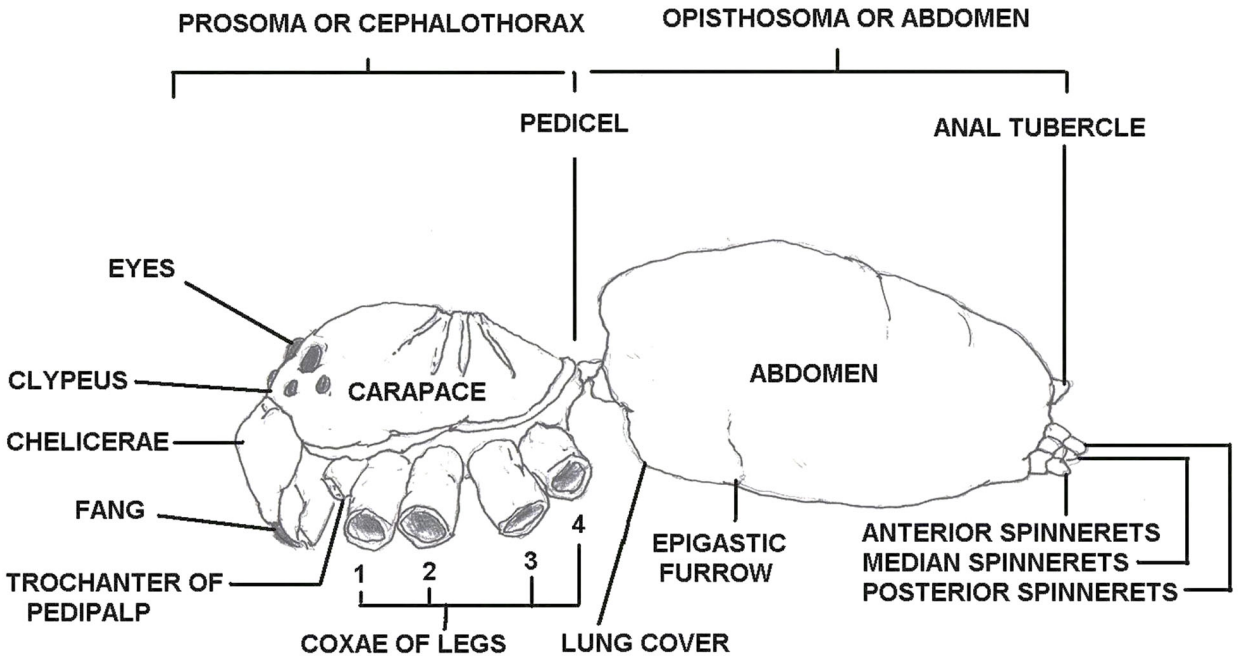
1. EIGHT LEGS TIPPED WITH CLAWS. EACH LEG HAS SEVEN SEGMENTS
2. CEPHALOTHORAX. CONTAINS MANDIBLE, JAWS, BRAIN, EYES, STOMACH AND LEG ATTACHMENTS.
3. PEDICAL (WAIST)
4. DISTINCTIVE "HOURGLASS" MARK
5. SPINNERETS (SILK GLANDS)
6. ABDOMEN. CONTAINS GUTS, REPRODUCTIVE ORGANS, HEART AND SILK GLANDS

SPIDER ANATOMY DIAGRAM #3

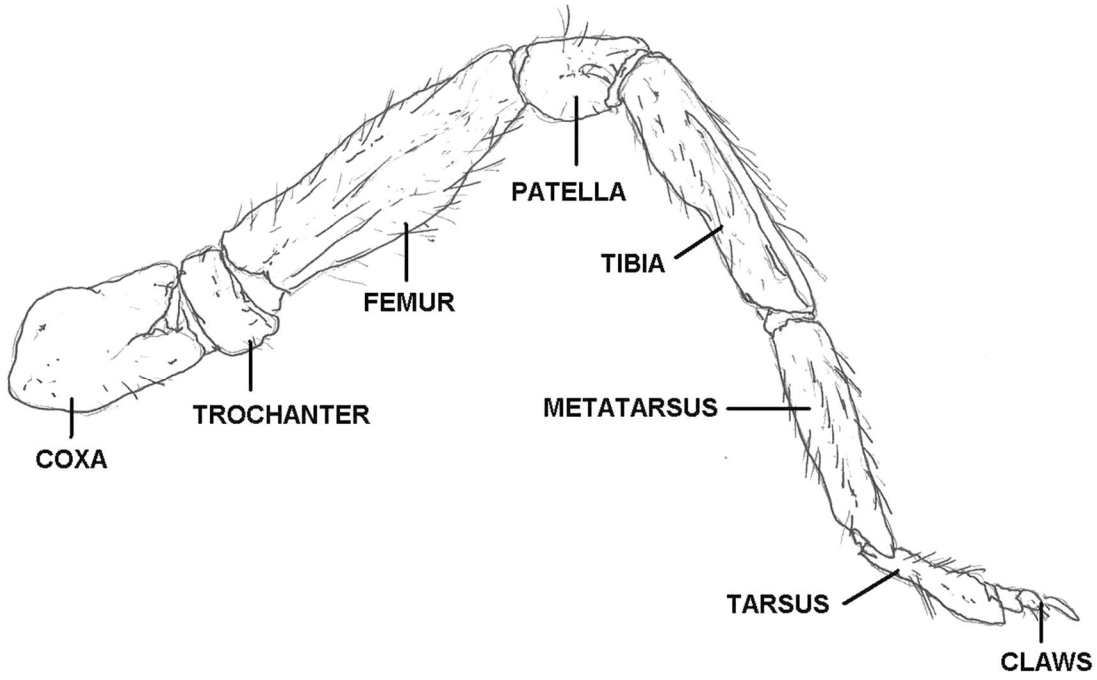
CLOSE-UP VIEW OF BLACK WIDOW EYES

CLOSE-UP VIEW OF BLACK WIDOW'S CLAWS

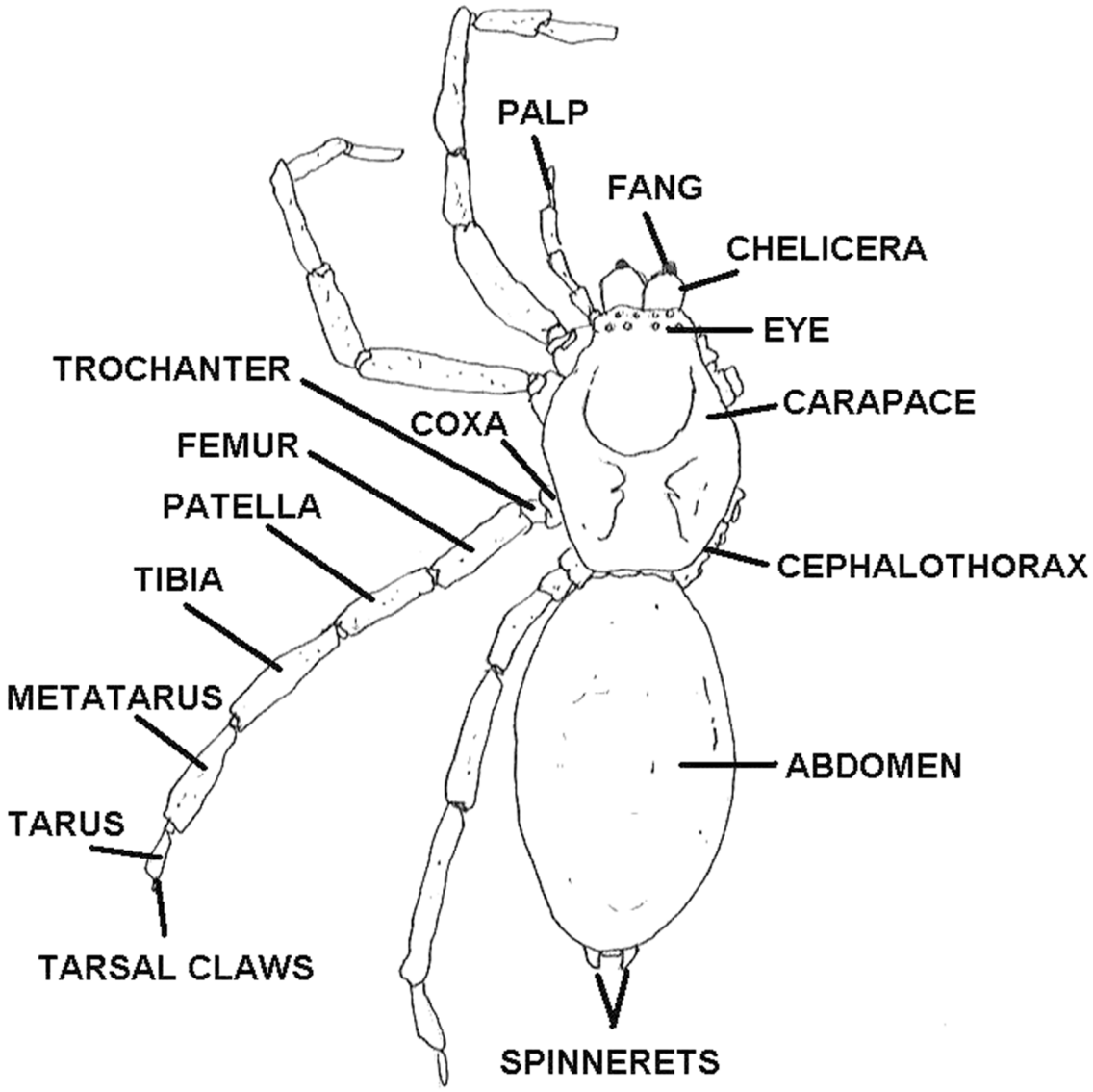
SPIDER ANATOMY DIAGRAM #4



SPIDER LEG



SPIDER ANATOMY DIAGRAM #5

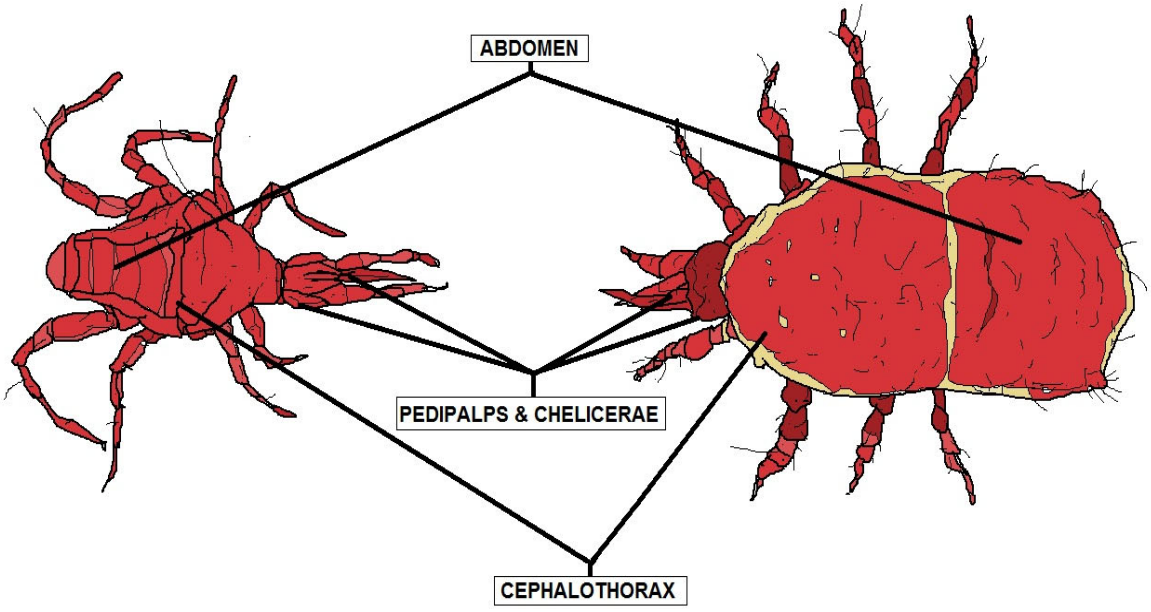


SPIDER ANATOMY DIAGRAM #6

Chelicerata

The Chelicerata, which is called a subphylum here for convenience, but which called a phylum in some texts, is an extremely ancient group of arthropods, including the extinct Eurypterida. The Chelicerata includes spiders and scorpions, mites and ticks, horseshoe crabs, daddy-longlegs, and extinct "*sea-scorpions*", to name a few. It is the second most prominent order of terrestrial arthropods, after the uniramians.

They are now distinguished from the other arthropod groups by the possession of (at least) six pairs of appendages. These normally include four pairs of walking legs, a pair of chelicerae and a pair of pedipalps. They have no mandibles and no antennae and the body is divided into two, not three, sections, as in the Uniramia. They are, however, normally bilaterally symmetrical, have a through gut, have uniramous appendages, a non-calcareous exoskeleton, and are gonochoristic.



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MITE AND TICK BODY REGIONS

No chelicerates possess jaws for biting and chewing, but suck up their food in liquid or semi-liquid form. However, this food may have been seriously torn up by the chelicerae before ingestion.

Most species go in for external digestion to some extent, meaning they secrete digestive juices onto the food item as it is held close to the mouth or inject digestive juices into their prey's body, and suck up the half-digested soup that results.

The inclusion of the class Pycnogonida in the Chelicerata is generally accepted but not scientifically proven; the fossil record for pycnogonids is very scant and they differ in many ways from the other chelicerates. The Chelicerata contain more than 80,000 species known to science, most of which are Arachnids divided almost evenly between the spiders and the mites.

Phylum Arthropoda; Subphylum Chelicerata	
Class Merostomata (Horseshoe Crabs)	5 species
Class Arachnida (Spiders, Mite, Scorpions etc.)	80,000 species
Class Pycnogonida (Sea Spiders)	1,000 species

More on Chelicerates
Chelicerates occupy a variety of roles in the ecology of marine and terrestrial systems. While many spiders build webs, others do not, but instead ambush prey as it passes by. This is also the tactic used by scorpions, another group of chelicerate predators.

The predatory habits of these incredible critters helps to control insect populations in many parts of the world. Some arachnid chelicerates are parasites, such as ticks and mites. They live upon the bodies of other animals and feed on the blood, skin, or hair. Some of these carry diseases, which they pass on to the host when they feed. Still other chelicerates are tiny organisms that feed on detritus, the bits of decaying matter that accumulate on and below the ground.

The first terrestrial chelicerates are believed to have been detritus feeders. Parental care is not common among the chelicerates, but some scorpions will carry their young on their backs for a time. In most cases, however, no such care is provided, and the young must fend for themselves from the time they hatch. Survival is then dependent on the fact that large numbers of eggs are produced at a time, and it is likely that at least a few will survive.

Spiders are Harmless
Most spiders found in the United States are harmless, with the exception of the black widow and the brown recluse spider. The brown recluse spider — a tiny oval brown spider with a small shape like a violin on its back — is found mostly in midwestern and southern parts of the United States. The bites usually don't hurt at first, and a child might not even be aware of the bite, but in some cases they cause swelling and changes in skin color and a blister.

The black widow spider, which is found all over North America, has a shiny black body and an orange hourglass shape on its underbelly. The venom (poison) in a black widow bite can cause painful cramps that show up within a few hours of the bite. The cramps can start in the muscles around the bite and then spread. The bite may also lead to nausea, vomiting, chills, fever, and muscle aches. If your child has any of these symptoms — or you know that he or she has been bitten — go to the emergency room right away.

Spider's Life

What infinite care the Creator has taken in the design of the spider! This little creature breaks the rules of the evolution model with its marvelous complexity for the spider with all its abilities and peculiarities. As does each species of spider, it has its own unique web, which may be spun more than two feet in diameter. At the center of the web, the spider makes a dense area of silk that often gives the appearance of a zipper or zigzag bulk of silk. There is no way a spider's silk gland could have evolved or the spider's skills for web spinning.

The female weaves an egg sac that is pear-shaped and about one inch in diameter. She then hangs the egg sac somewhere close to her main web. This spider lays all her eggs at once. There are usually 40 or, 50. As each egg is expelled, the female dusts it with a powdery substance. This dusting gives the egg a coating that looks like the bloom on a plum or a grape. The eggs are enclosed in a silken cup at the center of the sac. The cup, in turn, is covered by a layer of flossy silk. And for additional protection the female weaves another layer of silk around both the cup and the floss. This outer covering is tightly woven and brown in color. Shortly after the eggs are laid they hatch. The young are known as spiderlings. They break out of the shells by means of an organ known as the "egg tooth." This later disappears.

The black and yellow garden spider is like a miniature manufacturing plant. It produces different kinds of webbing in more than one color for different purposes, as well as making the powdery substance with which it coats its eggs. *Will Barker, Winter-Sleeping Wildlife (New York: Harper and Row, Pubs., 1958), pp. 94- 96.*

Some of its webbing is sticky to entrap insects for food. Other parts of the web are not sticky, enabling the spider to move rapidly across the web without ensnaring itself. How does evolution (the impersonal plus time plus chance) explain the complicated ability of one spider to produce different types of webbing for different purposes and even in different colors (varying from white to brown)? And how does evolution explain the presence of an "egg tooth" in a baby spider?

When the spider decides it is time to move on to new territory, it has an ingenious means of travel: To reach new locations the spider travels by a means of transportation known as "ballooning." A spiderling or spider throws out streams of silk. These threads form a sort of "flying carpet." It rises on warm currents of ascending air, and spiders and spiderlings are borne aloft and scattered far and wide. Sometimes they go as high as 14,000 to 15,000 feet and travel hundreds or even thousands of miles.

Spider Habitat

Spiders can be found in nearly every conceivable kind of habitat. The limiting factor appears to be the lack of available food to prey upon. Many species live outdoors under natural surroundings and seek shelter in ground litter, vegetation under rocks, or in crevices. Those species that build webs may construct them in vegetation or are associated with human dwellings. A few species, such as the house spider, cellar spider, and brown recluse, have adapted to living inside houses. They take advantage of the protection and warmth that our houses provide. It has been stated that usually we are never farther than about eight feet from a spider during most of our lives!

A vegetarian spider species was described in 2008, but all other known species are predators, mostly preying on insects and on other spiders, although a few large species also take birds and lizards.

Spiders use a wide range of strategies to capture prey: trapping it in sticky webs, lassoing it with sticky bolas, mimicking the prey to avoid detection, or running it down. Most detect prey mainly by sensing vibrations, but the active hunters have acute vision and hunters of the genus Portia show signs of intelligence in their choice of tactics and ability to develop new ones. Spiders' guts are too narrow to take solids, and they liquidize their food by flooding it with digestive enzymes and grinding it with the bases of their pedipalps, as they do not have true jaws.

Male spiders identify themselves by a variety of complex courtship rituals to avoid being eaten by the females. Males of most species survive a few matings, limited mainly by their short life spans. Females weave silk egg-cases, each of which may contain hundreds of eggs. Females of many species care for their young, for example by carrying them around or by sharing food with them. A minority of species are social, building communal webs that may house anywhere from a few to 50,000 individuals. Social behavior ranges from precarious toleration, as in the aggressive widow spiders, to co-operative hunting and food-sharing. Although most spiders live for at most two years, tarantulas and other mygalomorph spiders can live up to 25 years in captivity.

Biology
Spiders range in size from less than 1.0 mm (0.04 in) to more than 10 cm (4 in) in length, with a leg span of up to 20 cm (8 in). A spider’s body is divided into two parts: the front portion, called the prosoma or cephalothorax, and the rear portion, called the opisthosoma or abdomen. A narrow stalk called the pedicel connects these two parts.

A hard shell, called an exoskeleton, covers the entire body of a spider. The exoskeleton is made of cuticle, a material composed of a combination of protein and tough fibers called chitin. The cuticle forms thin layers stacked on top of one another, an arrangement that improves the strength and elasticity of the exoskeleton. The spider’s cuticle provides attachment sites for many muscles, and it also prevents *desiccation* (loss of body water). The cephalothorax cuticle is strong and stiff, while the cuticle of the abdomen is soft and extensible. As a spider grows, it sheds or molts its exoskeleton and grows a new one to cover its larger body.

Cephalothorax Structures
The cephalothorax contains a number of structures and appendages: one pair of biting mouthparts known as chelicerae; a pair of poison glands; one pair of short, leg-like appendages called pedipalps or palps; and four pairs of legs. The spider’s eight eyes are also located on the cephalothorax.

Mouthparts
When a spider catches prey, it uses a pair of jointed appendages known as the chelicerae, located in front of the mouth opening. Chelicerae resemble tiny pocketknives. Each chelicera has a sharp fang that swings out of its resting position to stab into the victim. Near the tip of the fang is a duct opening that comes from a poison gland. The fang acts like a hypodermic needle—it ejects venom from the poison gland and delivers it into the prey. Spiders also use chelicerae as multipurpose tools. They have been called the “*hands*” of the spider. Spiders can use their chelicerae to perform tasks such as digging burrows in the soil and transporting small prey.

Poison Glands
Most spiders have a pair of poison glands that lie within the cephalothorax. Each bulblike poison gland produces and stores toxin. A muscle spirals around the gland. When this muscle contracts, it squeezes poison from the gland through a duct into the fangs of the chelicerae, which then pass the poison into the prey.

Palps and Legs
Behind the chelicerae is a pair of palps, segmented limbs that are used in feeding and as feelers. Male spiders also use palps to transfer sperm to females during mating. Adjacent to the palps are four pairs of long, hairy legs. Unlike human hair, each spider hair found on the legs acts as a sensory organ, sensitive to touch and vibration. Each leg is made up of seven jointed segments, called the coxa, trochanter, femur, patella, tibia, metatarsus, and tarsus. More than 30 muscles control the movement of each leg. In addition, some joints of the leg move by the hydraulic action of body fluid. The tips of the legs have two or three small claws that are used for climbing or grasping the spider's silk thread. Many ground spiders have specialized adhesive hairs beneath their claws, known as claw tufts or scopulae. These claw tufts enable the spiders to walk sure-footedly on smooth, vertical surfaces—even upside down on glass.

Sensory Organs
Most spiders are active at night, and as a result, they use their other senses more than they use their eyesight, which is not well developed. In addition to the thousands of hairs found on the palps and legs that are highly sensitive to touch and vibrations, spiders also have hairs on their feet that they use to taste things.

Most spiders have four pairs of simple eyes (eyes with a single lens) that are located on the front of the cephalothorax. The eyes are usually grouped into two or three rows that form specific patterns in different spider families. This eye arrangement is often used to identify and classify a spider.

Unlike spiders that are active at night, spiders that are active during the day, such as jumping spiders and lynx spiders, typically have good vision at close range (around 10 to 20 cm, or 4 to 8 in). Their vision easily rivals the eyesight of many insects, which have *compound eyes* (eyes with multiple lenses).

Spider's Abdomen
The spider's abdomen is soft and saclike. On the underside of the tip of the abdomen are three pairs of spinnerets. Each spinneret is studded with many fine, hair-like tubes called spigots, which produce a variety of silk threads. The spigots lead to several large silk glands inside the abdomen. Silk is formed as a liquid inside these abdominal glands. As the silk is drawn out through the spigots, protein molecules within the silk line up parallel to one another, causing the silk to harden and form strong, elastic filaments. The hardening of silk results from the drawing-out process through the spigots, not from exposure to air, as is commonly believed. Several silk threads produced by different spigots may fuse to form a stronger one. Spinnerets are actually shortened limbs. They can move to place silk strands in precise locations when the spider builds a web or wraps prey in silk.

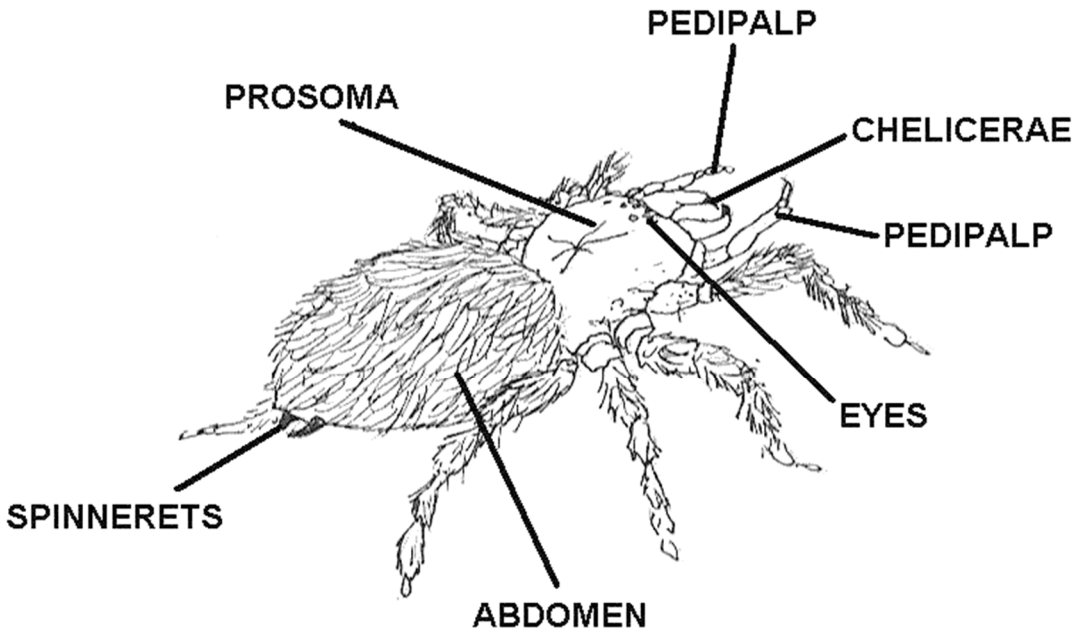
Internal Anatomy and Function
The cephalothorax houses part of the digestive system and the central nervous system. The abdomen contains most of the spider's vital organs, including a long, tubular heart; respiratory organs; reproductive organs; and excretory organs.

Breathing Organs
Spiders use two types of breathing organs: book lungs and tracheal tubes. Narrow slits on the underside of the abdomen lead to two or four respiratory organs called book lungs. These organs are so named because they consist of alternating layers of air spaces and thin leaflets of cuticle filled with blood, making the structures resemble a slightly opened book. Oxygen from the air passes through the extremely thin cuticle leaflets directly into the blood. A small opening in front of the spinnerets, known as a spiracle, leads to tracheal tubes made of cuticle. These tiny tubes branch and spread throughout the body. Air enters the spiracle and passes through the tracheal tubes so that oxygen can travel to all the spider's body tissues.

Moulting
Spiders undergo several moults before they are fully grown. If they do not shed their skin, they die. How would the spider know this until it grew too big for its shell and died? Dead spiders do not evolve new abilities! The skin moults and splits open in a special manner. First, the spider injects a certain liquid called "moulting fluid" between its outer old skin and its newly developing skin. Where does this special fluid come from, and how does the spider know what to do with it and when to use it? Using the moulting fluid too soon or too late is fatal!

The way that the old skin splits is crucial. If it cracks open in the wrong places, or at wrong angles, the spider perishes. Once the old skin is sufficiently loose, splits appear along the sides of the body and in front of the eyes. But no horizontal split occurs across the body.

The vertical split along each side of the body and the one crosswise in front of the eyes form a flap of skin. The spider pushes up the flap like a man thrusting up a hinged trap door. It pushes and pushes and pushes until the flap drops back over the abdomen. Out of the opening wriggles the spider.



SPIDER PARTS

Spider's Blood
Spider blood, also known as hemolymph contains many blood cells with oxygen-carrying pigments called hemocyanin, which give the blood a light blue color. In contrast, the primary components of human blood are red blood cells carrying the red pigment hemoglobin. Spider blood also contains many other types of blood cells that play a role comparable to that of the white blood cells of humans. Among other functions, these cells play a role in blood clotting after an injury.

The spider's long, tubular heart lies toward the back side of the abdomen. When the heart contracts, it pumps blood forward into the cephalothorax and backward into the abdomen. Blood travels through closed tubes, or arteries, into spaces in the body cavity. From these spaces the blood travels to the book lungs, where it releases carbon dioxide and picks up a fresh supply of oxygen before returning to the heart.

Digestive System
The digestive system consists of a branched tube that extends from the mouth to the anus. In the cephalothorax, the tube enlarges to form a stomach with powerful muscles. When these muscles contract, they produce a powerful sucking action that pulls food into the midgut. Spider digestion is unusual in that it begins outside of the spider's body. When a spider captures an insect or other animal, it uses its chelicerae to pierce the prey and inject poison into the wound to paralyze or kill the animal. The spider then vomits juices containing digestive enzymes into the wound of the victim to break down and liquefy its body tissue.

This liquefied tissue is then drawn through the spider's mouth and into its body by the sucking action of the stomach. Two mechanical filters in the mouth prevent solid food particles from passing into the digestive system. From the stomach, food passes into the midgut, which branches throughout the entire body. Enzymes secreted by the midgut further break down the liquefied food into nutrient molecules small enough to pass through the walls of the midgut into the blood. Nutrients can be stored for a long time in the spider's extensive digestive system, enabling many spiders to go for weeks or even months without the need to catch any prey.

Nervous System
Most arthropods have a central nervous system made up of a long chain of nerve cell centers, called ganglia that run throughout the body. In spiders, the ganglia are concentrated in the cephalothorax, where they condense into two compact masses: the sub-esophageal ganglion and the supra-esophageal ganglion. The sub-esophageal ganglion directs spider locomotion. The supra-esophageal ganglion is considered the brain of the spider. Sense organs throughout the body send information to this nerve center, where information processes and complex functions begin.

Spider's Brain
A spider's brain is relatively highly developed, enabling spiders to easily adapt to changes in their environment. Some scientists believe spiders can learn, and some have observed that spiders can remember where in their web they have stored captured prey; if the prey is removed, the spiders will continue searching for it in the same place for hours.

Spider Reproduction
All species of spiders have two separate sexes, and the males are usually smaller than the females. The male spider has two sperm-producing testes. A sexually mature male spider uses its large palps to transfer sperm cells into the female during mating. In this process, the male builds a small, triangular sperm web, onto which he deposits a drop of sperm from his

abdomen. He then dips both palps into this droplet, drawing sperm cells into the palps as if by a tiny pipette. The female reproductive system includes two egg-producing ovaries. After the male transfers sperm cells into the female's genital opening, located on her abdomen, they are stored, sometimes for months, in tiny receptacles. These sperm cells fertilize the female's egg cells just before she deposits her eggs into a silky cocoon.

Life Cycle
The life cycle of the spider consists of four stages: egg, larva, young spider, (known as a nymph or spiderling), and adult. Like insects, spiders grow only by molting, a process that involves periodically shedding their exoskeleton. In each molting stage, young spiderlings resemble tiny adults, a process known as incomplete metamorphosis.

Courting and Mating
Spiders become sexually mature after their last molt, at which time females have developed functional ovaries and males have mature testes. In most spider species, the male courts the female before mating occurs. After a male spider has filled its palps with sperm cells, he begins searching for a female. A male begins by identifying himself to a female so that she does not mistake him for potential prey. In some spiders, such as American tarantulas, this identification process involves the male repeatedly touching the female. More often, a male courting a female communicates with her over larger distances using vibrations.

For instance, a male wolf spider uses its legs to drum on the ground. In some web spiders, the male attaches a special signal thread to the female's web. The male then drums or plucks the thread in a rhythm that indicates the vibration is caused by another spider of the same species and not by an ensnared insect. If a female is ready to accept a courting male, she may send signals back to him.

Locating the right female can be tricky for a male spider. Fortunately, female spiders produce certain chemical substances, known as pheromones, that aid spider courtship. A female may release these pheromones through the air (like a perfume) or she may deposit them on her silk threads. When a male spider encounters pheromones from a female of the same species, he becomes excited, even if the female is not present.

Spiders with better eyesight may rely mostly on visual signals during courtship. When a male notices a female, he starts a zigzag dance in front of her in which he raises his front legs, vibrates his palps, and twitches his abdomen. Each species uses a different courtship dance with unique movements. A female will only accept a male who performs a dance with movements specific to that species. When a male finds an interested female, he inserts his sperm-containing palp into the female's genital opening. The process of mating can be very brief (a matter of seconds), or it can last several hours, depending on the species. In most species, both sexes separate peacefully after mating. Contrary to popular belief, the female black widow spider does not necessarily kill her partner after mating. Depending on the species, a female may mate only once or she may mate with several males during her lifetime.

Eggs and Brood Care
In most spider species, a female determines when sperm cells from the female's receptacles will fertilize her egg cells. Fertilization may occur a few weeks after mating, a strategy that enables the female to lay her eggs when she deems external conditions are best. The female then lays her eggs. Most spider species lay several hundred eggs; species of large spiders deposit several thousand within just a few minutes.

Typically, the female spider lays her fertilized eggs in a silky case called a cocoon, which provides a protective and insulating environment for the developing spiders. Many females abandon their cocoons right after they deposit their eggs, although they may camouflage them or hang them in hidden locations. Other spiders guard and defend their cocoons until the eggs hatch.

Some spiders exhibit special brood care. Female wolf spiders attach their cocoons to their spinnerets and carry them around until the eggs hatch. The newly hatched spiderlings then climb onto their mother's back, where they stay for about a week before they leave to survive on their own. Occasionally, young spiderlings stay in their mother's web for weeks. During this time, the mother feeds her brood, transferring regurgitated food from her mouth to their mouths.

Development and Growth

Spider eggs hatch inside the cocoon. The first stage hatches from the egg as an immobile, milky white larva. Larvae are covered by an embryonic membrane and receive nourishment from yolk material within their abdomen. After one to two molts over about a two-week period, the larva changes into a mobile spiderling, also referred to as a nymph.

In order to grow to an adult size, spiderlings undergo a series of molts that enables them to increase in size. During molting, the old cuticle slowly lifts off, while a thin new cuticle forms underneath. The new cuticle is wrinkled and pliable at first, but as molting progresses and the spiderling grows, the new cuticle stretches to accommodate the larger spiderling body. It later hardens into a new rigid exoskeleton that encases the larger spiderling. The number of molts between the spiderling and adult stage varies according to the size of the species. Small species may molt about five times, while some large tarantulas may molt as many as 40 times.

For most spiders, a spiderling's last molt marks adulthood, when functional sexual organs have developed and growth halts. Some adult female spiders, such as American tarantulas, continue to molt repeatedly. Most spiders live only 1 or 2 years. Notable exceptions are large female tarantulas, which can live up to 20 years. Male tarantulas live only 2 to 3 years. Many male spiders die soon after mating.

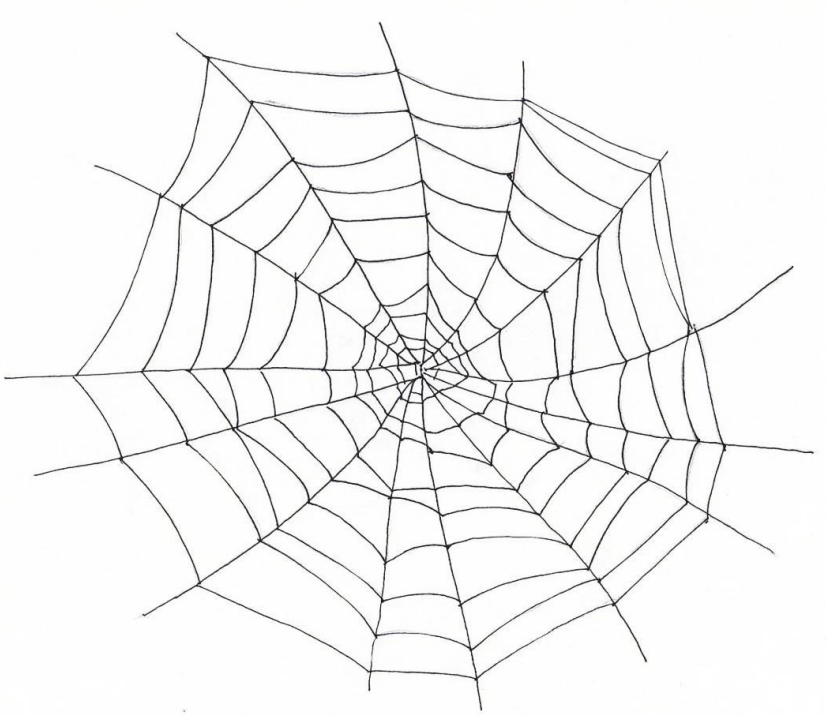
Behavioral Characteristics of Spiders

Most species of spider are active at night and all are predatory, feeding on a wide range of other invertebrates. Cannibalism may also occur among spiders especially where there is overcrowding. Different species of spiders use a variety of methods to capture their prey, but most usually construct sticky silk webs or threads to trap potential prey. Other species chase their prey often capturing them with rapid lunges.

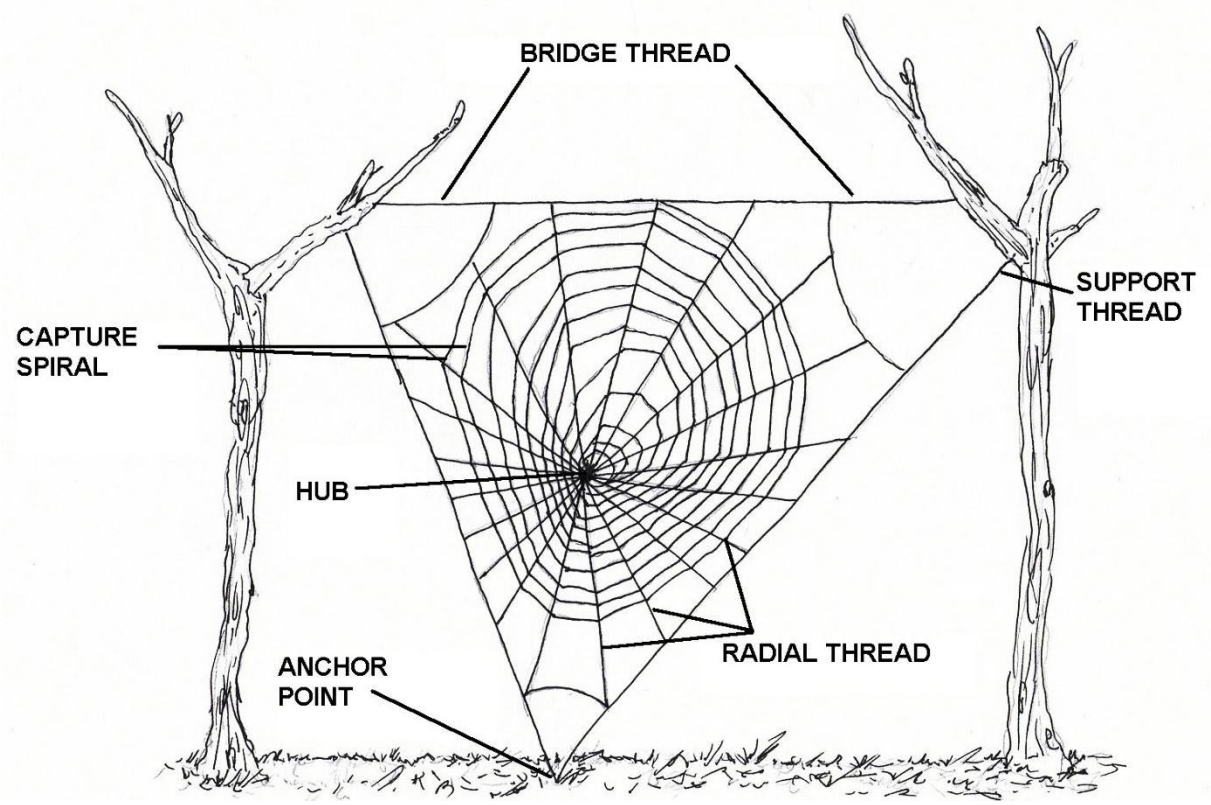
The venom that spiders produce is predominantly used to kill or immobilize their prey by being injected through hollow fangs into the captured animal. The prey is then squeezed or held by the strong basal section of the fangs and saliva in the spiders' upper lip digests the body contents. The insides of the victim are then consumed and the hard outer body discarded.

1) All spiders are predatory, feeding on other smaller animals. Some spiders, for example, the orb weavers, spin silk webs in which to catch prey. Others, such as wolf spiders and jumping spiders, hunt down their prey.

2) Spiders kill their prey by injecting them with venom from their poison glands. The venom is injected using their fang-like chelicera.



ORB WEB



WEB DESIGN DIAGRAM

Spider Web Section

Spider webs can be quite delicate, or exceptionally strong, depending on the species and age of the spider. Webs of black widows, for example, are expansive (usually about a cubic foot) and incredibly elastic. You can pluck the threads like guitar strings without breaking them. The webs of Nephila orb weavers from tropical regions are so strong that native peoples in Papua New Guinea use them as handheld fishing nets. Spider silk is widely regarded as the strongest natural fabric known, at least half as strong as a steel thread of the same thickness, and much more elastic. Efforts to synthesize spider silk have met with mixed results, but it is not out of the question to imagine a future with bullet-proof vests and parachutes made of spider silk.

Silks, Threads, and Webs
Nearly all spiders produce silk composed of the protein fibroin. This is the same protein produced by silkworms, the larvae stage of certain silk moths. Each spider has four to eight different kinds of silk glands in its abdomen, and each gland produces a different type of silk with different properties. For instance, spiders lay out a line of dry silk behind them as they move about. This dragline acts as a safety line like that used by a mountain climber. Other glands produce cocoon threads that blanket and protect fertilized eggs. Still other glands produce sticky capture threads that ensnare prey.

Spider silk threads are very thin, about 1 micrometer (0.01 mm) in diameter. Each thread weighs very little. A spider web composed of 20 m (70 ft) of silk thread weighs less than 1/1000 of a gram or 1 milligram. Despite its lightness, a spider silk thread is as strong as a nylon thread, but with more elasticity. The combination of strength and elasticity makes spider silk ideal for web building. Spider threads are tough enough to withstand the impact of a flying insect, while being elastic enough not to tear apart with the captured prey's weight.

Types of Spider Webs
Web patterns vary considerably, depending on the species of spider. Perhaps the most recognizable web is the almost circular orb web, in which an outer framework supports a continuous spiraling thread and a series of threads radiating from the center of the web. Other web types may have a more irregular shape. Some spiders build irregular, flimsy webs.

Common house spiders construct funnel webs, flat silk sheets with a raised tube in the corner that serves as a retreat for the spider. Cobweb spiders build an irregular silk meshwork with sticky threads at the bottom that trap insects. Sheet web spiders construct a horizontal silk sheet with a dome, from which the small spider hangs upside down. Many spider webs are found near the ground or in low vegetation, although orb webs often span the open spaces between bushes or trees in order to trap flying insects. The size of a web depends on the size of the spider. Whether the web has a tight or wide mesh depends on the size of the prey the spider expects to capture.

Web Building
Web building is a complex process, but some spiders can complete a web in less than 30 minutes. Spiders typically build their webs at night, completely relying on their sense of touch, not eyesight, during construction. Each type of spider uses a different procedure when building a web. Spiders that weave orb webs generally begin by spinning a thread that is carried by air currents until it catches on a tree limb or other firm support. From this thread, the spider lays down another thread to form a Y-shaped structure that is the basic framework of the web.

The spider then climbs to the midpoint of the Y-structure, known as the hub, and begins creating radius lines, or spokes, around the web. As the spider builds radius lines, it connects these lines with a few narrow circles of thread in the center of the web that forms the auxiliary spiral. The auxiliary spiral prevents radius lines from sagging when the spider walks on them. Using the auxiliary spiral as scaffolding, the spider begins the formation of the catching spiral, fastening sticky threads to each radius line. As the spider constructs the catching spiral, it dismantles the auxiliary spiral.

The catching spiral extends from the periphery of the web and stops short of the web's hub. In the finished web, only remnants of the auxiliary spiral remain and there is an empty space in the web's center known as the free zone. The spider may sit upside down with its legs placed in the center of its web to detect vibrations in the web when prey gets caught in the sticky catching spiral. Others may hide nearby under a curled leaf and use the vibrations from a signal thread attached to the hub to stay informed when prey has struck the web. The orb web is built anew every day. Some species eat their old web before starting a new web, while others roll up the web and discard it as a tiny silk ball.

Spider Web Types
Many spiders are classified by the type of webs they weave, the different types of webs are:

- Sheet webs
- Dome or tent webs
- Tubular webs
- Funnel webs
- Tangle webs or cobwebs
- Spiral orb webs

Depending on the type of spider, several different types of silk may be used in constructing a web such as a sticky capture silk to a fluffy capture silk. Webs may be constructed horizontally, normally sheet webs, or vertically, predominately orb webs, or any other angle in between.

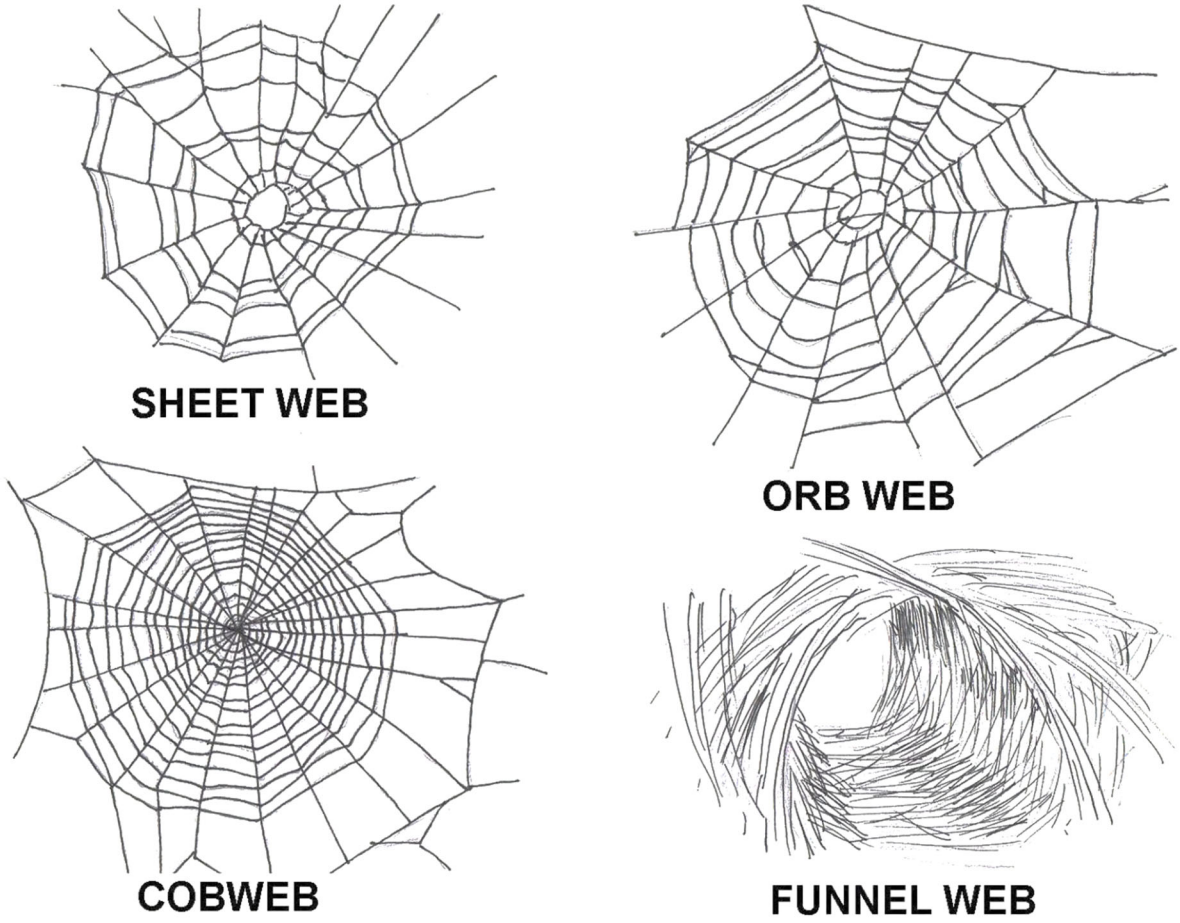
Constructing an Orb Web
During the making of the orb web, the spider will use itself for measurements. The majority of webs made by spiders span gapes they could not have easily crawled between. They accomplish this by first letting out a fine and very adhesive thread that will drift on the finest breeze across a gap. As soon as the thread has stuck to a suitable position, the spider will walk along it carefully while strengthening it with a second thread. The spider will continue backward and forward strengthening the line in order for it to support the rest of the web. After this thread is strengthened, the spider will continue to construct a Y-shaped netting. With this complete, the web can now be constructed, with more radials being added with the distance between each being small enough to cross. The size of the spider and the web determines how many radials there will be.

Once all the radials are in place, the spider will then move on to fortifying the center of the web with around five circular threads. After, the spider will spiral outwards using a non-sticky web, with widely spaced threads to be used for moving around the web during construction working from the inside to out. Then working from the outside in, the spider will replace the non-sticky guide web with a stick web spaced closer together. The spacing between each spiral will be proportionate to the distance from the tip of its back legs to its spinnerets. This is one of the ways in which the spider will use its self for measuring.

Once the web is completed, the spider will chew of the initial three center spiral threads then sit and wait for its prey. During construction, if the web becomes broken but without structural damage, the spider will not initially attempt to fix the problem. After having made the web, the spider will wait on or near the web for its prey to fall victim to its sticky trap. Once its prey has become trapped, the spider will initially feel the vibrations from the impact and then the struggle.

Spiders do not normally stick to their own webs thou they are not immune to sticking to them. When moving around there webs they must be careful so not to get stuck by using non-sticky threads in their webs.

A spider that positions its self at the center of the web is very visible to predators such as birds; many orb web spiders that hunt during the day will reduce this risk by hiding at the edge of its web, with one foot on a signal line from the center of the web.



TYPES OF SPIDER WEBS

Spider Web Uses

Some species of spiders do not use their webs for catching prey directly, some spiders pounce from hiding such as trapdoor spiders, or some chase down their prey such as the wolf spider. The Net casting spider uses both methods for catching its prey.

The Net casting spider will weave a small net that it attaches to its front legs, it will then lurk in wait for potential prey, when potential prey comes along, and the spider will lunge forward at its prey and wrap its victim in the net, followed by biting and paralyzing its victim. Using this technique, the Net casting spiders' uses less energy. They don't lose energy building a whole web and they don't loss energy from chasing down prey.

Some spiders don't even spin a web, they use the signaling technique. There are several types of water dwelling spiders that rest their feet on the surface of the water. Then when an insect falls into the water and breaks the water's surface tension, they become trapped; the spider senses the vibrations through the water and runs out to capture the prey.

Spiders webs are rich in vitamin K which can be very effective at clotting blood, in traditional European medicine, webs were used to help heal wounds and cuts and to reduce bleeding.

Communal Spiders Webs
Spiders may build webs together occasionally, in the same area. One measuring 500 feet (180 meters) across was reported at Lake Tawakoni State Park in Texas.

Enemy of Spiders
The greatest enemy of spiders, aside from frightened human beings, might be other spiders. Even some web-weaving spiders, such as cellar spiders in the family Pholcidae, can leave their own webs to stalk other spiders in their webs. Thread-legged assassin bugs in the family Reduviidae patiently approach spiders in their webs and then nab them lightning-fast with their vise-like front legs.

Giant tropical "helicopter" damselflies hover in front of spider webs and pluck the spider off. Mud dauber wasps tug on spider webs to mimic an entangled insect, then grab the spider and sting it into paralysis. The immobile spider is then stored in a nest as food for the wasp's offspring. Huge, colorful "tarantula hawk" wasps tackle the largest of spiders.

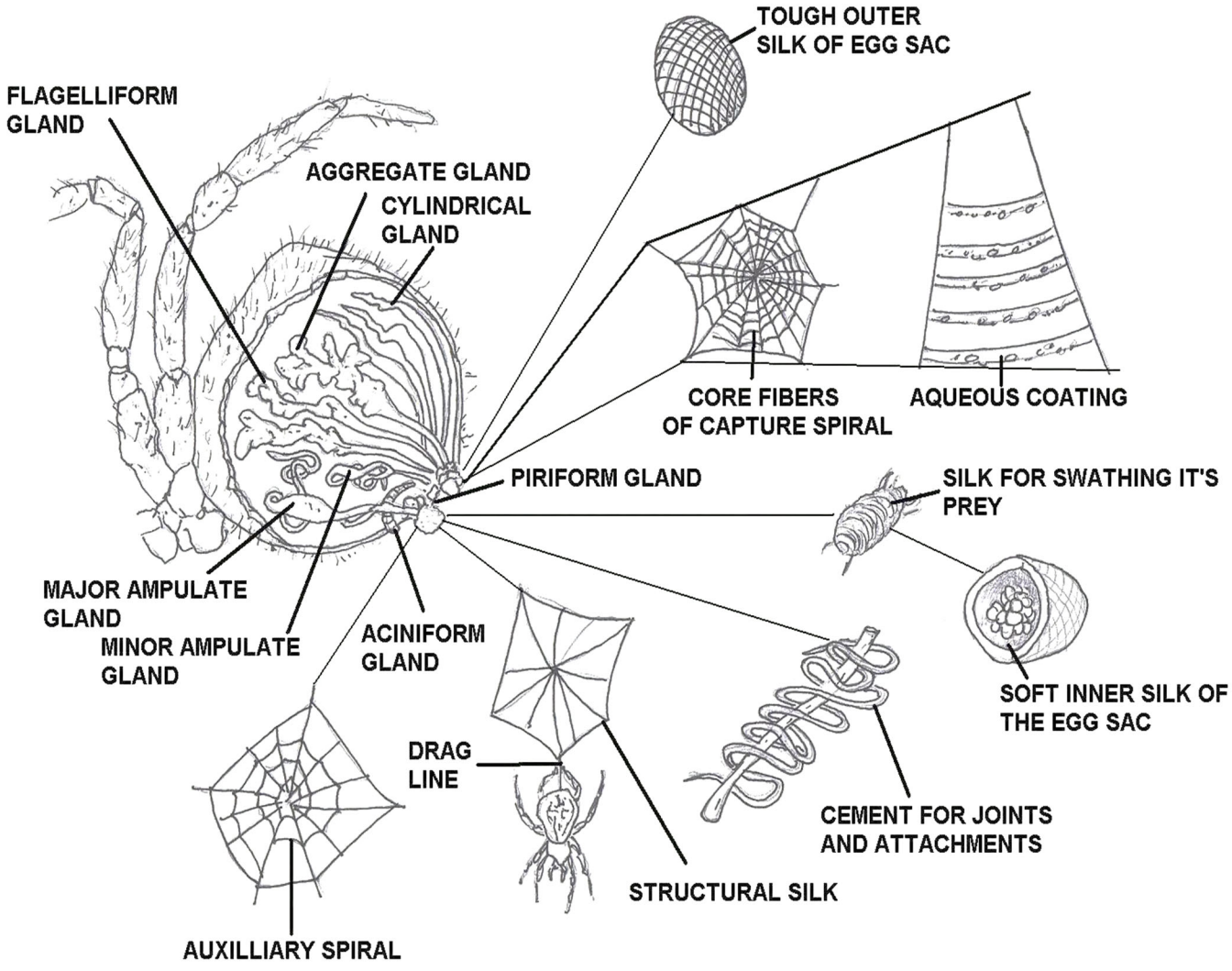
Other wasps called ichneumons will lay a single egg on a spider and the wasp larva that hatches then slowly eats the spider alive. Still other insects are parasites or predators of spiders in all life stages. Mantidflies in the family Mantispidae develop as larvae inside a spider egg sac, eating all the spider's eggs. Even human beings eat spiders intentionally. Some native peoples in South America hunt giant tarantulas and fry them. The spiders are considered a crunchy delicacy. Other mammals, like shrews, coatimundi, meerkats, and grasshopper mice also eat spiders regularly. So do reptiles, especially lizards. Birds not only eat spiders, but will use spider silk in making their nests.

Spiders get into your homes in one of two ways: 1) because you brought them in (firewood, boxes, stored materials, etc.) or 2) because they are attracted to the prey insects living in and around your house and found a way in. You can prevent them from coming in by weather stripping doors, repairing screens, and caulking and control prey insect populations. Insecticidal treatments are not recommended for controlling spiders.

Many types of spiders prefer living in houses and these species are generally not harmful to humans. Various kinds of small hunting spiders may wander indoors and occasionally, rather large, hunting-type spiders are discovered in homes or garages. Often these are fully grown wolf spider or tarantula males that have reached maturity and are searching for females. When these spiders are wandering, one or more may accidentally get indoors. The more insects there are inside a building, the more likely it is to have spiders living there.

When working in potentially spider-infested areas or handling firewood, always wear gloves and a long-sleeved shirt. When working in crawlspaces or attics wear a hooded sweatshirt and tuck your pants into your socks. If you suspect you have been bitten, try to safely capture the spider for identification (I know what you are thinking and yes, a smashed sample is better than nothing). Finding the spider is helpful in diagnosing and treating the bite and may aid physicians in diagnosis and treatment of spider bites (especially brown spider bites).

Bites from blood-feeding insects (kissing bugs, bird bugs, and bedbugs) can be mistaken for spider bites. In addition, environmental conditions, reactions to chemicals in the environment (pesticides, cleaning products, etc.), and other underlying health conditions can be misdiagnosed as spider or insect bites. It is best to learn to respect, tolerate, and enjoy spiders - they are excellent pest controllers in your garden, landscape and home.



SPIDER WEB COMPONENT DIAGRAM

Spider Prevention and Non-Chemical Control
Spiders may enter houses and other structures through cracks and other openings. They also may be carried in on items like plants, firewood, and boxes. Regular vacuuming or sweeping of windows, corners of rooms, storage areas, basements, and other seldom used areas helps remove spiders and their webs. Vacuuming spiders can be an effective control technique because their soft bodies usually do not survive this process. Indoors, a web on which dust has gathered is an old web that is no longer being used by a spider.

Individual spiders can also be removed from indoor areas by placing a jar over them and slipping a piece of paper under the jar that then seals off the opening of the jar when it is lifted up. To prevent spiders from coming indoors, seal cracks in the foundation and other parts of the structure and gaps around windows and doors. Good screening not only will keep out many spiders but also will discourage them by keeping out insects that they must have for food.

In indoor storage areas, place boxes off the floor and away from walls, whenever possible, to help reduce their usefulness as a harborage for spiders. Sealing the boxes with tape will prevent spiders from taking up residence within. Clean up clutter in garages, sheds, basements, and other storage areas. Be sure to wear gloves to avoid accidental bites.

Outdoors, eliminate places for spiders to hide and build their webs by keeping the area next to the foundation free of trash, leaf litter, heavy vegetation, and other accumulations of materials. Trimming plant growth away from the house and other structures will discourage spiders from first taking up residence near the structure and then moving indoors.

Outdoor lighting attracts insects, which in turn attracts spiders. If possible, keep lighting fixtures off structures and away from windows and doorways. Sweep, mop, hose, or vacuum webs and spiders off buildings regularly. Insecticides will not provide long-term control and should not generally be used against spiders outdoors.

Chemical Control
Typically pesticide control of spiders is difficult unless you actually see the spider and are able to spray it. There are various insecticides available in retail outlets labeled for spider control, including pyrethrins, resmethrin, allethrin, or combinations of these products. If you spray a spider, it will be killed only if the spray lands directly on it; the spray residual does not have a long-lasting effect. This means a spider can walk over a sprayed surface a few days (and in many cases, a few hours) after treatment and not be affected.

Control by spraying is only temporary unless accompanied by housekeeping. It is just as easy and much less toxic to crush the spider with a rolled up newspaper or your shoe or to vacuum it up. Sticky traps offer a non-insecticidal way to remove spiders from your home as long as you can place the traps where pets and curious children can’t tamper with them.

Sorptive dusts containing amorphous silica gel (silica aerogel) and pyrethrins, which can be applied by professional pest control applicators only, may be useful in certain indoor situations. Particles of the dust affect the outer covering of spiders (and also insects) that have crawled over a treated surface, causing them to dry out.

When applied as a dustlike film and left in place, a sorptive dust provides permanent protection against spiders. The dust is most advantageously used in cracks and crevices and in attics, wall voids, and other enclosed or unused places.

When is a Spider Web not a Spider Web?

There is a species of moth that makes an awesome spider web. These moths are harmless but scare people all over the world in to thinking spiders have gone crazy. Certain members of the unrelated snout moths (Pyralidae) are also known as "***ermine moths***".

Yponomeutidae
The family Yponomeutidae is known as the ermine moths, with several hundred species, most of them in the tropics. The larvae tend to form communal webs, and some are minor pests in agriculture, forestry, and horticulture. Some of the adults are very attractive. Adult moths are minor pollinators.

There are five or six subfamilies:

- Argyresthiinae
- Attevinae
- Praydinae
- Saridoscelinae
- Scythropiinae (sometimes in Yponomeutinae)
- Yponomeutinae

Species include:

- Ailanthus webworm, Atteva aurea
- Apple Ermine Yponomeuta malinellus
- Bird-cherry Ermine, Yponomeuta evonymellus.
- Orchard Ermine, Yponomeuta padellus.
- Spindle Ermine, Yponomeuta cagnagellus.
- Yponomeuta plumbella.

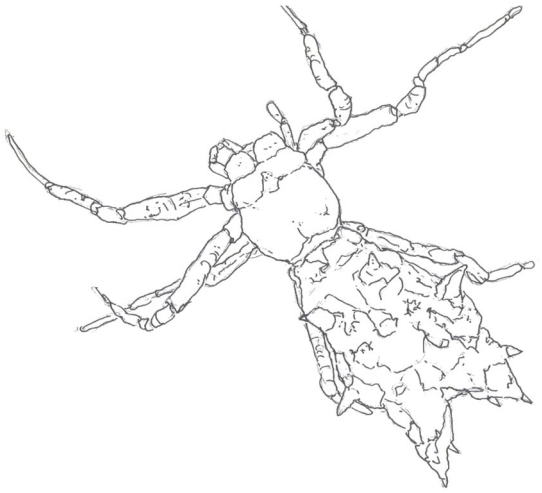
ERMINE MOTH

The buff ermine (Spilosoma lutea) is a hairy moth of the family Arctiidae. It's called buff ermine because of its buff coloring. Its color varies from yellowish to creamy with some black spots. Generally male are yellowish and females are creamy.

Spider History

One theory is that our friends the spiders evolved million years ago. Those ancient spiders were relatively large, and their bodies were segmented. In contrast, almost all spiders living today have an unsegmented abdomen. Only members of the suborder Mesothelae still exhibit a segmented abdomen, and these spiders are generally considered the most primitive types of spiders.

The fossil record of spiders is rather limited. The oldest spider fossil was found in New York State, in rocks dating back to the Devonian Period (about 410 million to 360 million years ago in theory). This fossil was remarkably well preserved. Using a microscope, scientists were able to recognize the spider's spinnerets and chelicerae. Some fossil spiders with segmented abdomens have been identified in rocks dating from the Carboniferous Period (360 million to 290 million years ago). Very few fossils have been found from the Mesozoic Era (240 million to 65 million years ago). These dates are all theories.



MICRATHENA GRACILIS

Spider webs rarely preserve as fossils, but scientists theorize that ancient spiders initially built irregular webs located near the ground, and that webs located higher up in trees evolved only later. Orb webs, for instance, may be an adaptation for snaring insects flying higher up in the vegetation. Some scientists suggest that spiders may have influenced the evolution of insects—and vice versa. In an effort to escape ground-living spiders, insects may have evolved ways to fly. At a later time, spiders may have learned ways to develop aerial webs in order to catch flying insects.

Mythology of Spiders

Arachne was a beautiful mortal with an exquisite talent for weaving. So gorgeous was her work that it was often said she could be an intern to Athena, or possibly weave better than the goddess of weaving. Athena became aware and instantly jealous of Arachne for two reasons. No one should be compared to a goddess in skill, and secondly, her husband, Zeus, had also noticed Arachne and was, like many powerful deities, prone to a soft spot (or hard spot as the case may be) for interns.

Athena visited Arachne, disguised as an old woman, to find out the truth. Arachne boasted of being able to out-weave the goddess and of the attention given to her by Zeus. Athena shed her disguise and challenged Arachne to a weaving contest. It was never discovered who won, as half way through, Athena touched Arachne's forehead and made her feel remorse for everything wrong she had ever done wrong.

It was too much for her poor human brain, and Arachne killed herself. Athena had not anticipated this and felt bad. She brought Arachne back to life, but not as a human, but as a hideous, eight legged spider, doomed to repel men, terrify women, and whose offspring were doomed to weave for eternity (obviously Athena did not feel all that bad).

Deadly Spider's Venom may Yield Super Virility

Chile's black widow also has promising spermicidal abilities, scientists find

Reuters SANTIAGO, Chile - Scientists have discovered a potentially marketable contraceptive in the venom of Chile's black widow spider, whose bite is fatal to many but can also cause prolonged, painful and involuntary erections in men. The venom of the Latrodectus mactans, a variety of black widow found only in the south of Chile, has spermicidal properties not found in black widows in other regions of the world, Chilean Dr. Fernando Romero said.

Romero heads a research team that has studied the spider's venom for seven years, prompted by tales of Chilean farmers who acquired superhuman virility after being bitten by the black widow.

Initial studies focused on taking extracts from the venom to treat erectile dysfunction, but they soon discovered it had a molecule that also made it an effective contraceptive. "This is a great business opportunity, we are the creators of the spermicide," Romero told Reuters by telephone. He said he believes the molecule's natural properties are superior to those of synthetic spermicides currently on the market.

"For us in Chile, this has opened a window of opportunity to an incredible market, since currently there are no naturally based spermicides that have the properties of this discovered molecule," Romero said. Romero, based at the Universidad de la Frontera in the southern city of Temuco, has already applied for a patent for his erectile dysfunction medicine. 'Spider-bitten.' His team discovered the property after looking into Chilean folklore that describes a virile man, one known to have spectacular sexual energy or many sexual partners, as being "spider-bitten."

The Chilean black widow is also known as the wheat spider for the wheat fields it inhabits and where its farmer-victims receive their often fatal bite.

The spider's bite can kill children and the elderly, but among strong young farmers it leads to erections that can last for days and involve involuntary ejaculations. At the end of the ordeal, the man is left sexually energized and feels physically stronger, the saying goes.

Short and sweet comment, if your wife places spiders in your lunch box, she may be trying to tell you something.

Topic 1 - Arachnid Introduction Post Quiz
Answers are found at rear of Glossary

Fill-in-the blank

1. There are eleven orders of arachnids. These include the scorpions; mites and ticks; harvestmen; pseudoscorpions; whipscorpions; solpugids; and spiders. It's like the relation of beetles with insects: beetles constitute one order of insects, the_____, but not all insects are beetles. Similarly, not all arachnids are spiders.

Spider's Life

Biology

2. Spiders range in size from less than 1.0 mm (0.04 in) to more than 10 cm (4 in) in length, with a leg span of up to 20 cm (8 in). A spider's body is divided into two parts: the front portion, called the_____, and the rear portion, called the opisthosoma or abdomen. A narrow stalk called the pedicel connects these two parts.

Spider Reproduction

3. All species of spiders have two separate sexes, and the males are usually smaller than the females. The male spider has two sperm-producing testes. A sexually mature male spider uses _____to transfer sperm cells into the female during mating. In this process, the male builds a small, triangular sperm web, onto which he deposits a drop of sperm from his abdomen. He then dips both palps into this droplet, drawing sperm cells into the palps as if by a tiny pipette.

Types of Spider Webs

4. Web patterns vary considerably, depending on the species of spider. Perhaps the most recognizable web is the almost_____, in which an outer framework supports a continuous spiraling thread and a series of threads radiating from the center of the web. Other web types may have a more irregular shape. Some spiders build irregular, flimsy webs.

Constructing an Orb Web

5. Once the web is completed, the spider will chew of the _____then sit and wait for its prey. During construction, if the web becomes broken but without structural damage, the spider will not initially attempt to fix the problem. After having made the web, the spider will wait on or near the web for its prey to fall victim to its sticky trap. Once its prey has become trapped, the spider will initially feel the vibrations from the impact and then the struggle.

6. Spiders do not normally stick to their own webs thou they are not immune to sticking to them. When moving around there webs they must be careful so not to get stuck by using _____in there webs.

7. A spider that positions its self at the center of the web is very visible to predators such as birds; many orb web spiders that hunt during the day will reduce this risk by hiding at the edge of its web, with one foot on a _____from the center of the web.

8. Many types of spiders prefer living in houses and these species are _____to humans.

Spider Prevention and Non-Chemical Control

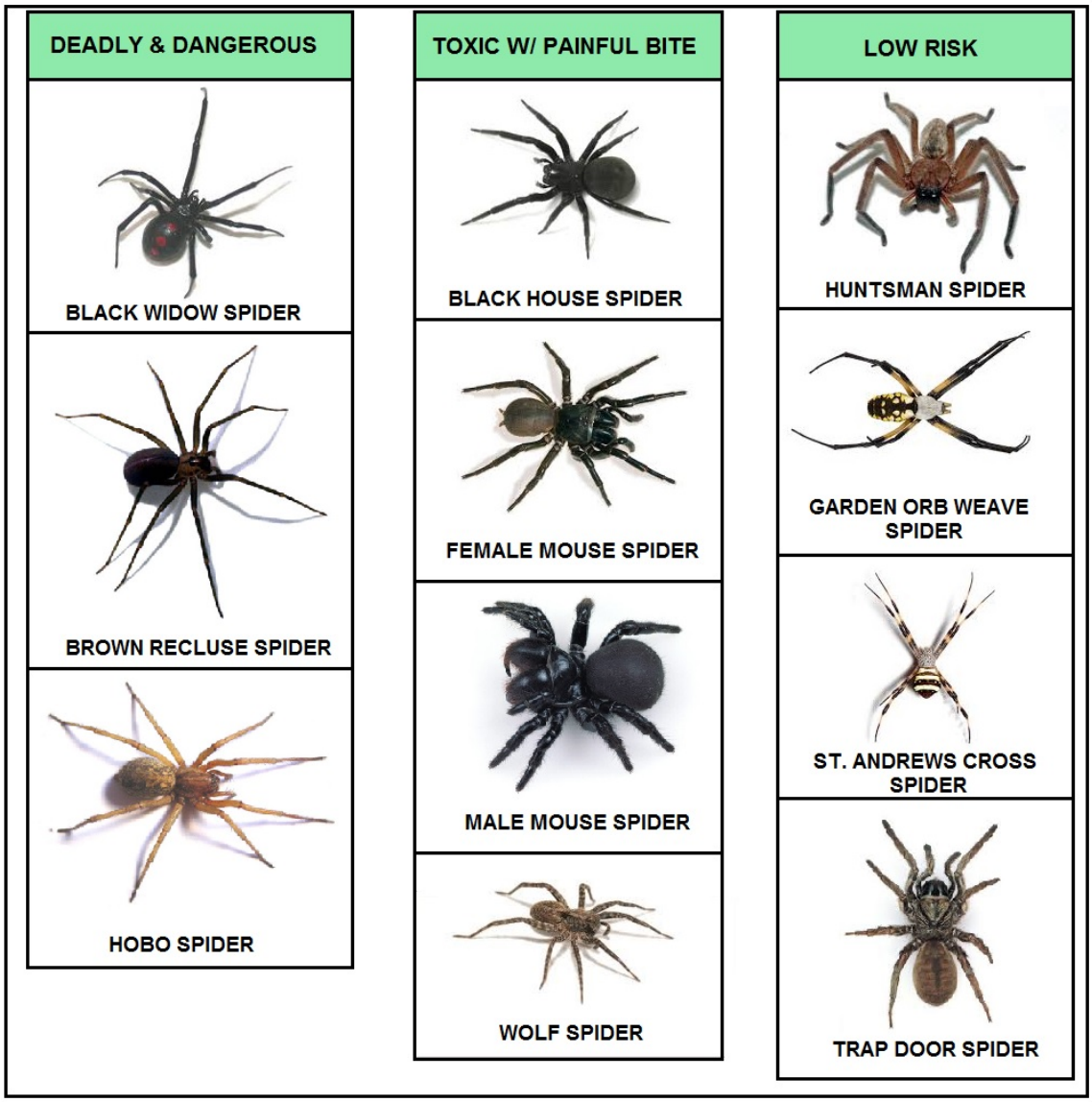
9. _____can be an effective control technique because their soft bodies usually do not survive this process.

10. To prevent spiders from coming indoors, seal cracks in the foundation and other parts of the structure and gaps around windows and doors. Good _____not only will keep out many spiders but also will discourage them by keeping out insects that they must have for food.

Topic 2 - Spider Identification Section

Topic 2 - Section Focus
You will learn the basics of spider identification. At the end of this section, you will be able to understand and describe various spiders. You will learn about common US spiders, genera, life cycle and related subjects. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Topic 2 – Scope/Background
Spiders can be divided into one of two groups depending on how they capture their prey: hunting (sometimes known as wandering) spiders and web-building spiders



COMMON US SPIDER DIAGRAM

Two Primary Spider Groups
Spiders can be divided into one of two groups depending on how they capture their prey: hunting (sometimes known as wandering) spiders and web-building spiders. All spiders produce silk, but hunting spiders do not construct webs to capture food. Instead, they rely on their quickness and relatively good eyesight to capture prey. Web-building spiders construct webs in rather quiet, undisturbed places to capture their food. They live in or near their web and wait for food to come to them. They generally have poor eyesight and rely on sensing vibrations in their web to detect prey.

Hunting Spiders
Crab Spiders
Are common spiders outdoors, but are not usually seen indoors. They are small to medium-sized spiders (1/10 - 2/5 inch long) ranging in color from yellow or red to brown or gray. The first four legs of crab spiders are crab-like, being held out to the sides. They are also usually longer than the back four. Crab spiders can walk forwards, sideways, or backwards. While many hunting spiders actively pursue prey, crab spiders wait motionless and ambush insects that pass closely by. Outdoors, crab spiders are often found on flowers but are also seen on stems or leaves.

Fishing Spiders – Human Biters
Also known as dock spiders, are typically seen around ponds, swamps, slow-moving streams, and nearby vegetation. They may occasionally be found indoors. Fishing spiders are the largest spiders in the Upper Midwest (1 inch long). With legs spread out, some fishing spiders cover as much as 4 inches. They are generally dark-colored, usually brownish or grayish, with white markings. Fishing spiders can "skate" across water and can dive underneath to capture prey. In addition to insects, fishing spiders can also catch tadpoles, small fish, and other small vertebrate animals.

Gnaphosid Spiders
Are commonly found outdoors. A specific gnaphosid spider known as a parson spider is occasionally seen inside. The parson spider is a medium-sized spider (1/2 inch long) with a brownish body and gray abdomen with a white band running down over half the length of its abdomen. Parson spiders hunt at night. During the day, they are usually found outdoors under stones or loose bark in silken retreats. Indoors, they hide under objects or in cracks or crevices.

Huntsman Spiders
Venom toxicity - the bite of Huntsman Spiders is of low risk (non-toxic) to humans. They are a non-aggressive group of spiders. However, a large individual can give a painful bite. Beware in summer when the female Huntsman Spider is guarding her egg sacs or young.

Spider Identification - an adult varies greatly around 1/2" in body length - has long legs - the diameter of an adult including legs may reach 2" - the first 2 pairs of legs are longer than rear two - it is hairy - buff to beige brown in color, with dark patches on the body.

Habitat - a hunter that prefers to live under the flaking bark of trees, under flat rocks and under eaves or within roof spaces of buildings. The Huntsman Spider often wanders into homes and is found perched on a wall. It is a shy, timid spider that can move sideways at lightning-fast speed when disturbed.

Jumping Spiders
Are common spiders outdoors and indoors. They are active during the day and are often found around windows, ceilings, walls, and other areas exposed to sunlight. Jumping spiders are generally small to medium-sized (about 1/5 - 1/2 inch long) and compact-looking. They are usually dark-colored with white markings, although some can be brightly colored, including some with iridescent mouthparts.

These spiders move quickly in a jerky, irregular gait. They get their name from their ability to leap on their prey, often jumping many times their own body length. Like most spiders, jumping spiders have eight eyes, of which the two middle eyes are particularly large. Jumping spiders have the best vision of spiders, seeing objects up to 8 inches away.

Jumping spiders (Family Salticidae) get their name from the sometimes spectacular leaps they make when pouncing on prey or simply hopping about in the foliage. They are very small to medium sized spiders 3-15mm (1/8 -- 5/8") long. Their eight eyes are arranged in 3 rows - the first row near the midline contains the largest pair, which faces forward in the manner of predatory animals requiring binocular vision, and a second, smaller pair outboard of those, also facing forward and slightly upward. The second row of eyes is very much smaller and facing upwards and only slightly forward. The jumping spiders have the most acute eyesight of all spiders.

Mouse Spiders – Human Biter
Venom toxicity - known to cause severe illness, especially to young children - similar to Red-Back Spider. Although normally not aggressive, the male mouse spider will bite if provoked, and should be considered dangerous to humans. It has large hard fangs which can cause a deep painful bite. First aid and medical attention (ambulance) should be sought as soon as possible.

Spider Identification - a medium to large spider of up to 1 and 1/2 inches in body length. The male Mouse Spider often has a bright red head and elongated fangs.

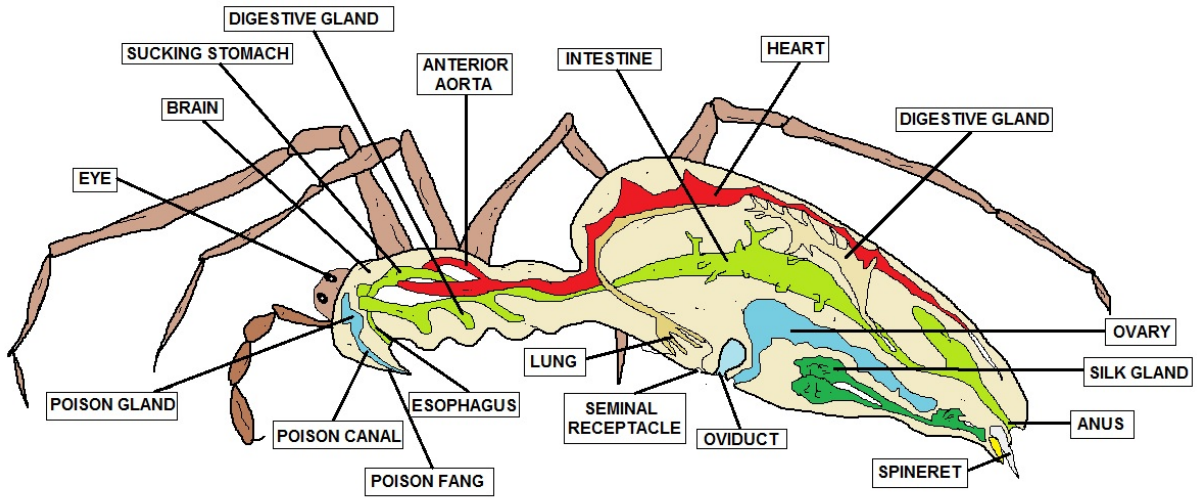
Habitat - Mouse spiders are ground dwellers with burrows of more than 3 feet deep. The male often wanders about during the day on open ground, especially after rain, in search of females.

Purseweb Spiders (Sphodros genus, Atypidae family, Mygalomorphae suborder)
Mygalomorphs are generally large spiders; though they seem to be the species most likely to inspire arachnophobia, all of the US species are harmless to humans. True Tarantulas (family Theraphosidae) are members of this suborder; some are found in the Southwestern US. The Atypidae are sometimes known as "atypical tarantulas." There are two genera in the US: Atypus and Sphodros

Sac Spiders
Also known as two-clawed hunting spiders are common spiders on foliage or on the ground, and can be commonly found indoors. They are small to medium-sized spiders (1/5 - 2/5 inch long) and are usually yellowish or light-colored. Although sac spiders do not construct webs, they do build retreats from silk. Outdoors, they usually roll up leaves into a tube, or may construct a retreat under stones. Inside buildings, sac spiders are found in retreats in a variety of places, including high up on walls near ceilings.

Wandering Spiders
Some spiders will enter buildings in search of food and shelter, particularly in the fall when the temperatures become cooler. Below is a list of spiders that are often found in or around buildings. Although many spiders can bite, the injury from this group is usually similar to a bee sting.

Wolf Spiders
Are common spiders outdoors and are occasionally seen indoors. They are moderate to large-sized spiders (1/4 - 3/4 inch long). Wolf spiders are found on the ground or under stones in a wide variety of habitats, such as forest floors, grassy meadows, swamps, and bogs. Some even like to live underground. They commonly hunt during the day or at night when it is warm. Wolf spiders are dark-colored, usually brownish or grayish, with white markings.



Technical Learning College

ANATOMY OF A SPIDER

Ground Spider Sub-Section

Tarantula

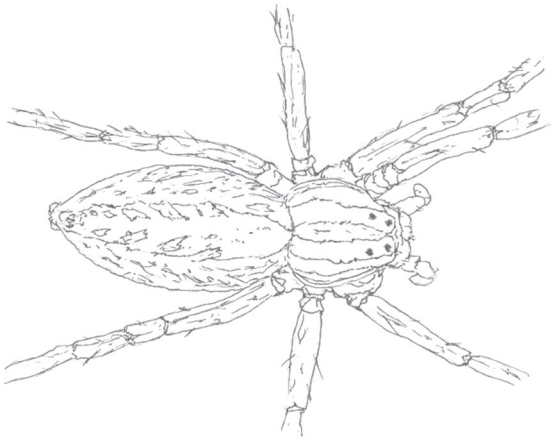
True tarantulas are a type of wolf spider that belong to the family Lycosidae in the suborder Araneomorphae. However, most people use the term *tarantula* to refer to about 700 species of spiders belonging to the family Theraphosidae in the suborder Mygalomorphae.

Sometimes known as American tarantulas, they are found in tropical regions throughout the world, with many species in the southwestern United States. These giants of the spider world can attain a body length of 10 cm (4 in) with a leg span up to 20 cm (8 in), making it possible for some species to overpower small vertebrates (animals with backbones), such as frogs or lizards, for their meal. Their large body and long legs are covered with hairs, and they have powerful chelicerae, giving them a fearsome appearance. Most tarantulas stay on the ground (often in burrows). As ground hunters, tarantulas are typical sit-and-wait predators—they wait for insects or small vertebrates to come near before they pounce and kill the prey with their strong chelicerae.

Perhaps as a result of their frightening size and appearance, tarantulas have gained a deadly reputation among humans. For the most part, however, tarantulas do not attack unless provoked, and their venom is not harmful to humans, although their strong chelicerae can cause painful wounds. Tarantulas are popular pets, and some become so tame that they can be picked up and handled safely. Although the chance of receiving a bite is small, there is another danger: Many tarantulas brush off their abdominal hairs when they feel threatened. These barbed hairs fly through the air and can penetrate skin and the mucous membranes of the nose, causing a strong burning sensation.

Wolf Spider

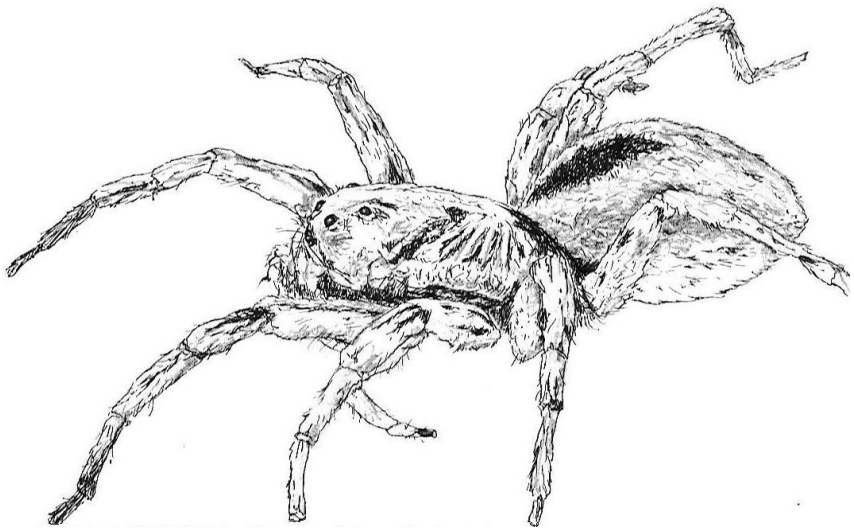
About 2,000 species of wolf spiders belong to the family Lycosidae in the suborder Araneomorphae. Found throughout the world, these spiders have dull brown or black coloration, stout bodies, and long, thick legs. Some species have hairy bodies.



RABID WOLF SPIDER

Wolf spiders are ground hunters, but their name inaccurately suggests that they actively hunt their prey just like their wolf namesake. However, like tarantulas, most wolf spiders usually sit in a hidden spot. When prey happens by, they ambush the prey by jumping on it. Wolf spiders are sensitive to vibrations, such as the buzzing wings of insects, as well as to visual signals.

For instance, during courtship males drum their legs on the ground or wave their legs and palps in a rhythmic dance in order to catch a female's attention. Female wolf spiders are renowned for their brood care. After laying eggs, a female spider carries the cocoon attached to her spinnerets. When the spiderlings hatch, she allows them to ride on her back for about a week. Some larger wolf spiders dig burrows in the soil, which they may line with silk and provide with a door. At night they leave their burrows to hunt for insects.



WOLF SPIDER (LYCOSDAE GULOSA)

Biology: Wolf spiders occupy a variety of ecological niches, including most terrestrial habitats. Some species are amphibious, having the ability to skate on the surface of water. Other species are diggers that build burrows in sandy soil. Wolf spiders are most numerous in grasslands where crickets and grasshoppers abound. These spiders capture prey by pouncing on and holding it while several bites are delivered with the chelicerae. They have a higher visual acuity than most spiders and use vision to locate and track prey.

Nocturnal species have reflective surfaces behind the retina that double the stimulation from a given unit of light and also cause the eyes to glow brightly in a flashlight beam. Although there are considerable variations in life histories, all female wolf spiders have a common and fascinating set of maternal care behaviors. After mating, a female produces a carefully constructed silken sac, into which she lays her eggs. She then attaches the egg sac to her posterior at her spinnerets and carries it with her wherever she goes, until the young spiderlings have hatched.

After hatching, the mother opens the sac with her chelicerae, and the young quickly escape and climb on their mother's back, where they remain until ready to molt and take up independent lives.

Envenomation: Although some tropical wolf spider species are suspected of having venoms that produce serious pathology in humans, the bite of most species causes only very mild symptoms.

Treatment: Wash the bite site with soap and water, and then treat with an antiseptic. Consult a physician if any unusual symptoms or infection should occur.

Precautions and Control: Don't handle wolf spiders. If one is found in a house, it should be "herded" to an exit. Wolf spiders generally move too rapidly to be swept up in a dustpan or otherwise captured. No control method is recommended for these spiders. They should be considered beneficial.

Tarantula Hawk Wasp

The tarantula hawk is the common name for species in the genera Pepsis and Hemipepsis of the family Pompilidae, in the insect order Hymenoptera. These two genera are limited to the Western Hemisphere, and “tarantula hawks” in the Eastern Hemisphere belong to different genera. These genera of wasps are called tarantula hawks due to their hunting of tarantulas as food for their larvae.

TARANTULA HAWK

Tarantula hawks are up to two inches (50 mm) long with a blue-black body and bright rust-colored wings. The bright rust coloring that they have on their wings is also known as aposematic coloring; this warns potential predators that they are dangerous. Their long legs end with hooked claws for grappling with their victims. The stinger of a female tarantula hawk can be up to 1/3 inch (7 mm) long.

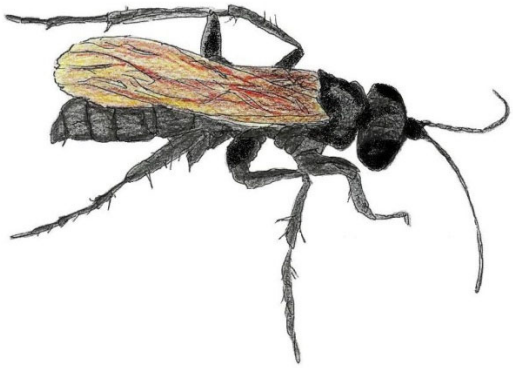
Female tarantula hawks may hunt for wandering male tarantulas. However, during the insect's reproductive season, male tarantulas are usually emaciated from ignoring food while searching for females. The tarantula hawks prefer female tarantulas and seek them in their burrows. They capture (often following a dramatic battle), sting, and paralyze the spider. Next they either drag the spider back into her own burrow or transport their prey to a specially prepared nest where a single egg is laid on the spider’s body, and the entrance is covered.

The wasp larva, upon hatching, begins to suck the juices from the still-living spider. After the larva grows a bit, the spider dies and the larva plunges into the spider's body and feeds voraciously, avoiding vital organs for as long as possible to keep it fresh. The adult wasp emerges from the nest to continue the life cycle. Tarantula hawks are "nectarivorous." The consumption of fermented fruit sometimes intoxicates them to the point that flight becomes difficult. While the wasps tend to be most active in daytime during summer months, they tend to avoid the very highest temperatures. The male tarantula hawk has an interesting behavior: many act in a behavior called "hill-topping," where they sit on top of tall plants and look out for females who are ready to reproduce.

TARANTULA HAWK'S STINGER

These wasps are usually not aggressive, but the sting, particularly of Pepsis formosa, is among the most painful of any insect. Commenting on his own experience, one researcher described the pain as "...immediate, excruciating pain that simply shuts down one's ability to do anything, except, perhaps, scream." Mental discipline simply does not work in these situations." It is listed near the top of the list in Schmidt Sting Pain Index. Although the sting is quite painful, the effect is reported to last only a few minutes and is fatal less often than the honey bee. Because of their stingers, very few animals are able to eat them; one of the few animals that can is the roadrunner.

What is a Wasp?
A wasp is any insect of the order Hymenoptera and suborder Apocrita that is not a bee or ant. The suborder Symphyta includes the sawflies and wood wasps, which differ from members of Apocrita by having a broader connection between the mesosoma and metasoma. In addition to this, Symphyta larvae are mostly herbivorous and "caterpillar-like", whereas those of Apocrita are largely predatory or "parasitic" (technically known as parasitoid).



SPIDER WASP

Black Widow Spider
Araneae: *Theridiidae, Latrodectus mactans*

BLACK WIDOW **BROWN RECLUSE**

Brown Widow Spider
Looks like a Bowl and Dolly or a caramel colored Black Widow Spider. It is rare but can be found in Southern California around Fontana, Riverside and areas of trucking containers are stored. I treat these dudes the same as any orb spider. It is not a brown recluse which is very rare in California, you will most likely find a Desert Recluse, but the recluse doesn't look anything like a black or brown widow female spider, maybe a huge male black widow at best. Women will generally call all spiders brown recluses or black widows.

Black Widow Spider
The male black widow's abdomen is more elongated than that of the female, with white and red markings on its sides. The female's abdomen is almost spherical, usually with a red hourglass mark below or with 2 transverse red marks separated by black. The legs of the male are much longer in proportion to his body than those of the female. The female is more easily recognized, her shiny black body giving great contrast to the red hourglass marking on her round abdomen.

The black widow's range is from Massachusetts to Florida and west to California, Texas, Oklahoma and Kansas. Although they can be found in almost every state (and some portions of Canada), this spider is most common in the Southern locales of the United States. Black widow spiders are common around wood piles, and are frequently encountered when homeowners carry firewood into the house. Also found under eaves, in boxes, underneath unused construction materials, inside wooden toy boxes, firewood boxes, outdoor toilets, meter boxes, and other unbothered places.

The female black widow spider rarely leaves her web. The web she constructs is an irregular, tangled, crisscross web of rather coarse silk.

The core of the web is almost funnel shaped, woven into a silken tunnel in which the female spider spends the majority of her daylight hours. This web is altered and rebuilt on a regular basis and is capable of capturing rather large insects. The female wraps any captured prey with her silk, repeatedly turning her victim with her legs as she applies more silk.

After her victim is covered in silk, the spider kills her prey by injecting her venom. The prey might be eaten immediately or reserved for a later feeding. After the prey is fed upon and the body fluids are sucked from the victim, the carcass is cut loose and allowed to drop to the ground. The female black widow is most often found hanging upside down in her web, where she spends most of her daytime hours. She stays close to her egg mass, defensively biting anything that disturbs her or her egg sac. After laying her eggs, the female black widow is hungry and more likely to bite a human. The female black widow stores sperm, producing more egg sacs without mating. Some females live more than three years, with older females dying in autumn after egg laying.

Egg Sacs
Egg sacs are pear shaped (or oval); brown, papery, and about ½ inch long. They hold from 25 to 900 or more eggs, which have an incubation period of 20 days. The spiderlings disperse shortly after emerging, tearing an opening in the egg sac but staying near the sac. After several hours, these second instar spiderlings balloon to the ground and scatter. Growth requires two to three months. Of all spiders, the Black Widow is the most feared. The female's venom is especially poisonous to people. Despite its reputation, this spider often attempts to escape rather than bite, unless it is guarding an egg mass or if it is cornered and pressed.

The male black widow will not bite you. After mating, the female sometimes eats the male (remember, she only has to mate once in her life), earning the name "widow." During the period shortly following mating and laying of eggs, the female black widow can be a little cranky and hungry. After this period (if he lives through it!) the male lives quite comfortably, eating prey captured by the female. The development of his venom sacs stop and become inactive as the male matures, thus making him less of a potential problem than his female counterpart.

Bite
The bite of the female black widow spider may not always be felt at first, and besides slight local swelling; there is usually little evidence of a lesion. Two tiny red spots can sometimes be observed in the center of the swollen area. Most of the time, pain at the site of the bite occurs immediately and becomes most intense after about three hours.

An overall aching of the body, especially the legs, is a common reaction. Headache, elevated blood pressure, nausea and profuse perspiration may occur in severe cases. The condition is self-limiting and in most cases symptoms disappear in two or three days. Calcium gluconate is used intravenously to relieve and relax muscle spasms produced by black widow venom.

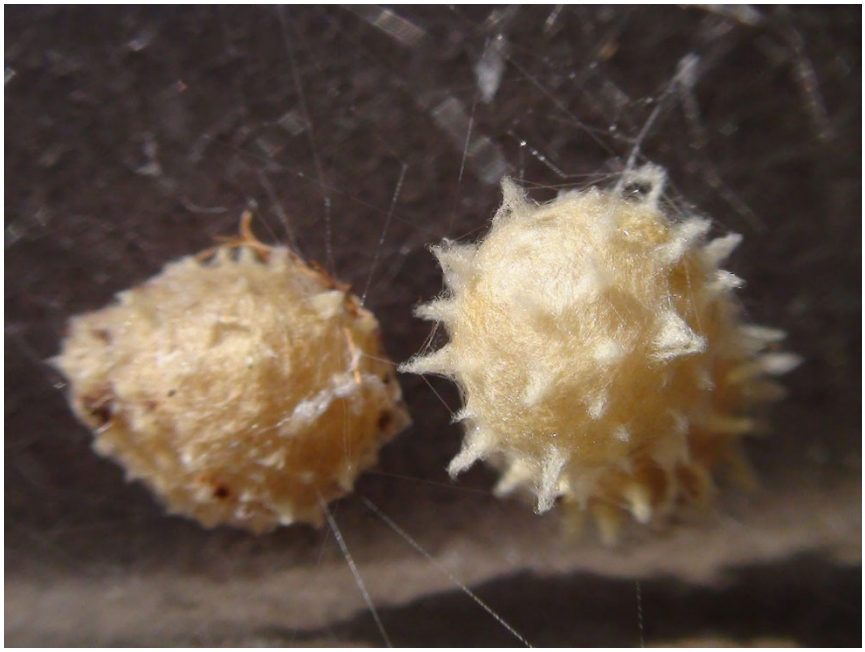
Be very careful when working around areas where black widow spiders may be established. Take proper precautions, wear gloves, and pay attention to where you are working. Black widow bites are sharp and painful, and the victim should go to the doctor immediately for treatment. Seek medical attention if you think you have a spider bite. If possible, collect up the spider or what remains of it and take with you to your doctor or emergency clinic.

Brown Window Spider

FEMALE BROWN WIDOW SPIDER
(LATRODECTUS GEOMETRICUS)

The brown widow spider (Latrodectus geometricus) is native to South Africa and was first discovered in the United States in 1935. This spider is also commonly known as the grey widow, brown button and geometric button spider. While it is true that brown widow spiders are highly venomous to their prey, they are very timid and rarely bite humans; when they do bite, they don't inject all their venom making them less harmful.

The brown widow is a medium to large spider that is slightly smaller than its cousin, the black widow. Its coloration ranges, but it is usually either dark grey, brown, or black. There is a general striped pattern on the legs and dorsal (top) side, and brown mottling on the ventral (bottom) side. Like the black widow, it often has an hourglass figure on its abdomen. However, instead of this marking being red, it is usually a vivid orange or yellowish.



BROWN WIDOW EGG SAC

If you cannot identify this spider by its markings alone, another method is to look for its distinctive egg sac. This spider floats its egg sac in a network of webs. The sac resembles a sandspur, having brown coloration and pointed projections on its surface. The egg sacs are often described as being "tufted," "fluffy," or "spiky" in appearance.

American Recluse Spiders

Eleven species of recluse spiders are native to the United States, and a few non-natives have become established in circumscribed areas of the country. The brown recluse spider is the proper common name for only one species, Loxosceles reclusa. It is the most widespread of the North American recluse spiders and lives in the south central Midwest from Nebraska to Ohio and south through Texas to Georgia.

BROWN RECLUSE SPIDER UNDERSIDE CLOSE-UP

Although the brown recluse does not live in California, they do have four species of native recluse spiders. The most common Californian recluse spider is the desert recluse, L. deserta. It is found mostly in the Sonoran and Mojave deserts, in the foothills of the lower San Joaquin Valley, and in adjacent areas of Mexico, all of which are sparsely populated by humans. In older literature, this spider was referred to as L. unicolor.

There are additional species (L. russelli, L. palma, L. martha), but they are so uncommon that they are of scientific interest only.

In addition to these native species, a South American recluse spider, Loxosceles laeta (pronounced "LEE-ta"), has become established in portions of Los Angeles (Alhambra, Sierra Madre, Monterey Park). This spider, however, seems to be confined to a very limited area in Los Angeles County, even though it has lived there for over 30 years. Also, occasional interceptions of the Mediterranean recluse, L. rufescens, are found in commercial goods shipped from out-of-state, but no populations of this spider have been found in California.

BROWN RECLUSE EGG SAC

BLACK WIDOW WITH EGG SAC AND MALE BLACK WIDOW

Other Widow Spiders

BROWN WIDOW FEMALE SPIDER

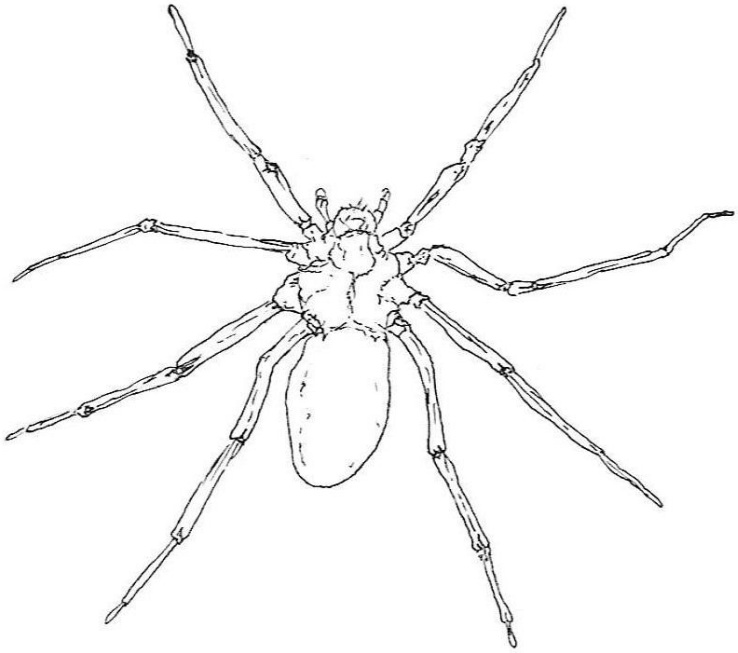
ORANGE WIDOW SPIDER

WHITE WIDOW SPIDER

RED WIDOW SPIDER

Brown Recluse Spider

Araneae: Loxascelidae, Loxosceles reclusa



BROWN RECLUSE (LOXASCELIDAE RECLUSA)

Over the years, the group of spiders to which the brown recluse belongs has been known by various colloquial names: "***violin***" spiders, "***fiddleback***" spiders, "***recluse***" spiders, and "***brown***" spiders. Recently the American Arachnological Society chose "recluse spiders" as the official common name for this group. The scientific name for the recluse spider group is ***Loxosceles*** (lox-SOS-a-leez). All known members of the group have a scientific name, and the more familiar members of this group also have a common name (e.g., brown recluse, desert recluse, Arizona recluse).

The spider is golden brown, with the fiddle being dark brown or black. This spider is not hairy and the fiddle pattern is often shiny. They are about 1/4 to 3/4-inch long. Members of this small family are known for their poisonous venom. They have six eyes in three pairs.

The most definitive physical feature of recluse spiders is their eyes: most spiders have eight eyes that typically are arranged in two rows of four, but recluse spiders have six equal-sized eyes arranged in three pairs, called dyads. There is a dyad at the front of the cephalothorax (the first main body part to which the legs attach) and another dyad on each side, further back.

Many publications refer to the violin on the dorsal surface of the cephalothorax as the most important diagnostic feature. Although this marking is fairly consistent in mature brown recluses and Texan recluses (*L. devia),* it can vary in intensity and sometimes fades in preservative, and it is very faint to nonexistent in several recluse species found in the southwestern United States (e.g., the desert recluse).

Therefore, checking the eye pattern will eliminate almost all suspect recluse spiders from consideration, whereas the presence or absence of the violin marking may lead to misidentifications.

In addition, the abdomens of all recluses are covered with fine hairs and are uniformly colored, although the coloration can vary from light tan to dark brown, depending on what they have eaten. There is never a coloration pattern on the abdomen. Finally, the legs are similarly covered with fine hairs, whereas many non-recluse spiders have stout spines on their legs.

Some spiders share each of these physical characteristics (six eyes in dyads, dark pattern near the eyes, uniformly colored abdomen with fine hairs, no spines on the legs); however, no non-recluse spider has all four characteristics. On this basis, more than 99% of the spiders found by Californians can be identified as something other than a recluse spider. If, however, you do find a recluse spider in California, it will most likely be the native desert recluse, *L. deserta.* To further identify *Loxosceles* spiders to species requires a high-power microscope and the skills of a spider expert (arachnologist).

The cephalothorax is rather flat above and has a conspicuous, lengthwise furrow in the midline at the rear third. Each foot has two claws. Many of the wolf spiders are similar in appearance and have similar markings as the brown recluse. They are large, robust, hairy, and therefore, they can be distinguished from the brown recluse.

Brown Recluse spiders spin small, irregular webs under bark, stones, or other secluded areas. Their venom is especially poisonous to people; those bitten often become ill and find that the wound does not heal quickly. Both male and female brown recluse spiders, as well as their spiderlings, are capable of injecting venom that may result in serious lesion formation or systemic reactions. The severity of the bite may vary. The symptoms may vary from no harm at all to a reaction that is quite severe. Usually, the brown recluse spider bite is not felt and the pain sets in from six to eight hours later. A typical bite area may resemble a pimple, pustule, or blister formation within six to 12 hours later. Mild to severe pain, accompanied by swelling, may occur during this interval.

The surrounding tissue begins to darken, is irregular in shape, and has sharply raised edges, resulting in a sunken area which may be several centimeters in diameter. Often there is a systemic reaction within 24-36 hours, characterized by restlessness, fever, chills, nausea, weakness, and joint pain. Where the bite occurs, there is often tissue death, and skin is sloughed off. In some severe cases, a wound may develop that lasts several months. In all cases, a physician should be notified. If at all possible, kill and take the spider to the physician for positive identification. Individual spiders can be crushed underfoot or sprayed with an aerosol spray.

Brown recluse spiders are found primarily in the Midwest. Many cases of bites are reported from Alabama, Florida, Georgia, Texas, Kansas, Missouri, and Oklahoma. They are suspected of being in other states as well. The edge of its range just reaches the tip of western Virginia, but it occurs rarely in this state. The Brown Recluse has adapted quite well to indoor habitats. They are commonly found in the storage areas of residences, including areas such as attics, closets, bedrooms and other dark recesses. This spider frequently inhabits clothing, toys, books, boxes, and furniture, as well as transport trucks, tool sheds, tree houses, and little-used or abandoned dog houses. Bites often occur when the spiders hide in towels or old clothes left in those areas.

The brown recluse spider is nocturnal and prefers food such as firebrats, crickets, Arachnides, and other soft-bodied creatures. Earning their name well, the brown recluse spider ceases its wanderings at first light.

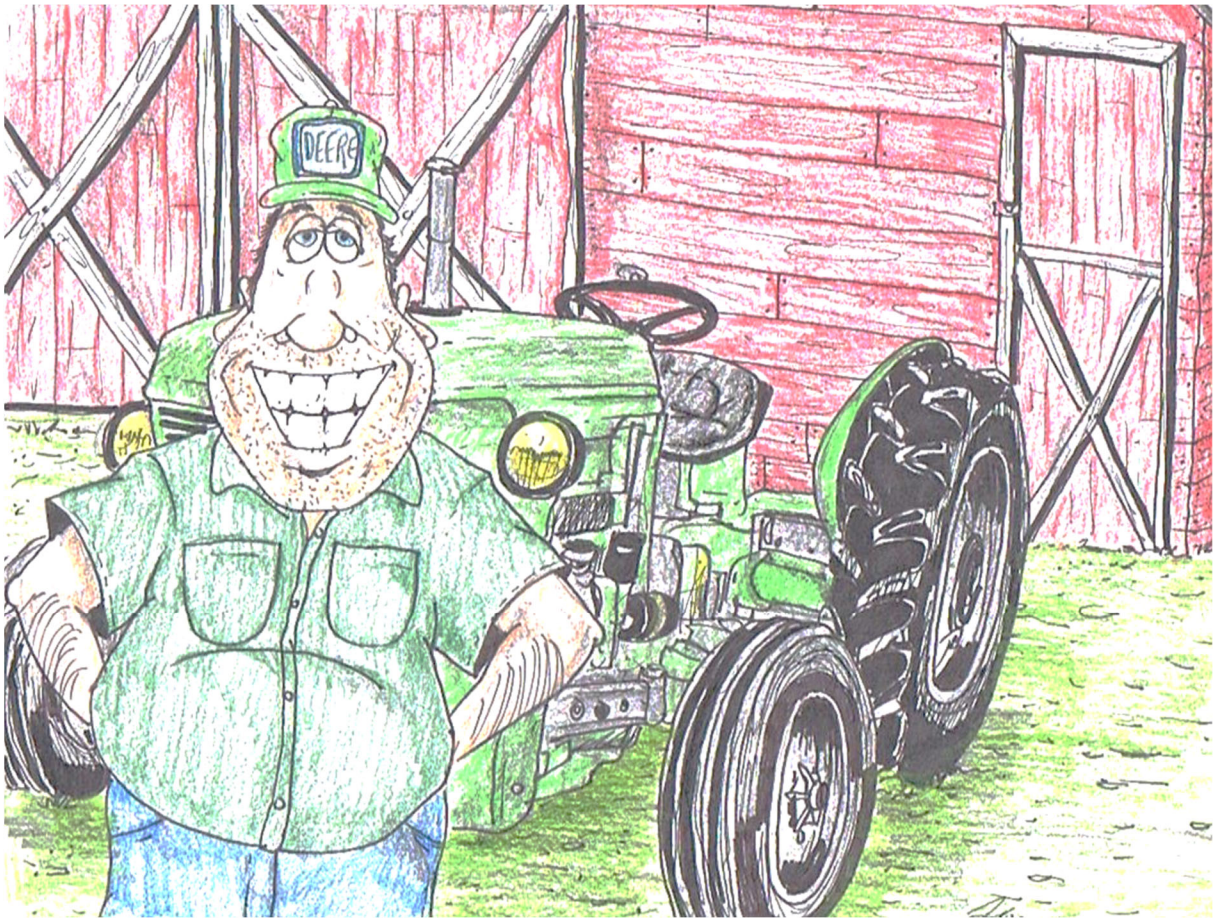
People are most commonly bitten in bed, while changing clothes, or cleaning storage areas. Not only will this spider hide in cracks and crevices of the home, they will often climb into clothing or shoes that someone has laid out to wear the following day.

A female deposits eggs in off-white silken cases about 1/3 inch in diameter in sheltered, dark areas. Spiderlings emerge in 24-36 days and abandon the egg case. Development is slow, influenced by weather conditions and food availability. They reach maturity in 10 to 12 months and can survive long periods of time without food or water. Immature spiderlings resemble adult brown recluse spiders but have lighter coloration. Adult males and females will vary from light tan to dark brown.

Most spiders found in the United States are harmless, with the exception of the black widow and the brown recluse spider. The brown recluse spider — a tiny oval brown spider with a small shape like a violin on its back — is found mostly in midwestern and southern parts of the United States. The bites usually don't hurt at first, and a child might not even be aware of the bite, but in some cases they cause swelling and changes in skin color and a blister.

The black widow spider, which is found all over North America, has a shiny black body and an orange hourglass shape on its underbelly. The venom (poison) in a black widow bite can cause painful cramps that show up within a few hours of the bite. The cramps can start in the muscles around the bite and then spread. The bite may also lead to nausea, vomiting, chills, fever, and muscle aches. If your child has any of these symptoms — or you know that he or she has been bitten — go to the emergency room right away.

VIOLIN SPIDER
(OFTEN CONFUSED WITH BROWN RECLUSE)



There are two types of spiders found around the home:
Ground dwellers and web makers. Spiders which thrive on the ground are usually much stronger than their web building cousins.

These brutes are aggressive, usually nocturnal, great hunters and rely on their strong grip and bite. They stalk food at night and will feed on just about anything which moves. Some species may have toxins to assist in their hunting. When prey is identified, they will usually stalk within pouncing distance, crouch, leap, rip, shred, bite, grab and kill – all within a few moments.

Web builders are spiders which are not built to be on the ground. They are usually fragile, weak, slow, lacking grip and not able to defend themselves when out of their webs. What they lack in physical body they more than make up for with bite. In most cases, they are equipped with toxins that can kill insects quickly and in some cases these toxins are so strong they can be fatal to humans!

Seek medical attention if you think you have a spider bite. If possible, collect up the spider or what remains of it and take with you to your doctor or emergency clinic.

Brown Recluse Spider Bite

This poor guy was bitten by a Brown Recluse spider.
Its summertime and cleanup is going on. Be careful where you put your hands. They like dark spaces and woodpiles, and cool areas in the attic.

Day 3, not too bad.

The following illustrates the progression of a brown recluse spider bite.
The affected skin actually dies on his body.

Day 5, it is getting worse. Pain is intense.
Some of the photographs towards the end are pretty nasty,
but take a look at the last one -- it is a photograph of the spider itself.

Day 6, time to worry. The smell of dead flesh and puss is horrible.

The Brown Recluse Spider is the most
dangerous spider that we have here in the USA.

Day 9, forget it, time to think about losing your arm. You are now in the hospital and on the news. This man barely lived; most people do not recover past this point. Be careful, I think that it would be strange to meet people in Heaven and find out that they got a one-way ticket because of a spider bite. A person can die from its bite. We all should know what the spider looks like. In fact, I get the creeps thinking about this dude.

Day 10, EWWW.

Employers must:

1. Provide handlers with the appropriate PPE in clean and operating condition.
2. Make sure the handlers wear the PPE correctly and use it according to the manufacturer's instructions. If a handler wears a respirator, make sure that it fits the wearer correctly.
3. Inspect all PPE before each day of use for leaks, holes, tears, or worn places, and repair or discard any damaged equipment.
4. Provide handlers with clean places away from pesticide storage and pesticide use areas to:
    - store personal clothing not in use,
    - put on PPE at the start of any exposure period,
    - take off PPE at the end of any exposure period.
5. Take any necessary steps to prevent heat illness (too much heat stress) while PPE is being worn.
6. Do not allow any handler to wear home or take home PPE contaminated with pesticides.

Jumping Spiders

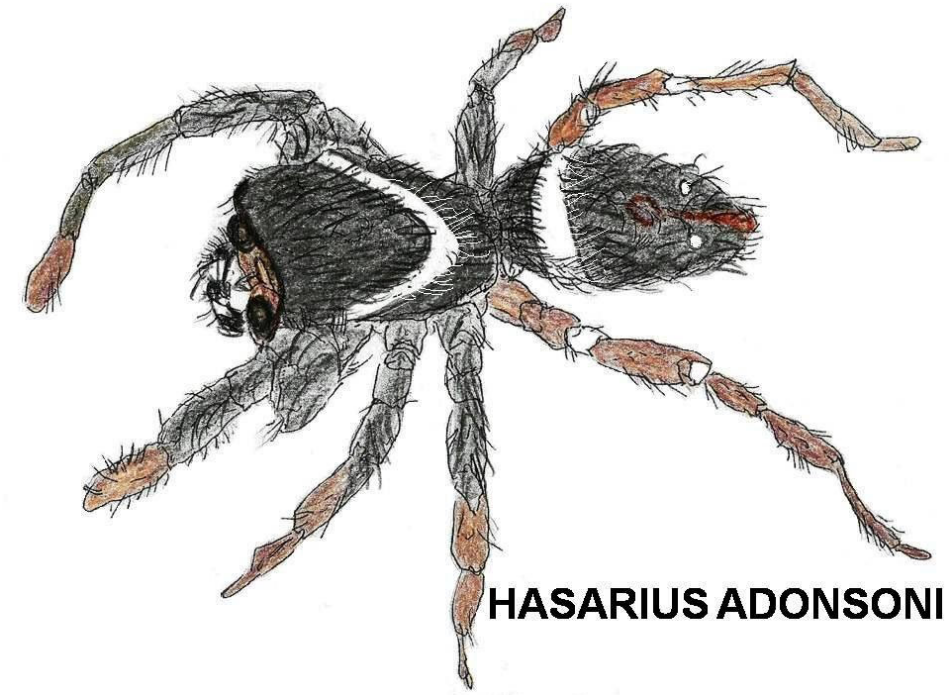
PHISIPPUS CLARUS

The jumping spiders are active hunters. Depending on the species, they can leap up to 25 times their body length when stalking prey. They belong to the family Salticidae, the largest spider family, with more than 4,000 species, in the suborder Araneomorphae. Jumping spiders are found mostly in tropical regions throughout the world, although some species live in high elevation regions in the Himalayas.

Jumping spiders are small spiders, seldom growing larger than 2 cm (0.8 in) in length. Most jumping spiders have somber brown or gray coloration, but a few male species are quite colorful, with iridescent scales and spines and tufts of bright hair. The most striking feature of jumping spiders is their eyes. They have two primary eyes on the front of their cephalothorax that provide exceptionally acute vision. For example, at 20 cm (8 in), they not only see sharp images, but also recognize members of their own species. Their six secondary eyes detect motion. Their excellent eyesight makes these spiders reliant on visual cues for courtship and hunting, and as a result, they are active mostly during the day. At night they hide in crevices or under bark, often in small silken cells that they weave for themselves.

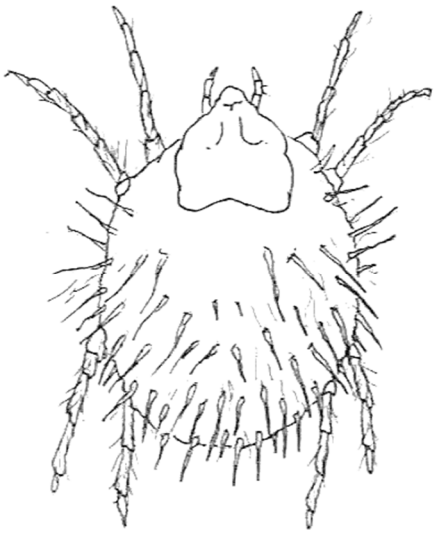
During courtship, the male jumping spider identifies himself by dancing in front of a female waving his legs in a pattern specific to that species. Hunting is also guided by visual cues. The spider's secondary eyes are able to detect a moving insect, which prompts the spider to turn toward the insect and scrutinize it with its primary eyes.

This overlapping visual field produced by the primary and secondary eyes enables the spider to accurately calculate the distance to the prey. Jumping spiders approach their prey the way a cat stalks a mouse. When the spider comes within a few centimeters of its prey, it suddenly leaps by pushing off the ground with its hind legs and then grabs the prey with its front legs. Muscle power and the hydraulic action of body fluids fuel the explosive force of the jumping spider's legs.

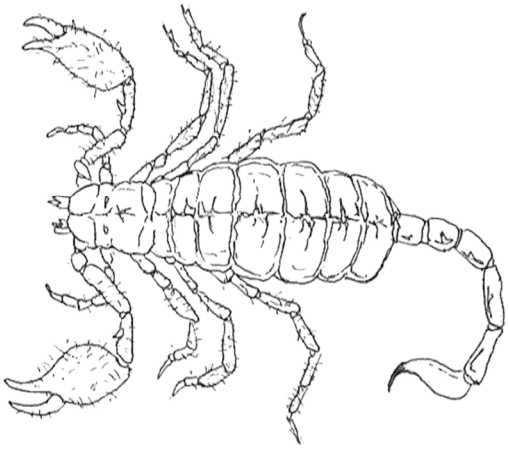


Top jumping spider, below tangle web spider.

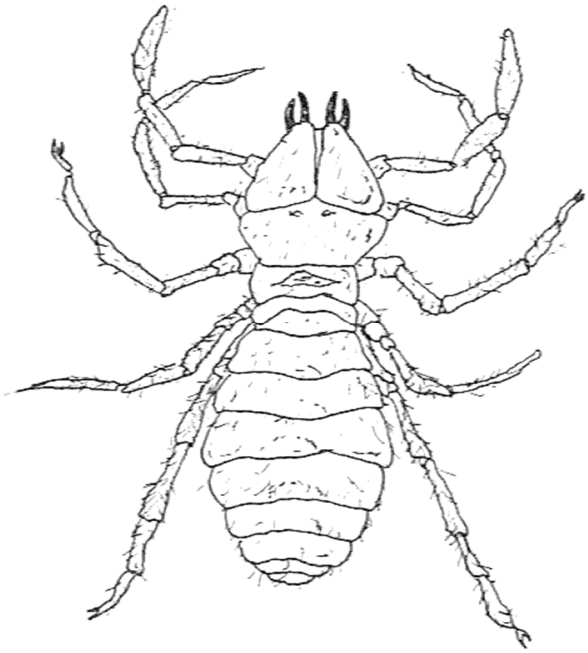
Arachnid Classification Orders



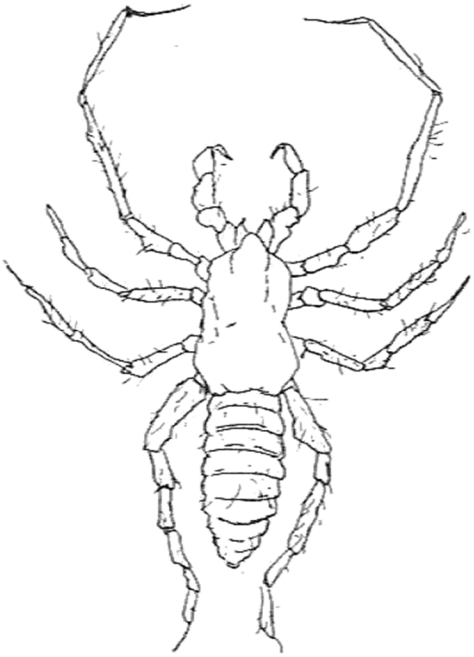
ACARI



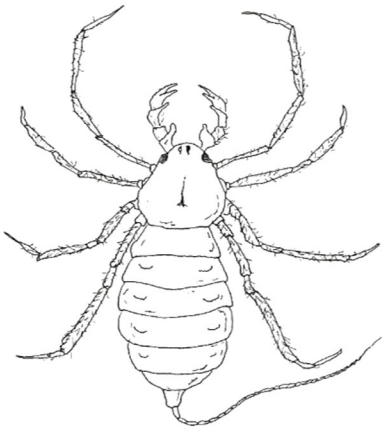
SCORPIONES



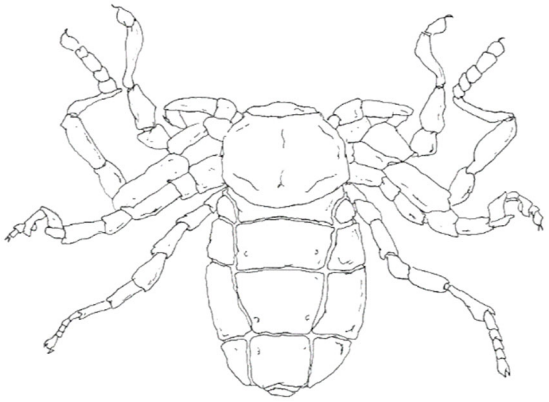
SOLIFUGAE



SCHIZOMIA



UROPYGI



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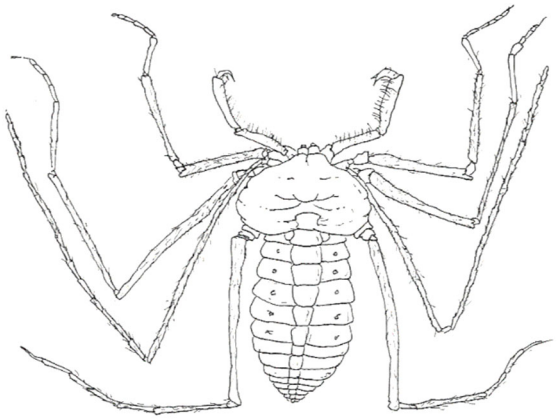
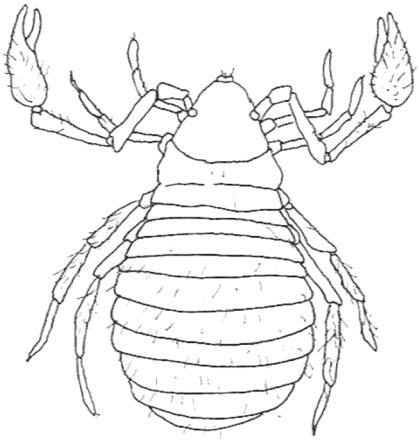


AMBLYPYGI



PSEUDOSCORPION

Common Spider Classifications, Families and Sub-Species Alphabetical Order

Amblypygi
Amblypygi is an order of invertebrate animals belonging to the class Arachnida, in the subphylum Chelicerata of the phylum Arthropoda. They form a separate order of arachnids alongside the spiders, scorpions and others. Amblypygids are also known as whip spiders and tailless whip scorpions (not to be confused with whip scorpions that belong to the Arachnid order Thelyphonida). The name "amblypygid" means "blunt rump", a reference to a lack of the telson ("tail") carried by related species. Despite an off-putting appearance, they are totally harmless to humans. By 2003, 5 families, 17 genera and around 155 species had been discovered. They are found in tropical and subtropical regions worldwide. Some species are subterranean; many are nocturnal. During the day, they may hide under logs, bark, stones, or leaves. They prefer a humid environment.

Amblypygids may range from 4 to 45 millimeters (0.16 to 1.8 in). Their bodies are broad and highly flattened, with a solid carapace and a segmented abdomen. They have a pair of median eyes at the front of the carapace, and three smaller eyes placed further back on each side. The pedipalps are large and somewhat pincer-like, being adapted for grabbing prey. As in some other arachnid orders, the first pair of legs are modified to act as sensory organs, while the animal uses the other six legs for walking. The sensory legs are very thin, have numerous sensory receptors, and can extend several times the length of body. Typically, the animal holds one of these legs out in front of it as it moves, and uses the other to probe the terrain to the side. Amblypygids have no silk glands or venomous fangs.

Amblypygids often move about sideways on their six walking legs, with one "whip" pointed in the direction of travel while the other probes on either side of them. Prey are located with these "whips", captured with pedipalps, then masticated with chelicerae. Courting rituals involve the male depositing stalked spermatophores which have one or more sperm masses at the tip on the ground and guiding the female with his pedipalps over them. She gathers the sperm and lays fertilized eggs into a sac carried under the abdomen. When the young hatch, they climb up onto the mother's back; any of which falling off before their first molt will be eaten by the mother. Amblypygids, particularly the species Phrynus marginemaculatus and Damon diadema, are thought to be one of the few species of arachnids that show signs of social behavior. Research conducted at Cornell University by entomologists suggests that mother amblypygids communicate with their young by caressing the offspring with her anteniform front legs. Further, in an experiment where two or more siblings were placed in an unfamiliar environment, such as a cage, they would seek each other out and gather back in a group.

Anelosimus Spiders
Anelosimus is a genus of tangle web spider (Theridiidae) described by Eugène Simon, in 1891, from Venezuela. It includes the South American social spider Anelosimus eximius and related species. A colony of A. eximius social spiders in the Amazon forest is a wonder of nature and a show-stopper for the naturalist or eco-tourist. The capture strands of the colony's web can reach 8 m into the canopy, and the basket-like retreat at 30 to 150 cm above the ground can be up to 3 m in diameter. A colony may house more than 1000 spiders.

Atrax
These spiders are medium-to-large in size, with body lengths ranging from 1 cm to 5 cm (0.4" to 2"). They are darkly colored, ranging from black to blue-black to plum to brown, with a glossy, hairless carapace covering the front part of the body. Like the related diplurid spiders, some hexathelids have relatively long spinnerets; this is especially true of A. robustus. Like other Mygalomorphae (also incorrectly called Orthognatha) —an infraorder of spiders that includes the tropical tarantulas —these spiders have fangs which point straight down the body and do not point towards each other (cf Araneomorphae).

They have ample venom glands that lie entirely within their chelicerae. Their fangs are large and powerful, capable of penetrating fingernails and soft shoes.

Funnel-webs make their burrows in moist, cool, sheltered habitats—under rocks, in and under rotting logs, some in rough-barked trees (occasionally meters above ground). They are commonly found in suburban rockeries and shrubberies, rarely in lawns or other open terrain. A funnel-web's burrow characteristically has irregular silk trip-lines radiating from the entrance. Unlike some related trapdoor spiders, funnel-webs do not build lids to their burrows.

Araneida
A large class of arthropods including spiders and ticks and scorpions and daddy longlegs; have four pairs of walking legs and no wings.

Araneomorphae
The Araneomorphae (also called the Labidognatha) are a suborder of spiders. They are distinguished by having fangs that oppose each other and cross in a pinching action, in contrast to the Mygalomorphae (tarantulas and their close kin), which have fangs that are nearly parallel in alignment. Almost all of the familiar spiders are included in this group. The major exception is the Tarantulas, which have become as common as pets that many people have seen them. There are a few other members of Mygalomorphae that one might see around homes or gardens, but they typically are relatively small and not easily noticed. For instance, the females of one such species lives and hunts from within a long silken tube, so unless one opens the tube or chances upon a male looking for a mate, one will never see them. The Araneomorphae, to the contrary, include the weavers of spiral webs, the cobweb spiders that live in the corners of our rooms and between windows and screens, the crab spiders that lurk on the surfaces of the flowers in our gardens, the jumping spiders that look back at us curiously from walls and tree trunks, the wolf spiders that sometimes carpet good hunting sites in a sunny spot in the lawn, the large Huntsman spiders that sometimes frighten people by getting into their cars or taking up residence behind wall clocks.

Cellar Spider or Daddy Longlegs
The cellar spider or daddy longlegs (Pholcus phalangioides), also known as the skull spider due to its cephalothorax looking like a human skull, is a spider of the family Pholcidae. Females have a body length of about 9 mm; males are slightly smaller. Its legs are about 5 or 6 times the length of its body (reaching up to 7 cm of leg span in females). Its habit of living on the ceilings of rooms, caves, garages or cellars gives rise to one of its common names. In Australian homes, they are considered beneficial because it is sometimes believed they will kill and eat the venomous Redback spider. This is the only spider species described by the Swiss entomologist Johann Kaspar Füssli who first recorded it for science in 1775.

Confusion often arises over its common name, because "daddy longlegs" is also applied to two other unrelated arthropods: the harvestman and the crane fly. Pholcus phalangioides has the habit of shaking its web violently when disturbed as a defense mechanism against predators. They can easily catch and eat other spiders (even those much larger than itself, such as Tegenaria duellica), mosquitoes and other insects, and woodlice.

When food is scarce, they will prey on their own kind. Because they originally came from the tropics, these spiders do not appear to be influenced by seasonal changes and breed at any time of the year. The female holds the 20 to 30 eggs in her pedipalps. Spiderlings are transparent with short legs and change their skin about 5 or 6 times as they mature.

Chelicerata
The subphylum (or phylum Chelicerata constitutes one of the major subdivisions of the phylum (or superphylum) Arthropoda, and includes horseshoe crabs, scorpions, spiders and mites. They originated as marine animals, possibly in the Cambrian period, but the first confirmed chelicerate fossils, eurypterids, date from the Late Ordovician period. The surviving marine species include the four species of Xiphosurans (horseshoe crabs), and possibly the 1,300 species of Pycnogonida (sea spiders), if the latter are chelicerates. On the other hand, there are over 77,000 well-identified species of air-breathing chelicerates, and there may be about 500,000 unidentified species.

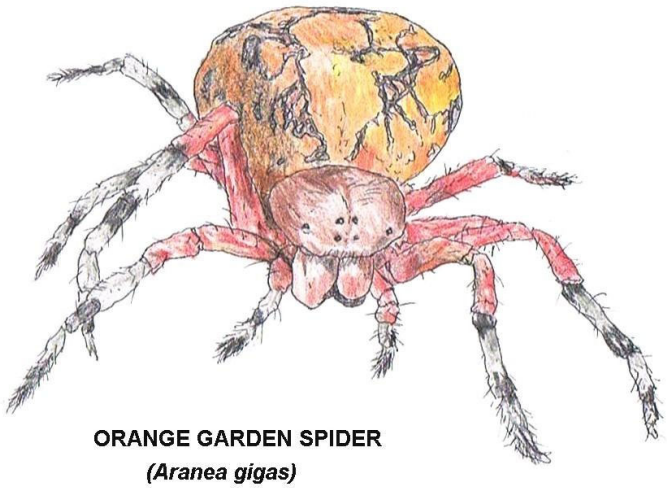
Chelicerata
Segmented Bodies with Jointed Limbs
Like all arthropods, chelicerates have segmented bodies with jointed limbs, all covered in a cuticle made of chitin and proteins. The chelicerate bauplan consists of two tagmata, the cephalothorax and the abdomen, except that mites have lost a visible division between these sections. The chelicerae, which give the group its name, are the only appendages that appear before the mouth. In most sub-groups they are modest pincers used in feeding.

However, spiders' chelicerae form fangs which in most species are used to inject venom into their prey. The group has the open circulatory system typical of the arthropods, in which a tube-like heart pumps blood through the hemocoel, which is the major body cavity.

Marine chelicerates have gills, while the air-breathing forms generally have both book lungs and tracheae. In general, the ganglia of living chelicerates' central nervous systems fuse into large masses in the cephalothorax, but there are wide variations and this fusion is very limited in the Mesothelae, which are regarded as the oldest and most primitive group of spiders. Most chelicerates rely on modified bristles for touch and for information about vibrations, air currents, and chemical changes in their environment. The most active hunting spiders also have very acute eyesight.

Chelicerates were originally predators, but the group has diversified to use all the major feeding strategies: predation, parasitism, herbivory, scavenging and eating decaying organic matter. Although harvestmen can digest solid food, the guts of most modern chelicerates are too narrow for this, and they generally liquidize their food by grinding it with their chelicerae and pedipalps and flooding it with digestive enzymes.

To conserve water, air-breathing chelicerates excrete waste as solids that are removed from their blood by Malpighian tubules, structures which also evolved independently in insects. While the marine horseshoe crabs rely on external fertilization, air-breathing chelicerates use internal but usually indirect fertilization. Predatory species generally use elaborate courtship rituals to prevent males from being eaten before they can mate. Most lay eggs that hatch as what look like miniature adults, but all scorpions and a few species of mites keep the eggs inside their bodies until the young emerge. In most chelicerate species the young have to fend for themselves, but in scorpions and some species of spider the females protect and feed their young.



ORANGE GARDEN SPIDER
(Aranea gigas)

Although the venom of a few spider and scorpion species can be very dangerous to humans, medical researchers are investigating the use of these venoms for the treatment of disorders ranging from cancer to erectile dysfunction. The medical industry also uses the blood of horseshoe crabs as a test for the presence of contaminant bacteria. Genetic engineers have experimented with modifying goats' milk and plants' leaves to produce spider silk. Mites can cause allergies in humans, transmit several diseases to humans and their livestock, and are serious agricultural pests.

Cheiracanthium
Cheiracanthium is a genus of spiders in the Miturgidae family. Certain species are commonly known as the "yellow sac spider. Cheiracanthium are usually pale in color, and have an abdomen that can range from yellow to beige. Both sexes range in size from 5 to 10 mm. Some yellow sac spiders are attracted to the smell of hydrogen oxide in gasoline. An unusual double pipe configuration in the Mazda 6 led to a recall of around 65,000 Mazda 6 vehicles in the US, Canada, Mexico and Puerto Rico from the 2009-10 model years after it was found that yellow sac spiders were building nests in the fuel line of the vehicles.

Cybaeidae (Water Spiders)
Small web-building spiders that typically live on the ground in forests (no common name). This family includes the highly unusual European spider Argyroneta aquatica that lives entirely underwater. While the water spider is the only representative of the family in northern Europe, three more species in the Cybaeus genus are found in central and southern Europe.

The only species in this genus, Argyroneta aquatica, is also known as the water spider. It is a special spider because it lives in water. The scientific name of the spider, Argyroneta, means 'with a silvery net'. The silvery net is the air bubble that surrounds the spider, which it needs to breathe. Special hairs on the skin of the spider give it the ability to keep the air attached to its body. The spider has to go to the surface regularly to refresh the air.

Argyroneta aquatica
Argyroneta aquatica constructs a web under water and fills it with air. She catches air from the surface and releases the air bubble from her body with her legs. This is repeated until there is enough air in her 'diving bell'. Diffusion and oxygen bubbles released by the water plants also add air in the bubble. Prey is caught under water, killed by a poisonous bite and consumed in the air bubble in her web. The spider is a good hunter under water and swims quickly between the water plants. Change of skin is done outside the water or in a separate diving bell.

There is hardly any foreplay before mating and male and female stay together for some time. The eggs with the spiderlings are packed in a white sac in a separate air bubble in late spring or early summer. Late in autumn her nest is sealed and the spider stays there during wintertime. The male is 9-12 mm large and the female 8 -15 mm and both are light to dark yellow-brown. The spider can be found in vegetated, fresh, not running water. The bite of the spider is very annoying to humans and should be avoided.

Cyphophthalmi
The Cyphophthalmi are a suborder of harvestmen, with about 36 genera, and more than hundred described species. The six families are currently grouped into two infraorders, the Tropicophthalmi and the Temperophthalmi; however, these are not supported by modern phylogenetic analysis. They are smaller than the more familiar "daddy long-legs" harvestmen, with adults ranging from 1 to 6mm, including legs. Moreover, their legs are comparatively short compared to their body length, typically shorter than the body. Some superficially resemble mites. Their coloration is almost always some shade of brown, with a heavily sclerotized body, and they are quite inconspicuous, residing in leaf litter or in caves. Many cyphophthalmids are eyeless, and presumably rely on olfactory cues to find food and mates. Their scent glands are located on special elevated cones called ozophores. They have low dispersal rates and consequently high endemism.

Dyspnoi
The Dyspnoi are a suborder of harvestmen, with about 32 genera, and about 320 described species. Several fossil species are known, including two extinct families. The superfamilies Ischyropsalidoidea and Troguloidea are monophyletic. However, the families Sabaconidae and Ceratolasmatidae are not; amongst other inconsistencies, Taracus (Sabaconidae) is a sister group to Hesperonemastoma (Ceratolasmatidae). The Dyspnoi are one of the most conserved biogeographically conserved higher groups of harvestmen.

None occur in the Southern Hemisphere, and most families are restricted along temperate regions. The only exceptions are some Ortholasmatinae (Nemastomatidae) inhabiting the tropics on high mountains in Mexico (Ortholasma bolivari) and northern Thailand (Dendrolasma angka). Some Troguloidea were also found in tropical regions during the Cretaceous.

Eupnoi
The Eupnoi are a suborder of harvestmen, with more than 200 genera, and about 1,700 described species. They consist of two superfamilies, the Phalangioidea with many long-legged species common to northern temperate regions, and the small group Caddoidea, which have prominent eyes and spiny pedipalps. Examples of this suborder include Hadrobunus grandis (Sclerosomatidae), Phalangium opilio and Dicranopalpus ramosus (Phalangiidae).

Gerridae (Water Striders, not Spiders)
Gerridae is a family of true bugs in the order Hemiptera, commonly known as water striders, water bugs, magic bugs, pond skaters, skaters, skimmers, water scooters, water skaters, water skeeters, water skimmers, water skippers, water spiders, or Jesus bugs. One main characteristic that sets gerrids and other true bugs apart from other insects is that the front wing is only half functional. Rather than using it for flight, it acts as a membranous covering and the thickened part is by where claws develop. Consistent with the classification of Gerridae as true bugs, gerrids have a mouthpart evolved for piercing and sucking, Gerrids distinguish themselves by having the unique ability to walk on water. Gerridae, or water striders, are anatomically built to transfer their weight to be able to run on top of the water's surface. As a result, one could likely find water striders present in any pond, river, or lake. Scientists have identified over 1,700 species of Gerrids, 10% of them being marine.

Freshwater Bugs
While 90% of Gerridae are freshwater bugs, it is the oceanic Halobates that helped the entire Gerridae family to gain attention. The genus Halobates was first heavily studied between 1822 and 1883 when Buchanan-White collected several different species during the Challenger Expedition. Around this time, Eschscholtz discovered three species of Family Gerridae, Order Hemiptera, raising attention to the species even though little of their biology was known. Since then, the Gerridae have been continuously studied due to their ability to walk on water and unique social characteristics. Small gerrids have frequently been confused with the other semiaquatic bugs, Veliidae.

The most consistent characteristic used to separate these two families are internal genitalia differences. Since internal genitalia require specific training and tools to identify, it is almost impossible to tell a member of the Gerridae apart from a member of the Veliidae by external visual cues. One must study their habitat and behaviors to properly differentiate the two without looking at their specific anatomy.

Gnaphosidae (Ground Spiders)
Ground spiders (family Gnaphosidae) include nearly 2,000 described species in over 100 genera, distributed worldwide. This makes the family the seventh largest known. New species are still being discovered. They are closely related to Clubionidae. Generally, ground spiders are characterized by having barrel-shaped anterior spinnerets that are one spinneret diameter apart. The main exception to this rule is found in the ant-mimicking genus Micaria.

Another characteristic is an indentation in the endites (paired mouthparts anterior and lateral to the labium, or lip). All ground spiders lack a prey-capture web and generally run prey down on the surface. They hunt at night and spend the day in a silken retreat. The thick-walled egg sacs are guarded by the mother until the spiderlings hatch. At present, no ground spiders are known to be seriously venomous to humans. Very few people even notice them. Common genera include Gnaphosa, Drassodes, Micaria, Cesonia, Zelotes and many others.

Habronattus
Habronattus includes approximately 100 species of jumping spiders, most from North America, the remainder in the neotropics. Most are ground-dwelling on open ground with sparse vegetation, especially on rocks, dry leaf litter and sand. The arid southwest has many species, but Florida also has many species, and others are known above the Arctic Circle and east to maritime Canada. The genus was recently revised by Griswold (1987), and its phylogeny studied by Maddison and Hedin (2003). The genus is notable for the remarkable forms and colors of the courtship ornaments of males, which are used in complex courtship behaviors.

Harvestmen (Daddy Long Legs)
Opiliones (formerly Phalangida) are an order of arachnids commonly known as harvestmen. Over 6,400 species of harvestmen have been discovered worldwide, although the real number of extant species may exceed 10,000.

The order Opiliones can be divided into four suborders: Cyphophthalmi, Eupnoi, Dyspnoi and Laniatores. Well-preserved fossils have been found in the Rhynie cherts of Scotland, which look surprisingly modern, indicating that the basic structure of the harvestmen has not changed much since then. Phylogenetic position is disputed: their closest relatives may be the mites (Acari) or the Novogenuata (the Scorpiones, Pseudoscorpiones and Solifugae).

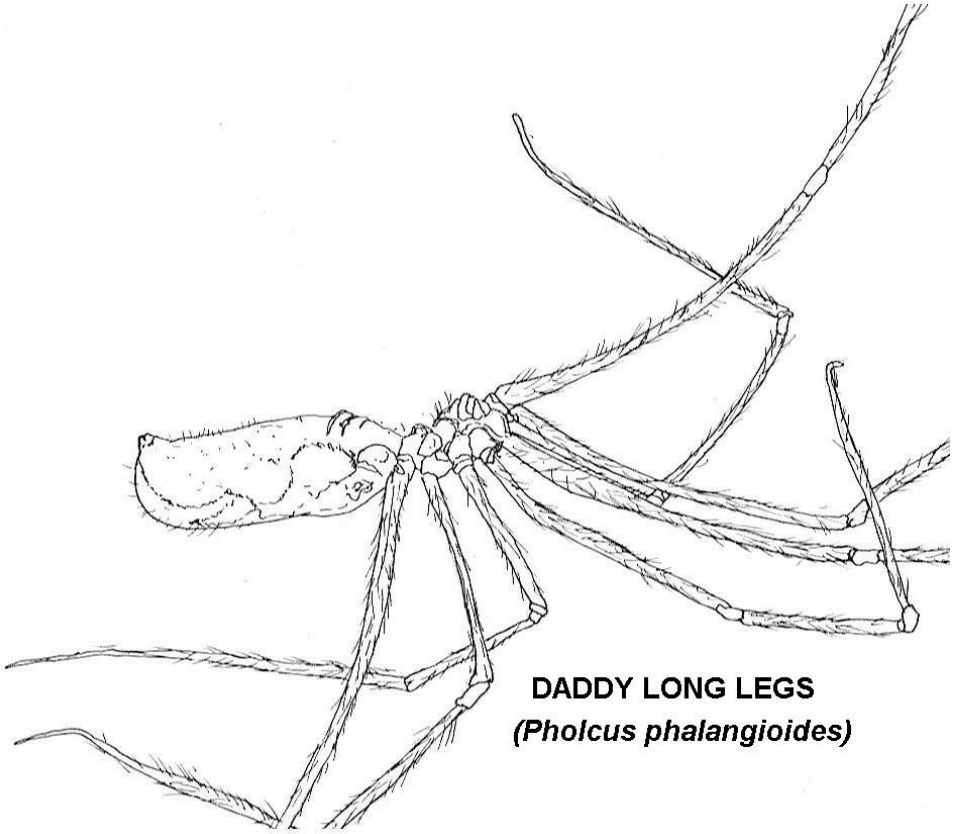
Not Spiders
Although they belong to the class of arachnids, harvestmen are not spiders, which are of the order Araneae rather than the order Opiliones. In some places, harvestmen are known by the name "daddy longlegs" or "granddaddy longlegs", but this name is also used for two other unrelated arthropods: the crane fly (Tipulidae) and the cellar spider (Pholcidae). Opiliones like spiders and scorpions are arachnids, so there are always questions about whether or not they follow spider practices and bite humans.

There is a common myth that Daddy Longlegs are the most venomous of all spiders but have a mouth too small to bite. This is untrue. They are also called harvestmen, and to make matters more confusing, crane flies and cellar spiders also go by the name daddy long legs. Daddy long Legs have eight legs, but only one body part. A close-up picture would also show their two eyes rather than the more common six and eight eyed spiders. They have the nickname harvester because they are omnivores that harvest most insects and plants that cross their path.

Daddy-longlegs do not have fangs or venom for killing prey, and therefore there is no need for humans to be concerned about being bitten by them. It also seems reasonable to assume that since they are omnivorous, eating insects, plants and fruit, they would have to bite or chew the food to eat it. Sometimes the words people choose to explain things are a bit confusing.

Certainly daddy-longlegs eat. Many species are omnivorous, eating primarily small insects and all kinds of plant material and fungi; some are scavengers, feeding upon dead organisms, bird dung and other fecal material. This broad range is quite unusual in arachnids, which are usually pure predators.

Most hunting harvestmen ambush their prey, although active hunting is also found. Because their eyes cannot form images, they use their second pair of legs as antennae to explore their environment. Unlike most other arachnids, harvestmen do not have a sucking stomach or a filtering mechanism. Rather, they ingest small particles of their food, thus making them vulnerable to internal parasites such as gregarines.

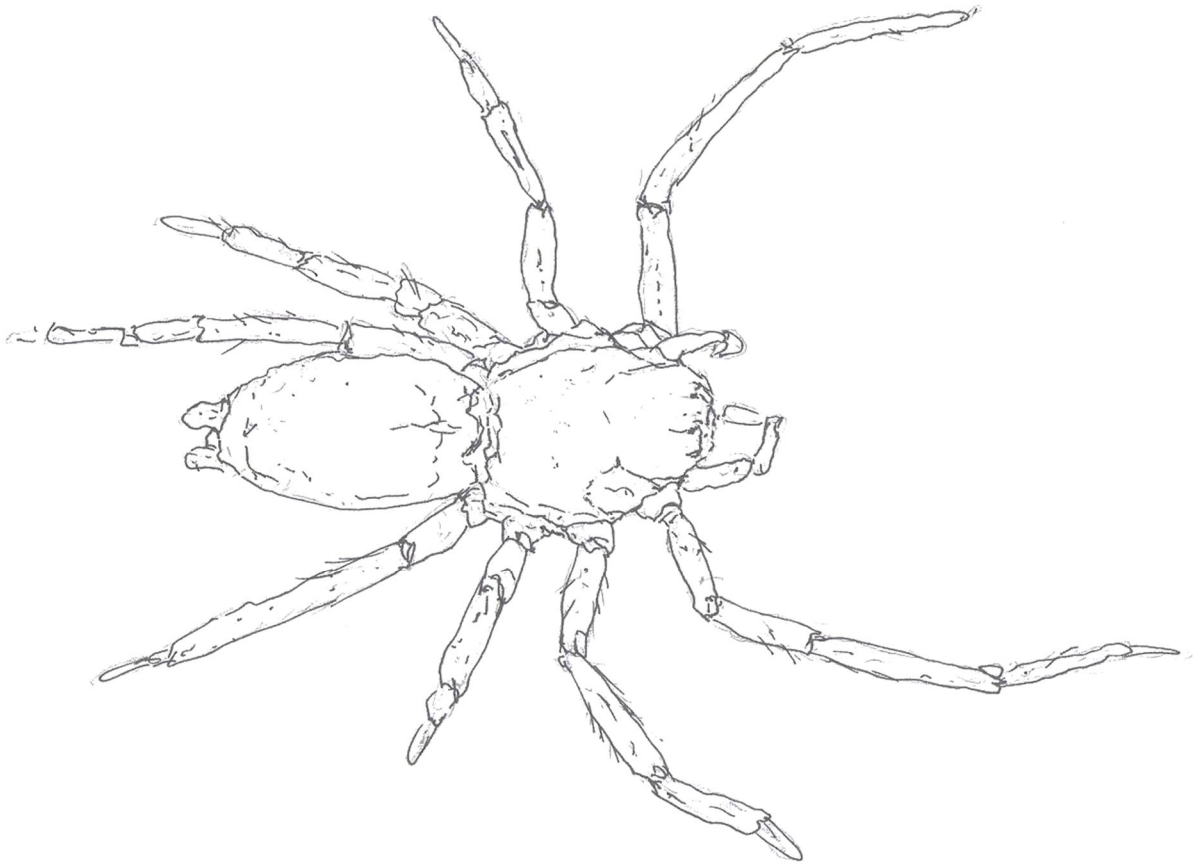


Hubbardiidae
Hubbardiidae is a family of arachnids, superficially resembling spiders. It is the larger of the two extant families of the order, Schizomida, and is divided into two subfamilies. The family is based on the description published by Orator F. Cook in 1899, and was previously named as Schizomidae.

The American Arachnological Society assigns the common name hubbardiid short tailed whipscorpion to members of this family. The classification of the family includes 28 genera. Seven of these genera are found in Australia, five of them occur nowhere else: Draculoides, Julattenius , Notozomus , Attenuizomus and Brignolizomus. Five genera are found in Mexico, three of which are endemic (Pacal, Mayazomus and Sotanostenochrus).

Laniatore
Laniatores is the largest suborder of the arachnid order Opiliones with over 4,000 described species worldwide. The majority of the species is highly dependent on humid environments and usually correlated with tropical and temperate forest habitats.

Laniatores are typically (relatively) short-legged, hard-plated, spiny Opiliones, common under logs and stones, in leaf litter and in caves. They often have spiny pedipalps and paired or branched claws on the third and fourth pairs of legs. The largest family is Gonyleptidae Sundevall, 1833, endemic of the Neotropics, with over 800 valid species and showing many cases of maternal and paternal care.



SAC SPIDER SPECIES EXAMPLE

Liocranoid (Sac Spiders)
Liocranid sac spiders consist of about 160 species of wandering spiders in 30 or so genera. The best known are those in the Holarctic genus Agroeca. Various genera of rather obscure spiders are included in the family, which still lacks a diagnosis.

Two species in the North American genus Neoanagraphis are found in often hyper-arid conditions in the Mojave, Sonoran and Chihuahuan Deserts. The females apparently live in animal burrows and the males wander and are often caught in pitfall traps.

Loxosceles (Recluse Spiders)
The recluse spiders or brown spiders (genus Loxosceles), also known as fiddle-back, violin spiders or reapers, are a venomous genus of spiders known for their necrotic bite, which sometimes produce a characteristic set of symptoms known as Loxoscelism. Recluse spiders are now identified as members of the family Sicariidae, having formerly been placed in their own family, "Loxoscelidae". Loxosceles is distributed nearly worldwide in warmer areas, and are often known as violin spiders, fiddlebacks or reapers. All have six eyes arranged in three groups of two (dyads) and some are brownish with a darker brown characteristic violin marking on the cephalothorax. However, the "violin marking" cannot be used as a reliable way to identify the spider as literally thousands of species of spider have the same markings.

BROWN RECLUSE

Spiders come with many markings varying greatly within the same species. Most Loxosceles can live for one and a half to two years. Members of both genera can live for very long times without food or water. They are about 7–12 mm long. Because wolf spiders are sometimes seen indoors and because they are usually brown in color, they are often mistaken for brown recluse spiders. If you see a fast-moving, dark-colored spider running on the floor, it is more likely to be a wolf spider than a brown recluse. Brown recluses are very secretive and are almost never seen out in the open. With a little practice, it is easy to tell the difference between wolf spiders and brown recluses.

The recluse spider family includes about 13 species in the United States, the brown recluse spider (Loxosceles reclusa) being the best known of these. It is found in a large area of the Midwest, west to Colorado and the New Mexico state line and east to Northern Georgia. Sporadic records from other locations only represent incidental introductions, not established populations.

Other notable members of this genus include the Chilean recluse (L. laeta) and the Mediterranean recluse (Loxosceles rufescens). Recently, concerns have been raised regarding recluses spreading faster due to warmer air carrying them further as a result of global warming. On the contrary, newly hatched recluses do not travel via ballooning and thus the populations are confined to very tight spaces with dense populations.

Loxosceles spiders, like their cousins in Sicarius, have potent tissue-destroying venoms containing the dermonecrotic agent, sphingomyelinase D, which is otherwise found only in a few pathogenic bacteria. Recent research has indicated the venom is composed largely of sulfated nucleosides, though these compounds are relatively new discoveries, so little is known about them. This venom is highly necrotic in effect, capable of causing lesions (open sores) as large as a bottle cap. The wounds take a long time to heal and may require skin grafts. If these open wounds become infected there are often serious consequences.

Rarely, the venom is carried by the blood stream to internal organs causing systemic effects. The constituency of recluse venom is identical in both male and female spiders, although females have a particularly potent venom, containing up to twice the concentration of toxins. For unknown reasons, the toxicity of the venom to mammalian species varies—recluse bites will cause necrosis in humans, rabbits, and guinea pigs, but not in mice or rats.

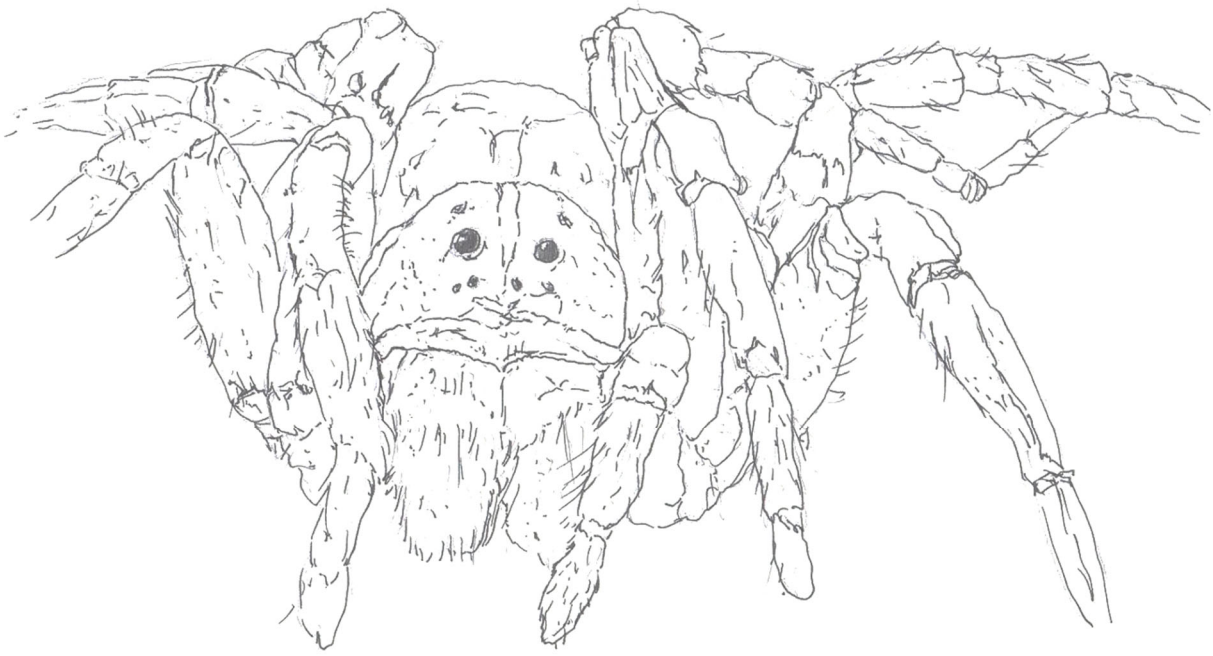
The Chilean recluse (Loxosceles laeta) supposedly has a more potent venom, which results in systemic involvement more often. This spider was accidentally introduced to the Los Angeles area (Alhambra, Sierra Madre, and Monterey Park). This spider, however, seems to be confined to a very limited area, even though it has lived there for over 30 years. Other members of the genus that have been tested have venoms similar to the brown recluse and all members of this genus are best avoided. However, the brown recluse and its relatives are not very aggressive and huge populations have been found in houses where the human inhabitants remained unbitten after years of cohabitation.

A possible problem with diagnosing a recluse spider bite is that the bite of these spiders is probably both underreported in some areas and over reported generally. Unfortunately, several diseases can mimic the lesions of a recluse spider bite, including Lyme disease, various fungal and bacterial infections and the first sore of syphilis. Therefore, it is extremely important to associate the spider directly with the bite, if at all possible, and consider alternative diagnoses if no spider was seen.

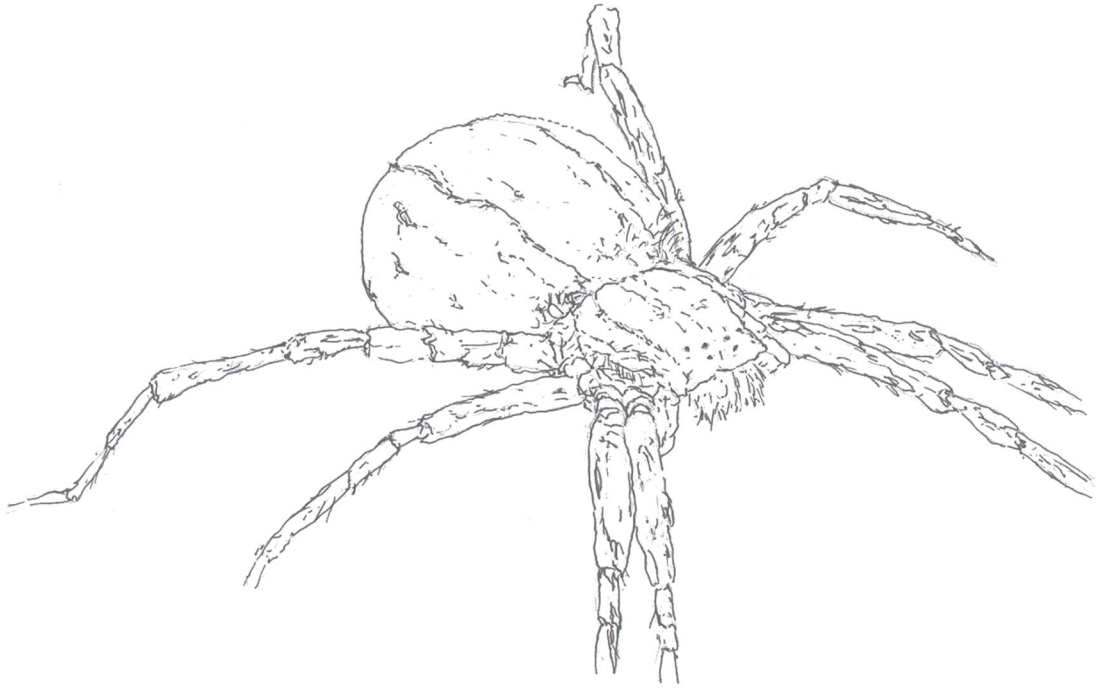
Recluse spiders are usually found in the center of space webs made of fungus-like silk, which often contains the remains of their recent meals. The most abundant food items for the Arizona recluse (Loxosceles arizonica) are night-active ants such as carpenter ants. The brown recluse feeds on whatever small prey is available. This is also true of all sicariids. Loxosceles reclusa have been shown in laboratory experiments to prefer scavenging than actively hunting.

Bites most often occur when the spider is engaging in defense while trapped against the skin, such as when the person is putting on clothes the recluse is inside of, or when the person while sleeping rolls over against the recluse. However, bug spray and other chemicals intended to repel or kill arthropods that do not kill the recluse will cause its nervous system to break down partially, inducing undesirable aggressive behavior.

The bite of a recluse spider can generally be categorized into one of the following groups:
Unremarkable - self-healing minute damage.
Mild reaction - self-healing damage that displays itchiness, redness, and mild lesion. Most bites fall into the unremarkable or mild reaction categories.
Dermonectrotic - (uncommon) necrotic skin lesion (the "classic" recluse bite). Approximately 66% of necrotic lesions caused by this type of bite heal with no complications. In extreme cases, the lesion may expand to as many as 40 cm in width, last for several months, and cause a permanent scar.
Systemic or viscerocutaneous - (extremely rare) a fatal blood system condition. This type of bite is directly related to obesity, and it is life-threatening, particularly to children.



LYCOSA APERSA



NURSERY WEB SPIDER

Lycosidae (Wolf Spiders)

Wolf spiders are members of the family Lycosidae, from an Ancient Greek word “Lycos” meaning "wolf". They are robust and agile hunters with good eyesight. They live mostly solitary lives and hunt alone. Some are opportunistic hunters pouncing upon prey as they find it or even chasing it over short distances. Some will wait for passing prey in or near the mouth of a burrow. Wolf spiders resemble Nursery web spiders (family Pisauridae), but they carry their egg sacs by attaching them to their spinnerets (Pisauridae carry their egg sacs with their chelicerae and pedipalps).

WOLF SPIDER

Two of the Wolf spider's eight eyes are large and prominent, which distinguishes them from the Nursery web spiders whose eyes are all of approximately equal size. There are many genera of wolf spider, ranging in body size from less than 1 to 30 millimeters (0.04 to 1.18 in). They have eight eyes arranged in three rows.

The bottom row consists of four small eyes, the middle row has two very large eyes (which distinguishes them from the Pisauridae), and the top row has two medium-sized eyes. They depend on their excellent eyesight to hunt. They also possess an acute sense of touch. Their eyes reflect light well, allowing someone with a flashlight to easily hunt for them at night. Flashing a beam of light over the spider will produce eyeshine. The light from the flashlight has been reflected from the spider's eyes directly back toward its source, producing a "glow" that is easily noticed. This is also especially helpful because the wolf spiders are nocturnal and will be out hunting for food, making it easier to find them.

Wolf spiders are unique in the way that they carry their eggs. The egg sac, a round silken globe, is attached to the spinnerets at the end of the abdomen, allowing the spider to carry her unborn young with her. The abdomen must be held in a raised position to keep the egg case from dragging on the ground, however despite this handicap they are still capable of hunting.

WOLF SPIDER WITH YOUNG ON HER BACK

Another aspect unique to wolf spiders is their method of infant care. Immediately after the spiderlings emerge from their protective silken case, they clamber up their mother's legs and crowd onto her abdomen. Because they depend on camouflage for protection, they do not have the flashy appearance of some other kinds of spiders. In general, their coloration is appropriate to their favorite habitat.

Hogna is the genus with the largest of the wolf spiders. Among the Hogna species in the U.S., the nearly solid dark brown H. carolinensis (Carolina wolf spider) is the largest, with a body that can be more than one-inch long. It is sometimes confused with H. helluo, which is somewhat smaller and entirely different in coloration. Some members of the Lycosidae, such as H. carolinensis, make deep tubular burrows in which they lurk much of the time. Others, such as H. helluo, seek shelter under rocks and other shelters as nature may provide. They may wander from place to place, and are therefore more likely to be the ones attracted into human habitation when the weather starts to turn colder in autumn.

There are many smaller wolf spiders. They live on pastures and fields and are an important natural control on harmful insects. In most cases, wolf spiders benefit humans by feeding on all sorts of insects, including crop pests. Wolf spiders are rarely pests, but they sometimes wander into houses, where their large size often frightens homeowners. Wolf spiders can bite, but their bites are extremely rare and no more dangerous or painful than bee stings. In fact, bees and wasps are more dangerous than wolf spiders because a wolf spider will never "attack" a person, unlike bees or wasps that will attack to defend a hive. Wolf spiders will only bite if they are handled.

Wolf spiders that are found indoors have wandered in by mistake and should be collected and released outdoors (if you ever need to collect a wolf spider, "herd" the spider into a container with a stick or a pencil).

Because wolf spiders are sometimes seen indoors and because they are usually brown in color, they are often mistaken for brown recluse spiders. If you see a fast-moving, dark-colored spider running on the floor, it is more likely to be a wolf spider than a brown recluse. Brown recluses are very secretive and are almost never seen out in the open. With a little practice, it is easy to tell the difference between wolf spiders and brown recluses

Mimetidae

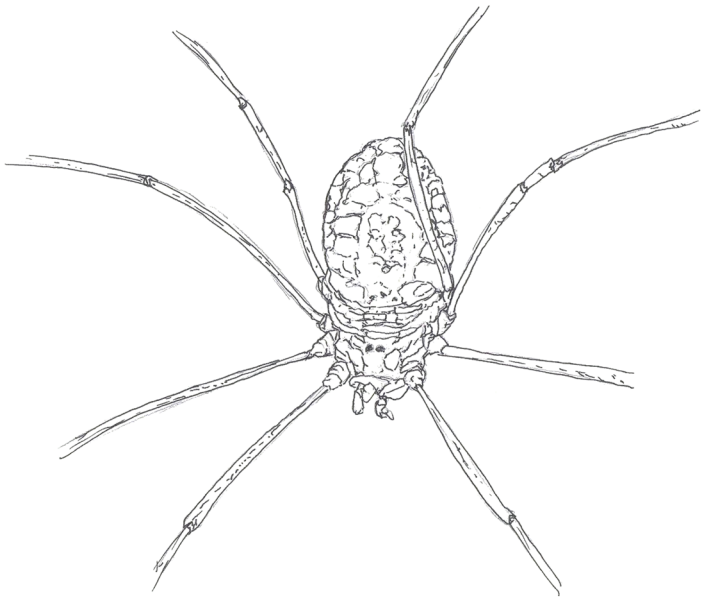
The family Mimetidae, commonly called pirate spiders, are spiders which typically feed on other spiders. The family Mimetidae contains roughly 200 species divided among 12 genera, of which Mimetus and Ero are the most common. Mimetids are usually yellow and brown and are usually 3 to 7 mm long. Mimetids can be recognized by the rows of spine-like hairs on their long front legs; the rows consist of a long spine, followed by a series of progressively shorter ones.

PIRATE SPIDER EXAMPLE

Mimetidae usually hunt by picking at the strands on their prey's web to simulate the movements of either a trapped insect or a potential mate. When their prey comes to investigate, they are instead captured and eaten. Some mimetids have been observed to feed on insects as well.

The spider-feeding habit presents problems in mating, and little is known about how the males court females to avoid being eaten. However, some male mimetids in the genus Gelanor, found in South America, have enormously long appendages which they use to inseminate females. The Mimetidae are sometimes taxonomically grouped in the superfamilies Araneoidea or Palpimanoidea.

Mygalomorphae
The Mygalomorphae, (also called the Orthognatha), are an infraorder of spiders. The latter name comes from the orientation of the fangs which point straight down and do not cross each other (as opposed to araneomorph). This suborder includes the heavy bodied, stout legged spiders popularly known as tarantulas as well as the dangerous Australasian funnel-web spiders. Like the "primitive" Mesothelae, they have two pairs of book lungs, and downward pointing chelicerae. Because of this, the two groups were once believed to be closely related.



DADDY LONG LEGS (HARVESTMAN)

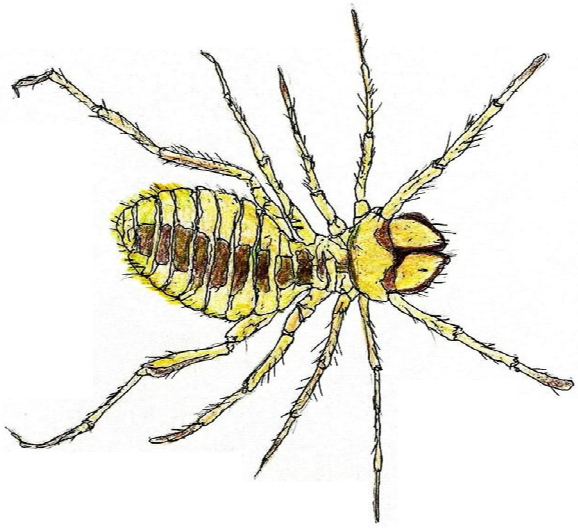
Later it was realized that the common ancestors of all spiders had these features (Symplesiomorphy), and that the mygalomorphs just retained them, while the closely related araneomorphs evolved new features (including a cribellum) (Coddington & Levy, 1991).

Almost all species of Mygalomorphae have eight eyes, however there are some with fewer (Masteria lewisi has only six eyes). They have ample venom glands that lie entirely within their chelicerae, but only spiders of the Australian genus Atrax can be really harmful to humans. Their chelicerae and fangs are large and powerful.

Occasionally members of this suborder will even kill small fish, small mammals, and the like. While the world's biggest spiders are mygalomorphs - Theraphosa blondi (Latreille, 1804) has a body length of 10 cm, and a leg span of 28 cm - some species are less than one millimeter long.

Mygalomorphs are capable of spinning at least slightly adhesive silk, and some build elaborate capture webs that approach a meter in diameter (Coddington & Levy, 1991). Unlike Araneomorphae, which die after about a year, Mygalomorphae can live for up to 25 years, and some don't reach maturity until they are about six years old. Some flies in the family Acroceridae which are endoparasites of mygalomorphs may remain dormant in the book lungs for as long as 20 years before beginning their development and consuming the spider.

Novogenuata
Dromopoda is a subclass of the arachnids, including the Opiliones (harvestmen), Scorpions, Pseudoscorpions and Solifugae ("camel spiders"). The latter three are sometimes grouped as Novogenuata. However, morphological analysis showed the Dromopoda to be monophylic only when fossils were not taken into account.



SUN SPIDER

Oxyopidae (Lynx spiders)
Stalk and capture resting or walking insects. Active hunters with good vision. Most have spiny legs and a brightly colored body that tapers sharply toward the rear. They have four pairs of eyes grouped in a hexagon. About 2 dozen known species in North America.

GREEN LYNX SPIDER

Pantopoda or Pycnogonids (Sea Spiders)
Sea spiders, also called Pantopoda or pycnogonids, are marine arthropods of class Pycnogonida. Sea spiders have long been considered to belong to the Chelicerata, together with horseshoe crabs, true spiders, mites, ticks and scorpions. They are cosmopolitan, found especially in the Mediterranean and Caribbean Seas, as well as the Arctic and Antarctic Oceans. There are over 1300 known species, ranging in size from 1 to 10 millimeters (0.039 to 0.39 in) to over 90 cm (35 in) in some deep water species. Most are toward the smaller end of this range in relatively shallow depths; however, they can grow to be quite large in Antarctic waters.

SEA SPIDER

Although "sea spiders" are not true spiders, or even arachnids, and should not be confused with Water Spiders, their traditional classification as chelicerates would place them closer to true spiders than to other well-known arthropod groups, such as insects or crustaceans. However, this is in dispute, as genetic evidence suggests they may even be an ancient sister group to all other living arthropods. The class Pycnogonida comprises over approximately 1,300 species, which are normally split into eighty-six genera. The correct taxonomy within the group is uncertain, and it appears that no agreed list of orders exists. Accordingly, families are listed in the taxobox, all considered part of the single order Pantopoda.

Another idea is that they belong to their own lineage, distinct from chelicerates, crustaceans, myriapods, or insects. The reason for this is that it seems the appendages called chelifores are unique among extant arthropods, and are not homologous to the chelicerae in real chelicerates as previously supposed. Instead of developing from the deuterocerebrum, they can be traced to the protocerebrum, the anterior part of the arthropod brain and found in the first head segment that in all other arthropods give rise to the eyes only. This is not found anywhere else among arthropods except in some fossil forms like Anomalocaris, indicating that the Pycnogonida may be a sister group to all other living arthropods, the latter having evolved from some ancestor that had lost the protocerebral appendages.

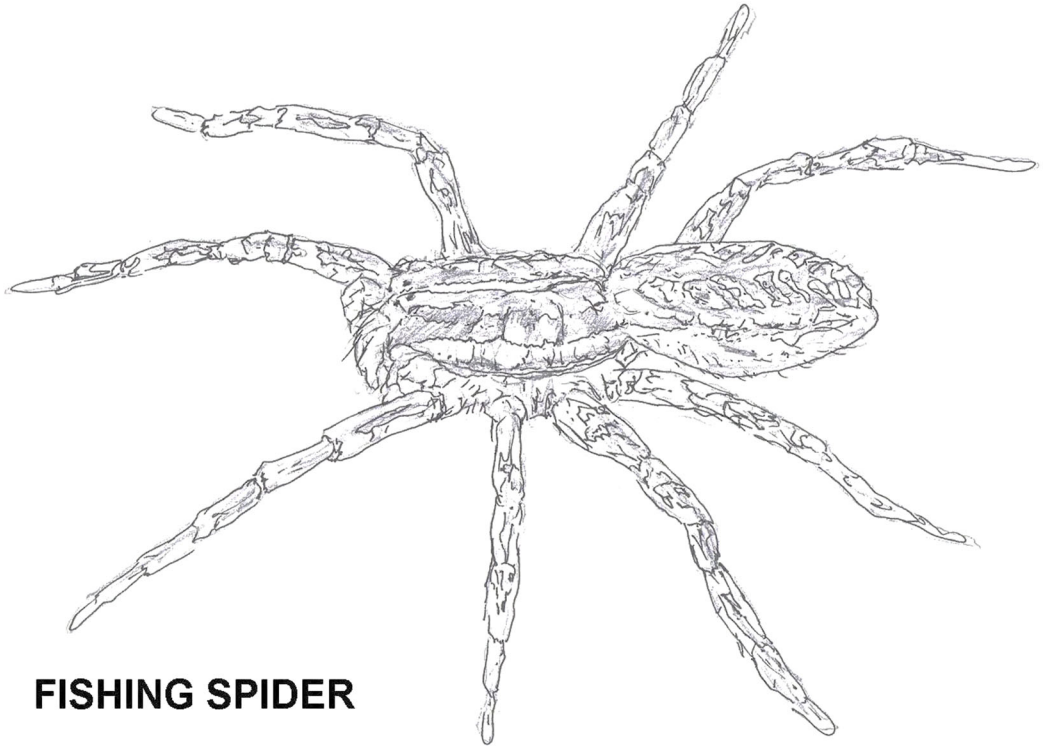
If this is confirmed, it would mean the sea spiders are the last surviving (and highly modified) members of an ancient stem group of arthropods that lived in Cambrian oceans. Recent work places the Pycnogonida outside the Arachnomorpha as basal Euarthropoda, or inside Chelicerata (based on the chelifore-chelicera putative homology).

Phalangiidae
The Phalangiidae are a family of harvestmen with about 380 known species. The best known is Phalangium opilio. Dicranopalpus ramosus is an invasive species in Europe. It is not to be confused with the harvestman family Phalangodidae, which belongs to the suborder Laniatores.

HARVESTMAN

Pisauridae (Nursery-web and fishing spiders) – Human Biters
Nursery-web and fishing spiders are large, hairy spiders in the family Pisauridae. These spiders are typically patterned with black, brown, white, and gray markings. Although difficult to distinguish from wolf spiders, nursery-web and fishing spiders are usually slimmer in build than wolf spiders. Like all spiders, nursery-web and fishing spiders have 8 legs, 2 body parts, and fangs (called "chelicerae"). Nursery-web and fishing spiders have 8 eyes. Simple metamorphosis: like all spiders, young nursery-web and fishing spiders hatch from eggs and look like tiny adults when they are born. They shed their skin as they grow. After laying her eggs, a female nursery-web or fishing spider will wrap them into a silk egg sac. She will then carry the egg sac in her chelicerae until the eggs hatch.

When hatching time arrives, the female will build a "nursery" in which the eggs can hatch. The nursery consists of a few leaves woven together with silk. This forms a protective pocket into which the egg sac is placed. Many spiders in the Pisauridae family are active hunters that search the ground for insects, worms, spiders, and other small creatures.



FISHING SPIDER

Others are ambush predators that wait quietly for prey to come to them. Fishing and nursery-web spiders are common in forests and meadows, especially near streams and creeks, where they patrol rocks and pebbles at the water's edge. Fishing spiders, in particular, are very common around ponds and streams, and will even hunt for prey on the water's surface, usually by holding onto vegetation at the water's edge. Some fishing spiders will partially submerge themselves underwater for brief periods of time to catch aquatic prey.

Although nursery-web and fishing spiders resemble tarantulas, they are not closely related. Nursery-web and fishing spiders are closely related to wolf spiders. Fishing spiders in other parts of the world can grow very large!

Ricinulei
The Order Ricinulei is a group of arachnids known as hooded tickspiders. In older works they are sometimes referred to as Podogona. 60 extant species of ricinuleids have been described worldwide, all in the single family Ricinoididae.

TICKSPIDER

They occur today in west-central Africa (Ricinoides) and the Neotropical region (Cryptocellus and Pseudocellus). In addition to the three living genera, there are two families and four genera containing fossil species. Ricinulei are typically about 5 to 10 millimeters (0.2 to 0.4 in) long. The cuticle (or exoskeleton) of both the legs and body is remarkably thick. Their most notable feature is a "hood" (or cucullus) which can be raised and lowered over the head. When lowered, it covers the mouth and the chelicerae. Living ricinuleids have no eyes, although two pairs of lateral eyes can be seen in fossils and even living species retain light-sensitive areas of cuticle in this position.

The heavy-bodied abdomen (or opisthosoma) exhibits a narrow pedicel, or waist, where it attaches to the prosoma. Curiously, there is a complex coupling mechanism between the prosoma and opisthosoma. The front margin of the opisthosoma tucks into a corresponding fold at the back of the carapace. The advantages of this unusual system are not well understood, and since the genital opening is located on the pedicel (another rather unique feature) the animals have to 'unlock' themselves in order to mate. The abdomen is divided dorsally into a series of large plates or tergites, each of which is subdivided into a median and lateral plate.

Salticidae (Jumping Spiders)
The jumping spider family (Salticidae) contains more than 500 described genera and about 5,000 described species, making it the largest family of spiders with about 13% of all species. Jumping spiders have good vision and use it for hunting and navigating. They are capable of jumping from place to place, secured by a silk tether. Both their book lungs and the tracheal system are well-developed, as they depend on both systems (bimodal breathing). Jumping spiders live in a variety of habitats. Tropical forests harbor the most species, but they are also found in temperate forests, scrub lands, deserts, intertidal zones, and even mountains. Euophrys omnisuperstes is a species reported to have been collected at the highest elevation, on the slopes of Mount Everest. Jumping spiders are generally recognized by their eye pattern. All jumping spiders have four pairs of eyes with very large anterior median eyes.

JUMPING SPIDER

Jumping spiders are generally diurnal, active hunters. Their well-developed internal hydraulic system extends their limbs by altering the pressure of body fluid (hemolymph) within them. This enables the spiders to jump without having large muscular legs like a grasshopper. Most jumping spiders can jump several times the length of their body. When a jumping spider is moving from place to place, and especially just before it jumps, it tethers a filament of silk (or dragline) to whatever it is standing on. Should it fall for one reason or another, it climbs back up the silk tether.

Schizomida

Schizomida (common name short tailed whipscorpion) is an order of arachnids, superficially resembling spiders and generally less than 5 millimeters (0.20 in) in length. The order is not yet widely studied. As of 2005, more than 230 species of schizomids have been described worldwide, most belonging to the Hubbardiidae family.

WHIP SCORPION

Schizomids are relatively small, soft-bodied arachnids, somewhat similar in appearance to whip scorpions. The prosoma (cephalothorax) is divided into three regions, each covered by plates, the large protopeltidium and the smaller, paired, mesopeltidia and metapeltidia. The name means "split or cleaved middle", referring to the way the thorax is divided into two separate plates.

Opisthosoma
The opisthosoma (abdomen) is a smooth oval of 12 recognizable segments. The first is reduced and forms the pedicel, while the last three are constricted, forming the pygidium. The last segment bears a short whip-like tail or flagellum, consisting of no more than four segments. Like the related orders Thelyphonida, Amblypygi, and Solifugae, the schizomids use only six legs for walking, having modified their first two legs to serve as sensory organs. They also have large well-developed pincer-like pedipalps just before the sensory legs.

SCHIZOMID EXAMPLE

Schizomids have no actual eyes, but a few species have vestigial eyespots capable of telling light from dark. Schizomids are generally tropical creatures, although some populations have been found in California and Arizona. They tend to live in the top layer of soil and in the cavities beneath logs and rocks, where they can avoid desiccation. They seek water and avoid light. Some species are cave dwellers, and a few live in or near termite or ant colonies.

Scytodidae – Human Biters
Spitting spiders (family Scytodidae) are spiders of the genus Scytodes and their relatives. There are five known genera and over 150 species of scytodids worldwide. They catch their prey by spitting a fluid that immobilizes it by congealing on contact into a venomous and sticky mass. They can be observed swaying from side to side, in order to cover the prey in a crisscrossed "Z" pattern; each of two pores in the chelicerae emits half of the pattern. The spider usually strikes from a distance of 10-20mm and the whole attack sequence is over in a little under 1/700th of a second.

SPITTING SPIDER – HUMAN BITER

Like the Sicariidae and Diguetidae these spiders are haplogyne (lack hardened female genitalia) and have six eyes, which are arranged as three pairs. They differ from these in having a dome-shaped carapace and in their characteristic flecked pattern of spots. Two scytodes will fight each other, the larger one is strong enough to break free and win.

Spider identification is difficult even for experts. There are about 3,700 species of spiders in North America alone, and there are no doubt many “new” species awaiting descriptions and names from scientists.

Even taking a picture of a spider is no guarantee that one of our experts can tell you what species it is. The characters needed to identify a spider, like the arrangement of its eyes, are often not visible in images. It is helpful, however, to note the kind of web you found the spider in (not all spiders spin webs, though), whether it was outdoors or indoors, and include an accurate assessment of the size of the spider (body length or legspan). Always remember to include a specific geographic location in your post. Lastly, make sure it is actually a spider that you have, and not another arachnid, or even an insect.

Solifugae (Sun Spiders or Wind Scorpions)
Solifugae is an order of Arachnida, known as camel spiders, wind scorpions or sun spiders, comprising more than 1,000 described species in about 153 genera. They may grow to a length of 15 cm (6 in) including legs, and have a body comprising an opisthosoma (abdomen) and a prosoma (head) with conspicuously large chelicerae, which are also used for stridulation. Most species live in deserts and feed opportunistically on ground-dwelling arthropods and other animals. A number of urban legends exaggerate the size and speed of Solifugae, and their potential danger to humans. Solifugids are moderate to large arachnids, with the larger species reaching 15 centimeters (6 in) in length.

SUN SPIDER

The body is divided into a forward part, cephalothorax or prosoma, and a ten-segmented abdomen or opisthosoma. The prosoma comprises the head, mouthparts and somites containing the pedipalps. It is divided into a relatively large anterior carapace, including the animal's eyes, and a smaller posterior section.

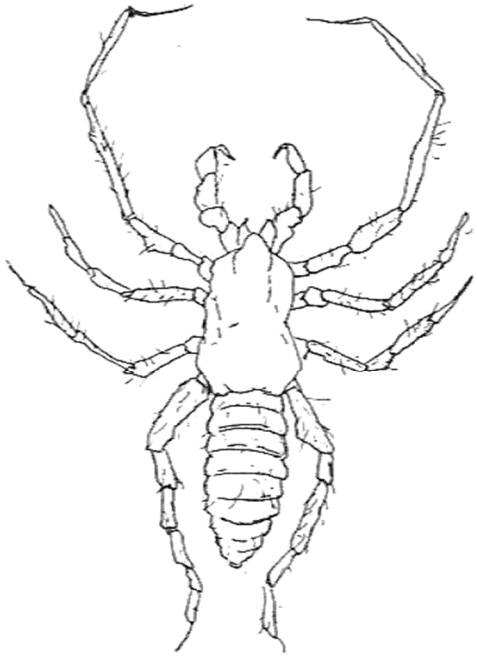
The most distinctive feature of Solifugae is their large chelicerae, which are longer than the prosoma. Each of the two chelicerae are composed of two articles forming a powerful pincer; each article bears a variable number of teeth. While solifuges appear to have ten legs, they have eight legs like other arachnids; the first set of appendages are pedipalps, which function as sense organs similar to insects' antennae and give the appearance of an extra pair of legs.

The pedipalps terminate in eversible adhesive organs, which are used to capture flying prey, and for climbing. They stridulate with their chelicerae, producing a rattling noise. Of the four pairs of legs, the first pair are smaller in size, and act as accessory tactile organs used to feel the animal's surroundings, so that only the other six legs are used for running. On the last pair of legs, Solifugae have fan-shaped sensory organs called racquet organs or malleoli. Like pseudoscorpions and harvestmen, they lack book lungs, having instead a well-developed tracheal system that takes in air through three pairs of slits on the animal's underside. In some species there are very large central eyes that are capable of recognizing forms, and are used for hunting. Lateral eyes are only rudimentary, if present at all. Males are usually smaller than females, with longer legs.

Theridiidae
Theridiidae is a large family of spiders, also known as the tangle-web spiders cobweb spiders and comb-footed spiders. The diverse family describes over 2200 species in over 100 genera) of three-dimensional space-web-builders found throughout the world. Theridiid spiders are entelegyne (have a genital plate in the female) araneomorph ecribellate (use sticky capture silk instead of woolly silk) spiders that often build tangle space webs and have a comb of serrated bristles (setae) on the tarsus of the fourth leg.

The family includes some model organisms for research, for example, the genus Latrodectus, the medically important widow spiders. In addition to studies characterizing their venom and its clinical manifestation, widow spiders are broadly used in research on spider silk, and on sexual biology including sexual cannibalism. Anelosimus spiders are also model organisms, used for the study of sociality, its evolution, and its ecological and evolutionary causes and consequences.

They are particularly important for such studies as the genus contains species varying from solitary to permanently social, and because sociality has evolved frequently within the genus allowing comparative studies across species.
These spiders are also a promising model for the study of inbreeding as their mating system co-varies with sociality, and all permanently social species are highly inbred. One species in Theridion, the Hawaiian T. grallator, is used as a model to understand the selective forces and the genetic basis of color polymorphism within species. Theridion grallator is known as the "happyface" spider, as certain morphs have a pattern uncannily resembling a smiley face or a grinning clown face on their yellow body.



SCHIZOMIDA

The family also contains the well-studied kleptoparasitic species of the subfamily Argyrodinae (including Argyrodes, Faiditus, and Neospintharus) which often have triangular bodies.

These spiders live in the webs of larger spiders and pilfer small prey caught by their host's web, eat prey killed by the host spider, and may consume silk from the host web, as well as attack and eat the host itself. The largest genus with over 600 species currently placed in it is Theridion, but it is not monophyletic. Another large genus is Parasteatoda, previously Achaearanea, which includes the common house spider. Many theridiids trap ants and other ground dwelling insects by means of elastic sticky silk trap lines leading to the soil surface. Despite their name, cobweb or tangle-web spiders have a huge range of web architectures.

Vinegarroons
Vinegarroons range from 25 to 85 mm (0.98 to 3.3 in) in length, with most species not longer than 30 mm (1.2 in); the largest species, of the genus Mastigoproctus, reaching 85 mm (3.3 in). Like the related orders Schizomida, Amblypygi, and Solifugae, the vinegarroons use only six legs for walking, having modified their first two legs to serve as antennae-like sensory organs.

VINEGARRON

Many species also have very large scorpion-like pedipalps (pincers). They have one pair of eyes at the front of the cephalothorax and three on each side of the head, a pattern also found in scorpions. Vinegarroons have no venom glands, but they do have glands near the rear of their abdomen that can spray a combination of acetic acid and octanoic acid when they are bothered. The acetic acid gives this spray a vinegar-like smell, giving rise to the common name vinegarroon.

Carnivorous, Nocturnal hunters
Vinegarroons are carnivorous, nocturnal hunters feeding mostly on insects and millipedes, but sometimes on worms and slugs. Mastigoproctus sometimes preys on small vertebrates. The prey is crushed between special teeth on the inside of the trochanters (the second segment of the leg) of the front legs.

They are valuable in controlling the population of roaches and crickets. Males secrete a sperm sac, which is transferred to the female. Up to 35 eggs are laid in a burrow, within a mucous membrane that preserves moisture. Mothers stay with the eggs and do not eat. The white young that hatch from the eggs climb onto their mother's back and attach themselves there with special suckers.

After the first molt they look like miniature vinegarroons, and leave the burrow; the mother dies soon after. The young grow slowly, going through three molts in about three years before reaching adulthood. They live for up to another four years.

SPIDER CONTROL WITH USE OF SPRAY PESTICIDES

To avoid harm from the pesticide, you should:

• Pour the clothes from their container into the washer without touching them.
• Handle only the inner surfaces, such as the inside of boots, aprons, or coveralls.
• Do not breathe the steam from the washer and dryer.

Always follow the label's instructions no matter the case or what you think might work. Applicators go to jail and are given large fines for not following the label.

You should wear work clothing that protects your body from pesticide residues, such as long-sleeved shirts, long pants, shoes, and socks. If possible, avoid touching the parts of the equipment where the pesticide is most likely to be. Or, if practical for the job that you will be doing, consider wearing rubber or plastic gloves and an apron.

You should not let pesticides stay on your hands:

• Wash your hands as soon as you finish handling the equipment.
• Wash your hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
• Wash or shower with soap and water, shampoo your hair, and put on clean clothes after work.
• Wash work clothes that may have pesticides on them separately from other clothes before wearing them again.

Scorpion Section – Human Threat - Biter/Stinger

Note: The word scorpion is sometimes misspelled as scorpian, and the plural scorpions have sometimes been misspelled as scorpians or scorpiones. The correct spellings are scorpion and scorpions.

Scorpions are arachnids, close relatives of ticks, mites and spiders. There are approximately 1,300 species of scorpions worldwide, characterized by an elongated body and a segmented tail that is tipped with a venomous stinger. Scorpions are very common in the Southern and Southwestern States. Most are not poisonous, except for two species found in the southwestern states like Arizona, California, New Mexico, and Texas.

Scorpions are commonly thought of as desert animals, but in fact, they occur in many other habitats as well, including grasslands and savannahs, deciduous forests, pine forests, rain forest and caves.

Scorpions are opportunistic predators of small arthropods, although the larger kinds have been known to kill small lizards and mice. The large pincers are studded with highly sensitive tactile hairs, and the moment an insect touches these, they use their chelae (pincers) to catch the prey. Depending on the toxicity of their venom and size of their claws, they will then either crush the prey or inject it with neurotoxic venom. This will kill or paralyze the prey so the scorpion can eat it.

Scorpions have a relatively unique style of eating using chelicerae, small claw-like structures that protrude from the mouth that are unique to the Chelicerata among arthropods. The chelicerae, which are very sharp, are used to pull small amounts of food off the prey item for digestion into a pre-oral cavity below the chelicerae and carapace. Scorpions can only ingest food in a liquid form; they have external digestion. The digestive juices from the gut are egested onto the food and the digested food sucked in liquid form. Any solid indigestible matter (fur, exoskeleton, etc.) is trapped by setae in the pre-oral cavity, which is ejected by the scorpion.

Predatory Arthropod

Scorpions are predatory arthropod animals of the order Scorpiones within the class Arachnida. They have eight legs and are easily recognized by the pair of grasping claws and the narrow, segmented tail, often carried in a characteristic forward curve over the back, ending with a venomous stinger. Scorpions range in size from 9 mm (Typhlochactas mitchelli) to 21 cm (Hadogenes troglodytes). Scorpions are nocturnal; they prefer to be active during the night. They have poor eyesight yet thrive in the dark relying on their strong body, pinchers and stinger as a way to both defend and navigate any hostile environment.

Scorpions are found widely distributed over all continents, except Antarctica, in a variety of terrestrial habitats except the high latitude tundra. Scorpions' number about 1752 described species, with thirteen extant families recognized to date. The taxonomy has undergone changes and is likely to change further, as a number of genetic studies are bringing forth new information. Though the scorpion has a fearsome reputation as venomous, only about 25 species have venom capable of killing a human being. The body of a scorpion is divided into three parts (tagmata): the head (cephalothorax), the abdomen (mesosoma) and the tail (metasoma).

Bark Scorpion

The bark scorpion is found throughout Arizona, in the extreme southeastern portion of California near Arizona, and in southwestern New Mexico. Bark scorpions reach a length of 3 inches and have a very thin tail only 1/16 inch wide; the body is yellow without stripes or patterns. The bark scorpion is the only common climbing scorpion and does not normally burrow, but usually lives above ground under tree bark and in palm trees and crevices of rocky cliffs. Because it can ascend slump block walls or stucco, this species is the scorpion most likely to enter dwellings. The bark scorpion is attracted to moisture around homes and in the house. It also may be found in stacked lumber or bricks, firewood piles, cellars, and attics. It needs only a crack of 1/16 inch to enter a home.

Arizona Hairy Scorpion

The Arizona hairy scorpion, Hadrurus arizonensis, is a common desert species found in southern California and throughout Arizona. At maturity it can be 5 to 7 inches in length. Like many other desert scorpions, the Arizona hairy scorpion is a burrower, but may also be found under rocks, logs, sleeping bags, and other surface objects. This scorpion can often be found around homes and in garages. It is a night feeder attracted to water, swimming pools, irrigated areas, or outside lights where food prey such as beetles, cockroaches, crickets, moths, and other insects are attracted as well. During the day it may be found in woodpiles, palm trees, and decorative bark, or under loose boards, woodpiles, rocks, or the bark of trees. Like some other scorpions, the Arizona hairy scorpion may enter homes in search of water. Common indoor places where it might be found are dark, cool areas in the bathroom or kitchen as well as crawl spaces, attics, and closets.

Stripedtail Scorpion
The stripedtail scorpion, Vaejovis spinigerus, is one of the most common scorpion species in southern California, Arizona, and the United States. It is a burrowing scorpion that is often found in sandy soil but can survive in a variety of habitats, from desert floor to rocky hillside. At maturity, the stripedtail scorpion is about 2-1/2 inches long and the body is striped on the upper side. This scorpion is venomous, but not considered dangerous. It may be found under common objects such as sleeping bags, shoes, and other similar items.

Scorpion Biology
Scorpions have a three part body comprised of the cephalothorax (head), their main body or trunk which has 7 segments and their tail, which has 6 segments. The last segment of their tail works like a universal joint with a stinger attached. Scorpions are able to maneuver their tail in any direction and though most people think of them stinging in the classic "C" position with stinger over their head, scorpions will sting anyway possible when danger is present. Scorpions have 8 legs along with a set of pinchers up front which are quite strong and agile. They use these pinchers for hunting their prey, self-defense, grooming and maintaining their young.

Cephalothorax
The cephalothorax, also called the prosoma, comprises the carapace, eyes, chelicerae (mouth parts), pedipalps (commonly called claws, pincers or chelae) and four pairs of walking legs. The scorpion's exoskeleton is thick and durable, providing good protection from predators. Scorpions have two eyes on the top of the cephalothorax, and usually two to five pairs of eyes along the front corners of the cephalothorax The position of the eyes on the cephalothorax depends in part on the hardness or softness of the soil upon which they spend their lives. The pedipalp is a segmented, chelate (clawed) appendage used for prey immobilization, defense, and sensory purposes. The segments of the pedipalp (from closest to the body outwards) are coxa, trochanter, femur (humerus), patella, tibia (including the fixed claw and the manus) and tarsus (moveable claw).A scorpion has darkened or granular raised linear ridges, called "keels" or carinae on the pedipalp segments and on other parts of the body which are useful taxonomically.

Mesosoma
The abdomen, also called the opisthosoma, consists of seven segments (somites), each covered dorsally by a sclerotosed plate (tergum) and also ventrally for segments 3 to 7. The first abdominal segment bears a pair of genital opercula which cover the gonopore. Segment 2 consists of the basal plate with the pectines. Each of the mesosomal segments 3 to 7 have a pair of spiracles which are the openings for the scorpion's respiratory organs, known as book lungs. The spiracle openings may be slits, circular, elliptical, or oval.

Metasoma
The metasoma, the scorpion's tail, comprises five caudal segments (the first tail segment looks like a last mesosoman segment), and sixth bearing the telson (the sting). The telson, in turn, consists of the vesicle, which holds a pair of venom glands, and the hypodermic aculeus, the venom-injecting barb. On rare occasions, scorpions can be born with two metasomata (tails). Two-tailed scorpions are not a different species, merely a genetic abnormality.

Scorpion Habits
Scorpions are nocturnal, predatory animals that feed on a variety of insects, spiders, centipedes, and other scorpions. The larger scorpions occasionally feed on vertebrates, such as smaller lizards, snakes, and mice. Prey is located primarily by sensing vibrations. Although scorpions are equipped with venom to defend themselves, scorpions fall prey to many types of creatures, such as centipedes, tarantulas, insectivorous lizards, birds (especially owls), and mammals (including

shrews, grasshopper mice, bats). Scorpions feed mainly on insects and spiders and can survive without feeding for six months. During the day scorpions hide under stones, in piles of rocks, in cracks in masonry, in wood piles and under the bark of trees. Scorpions enter structures seeking water and shelter

Fluorescence
Scorpions are also known to glow when exposed to certain wavelengths of ultraviolet light such as that produced by a blacklight, due to the presence of fluorescent chemicals in the cuticle. One fluorescent component is now known to be beta-carboline. A hand-held UV lamp has long been a standard tool for nocturnal field surveys of these animals. Fluorescence occurs as a result of sclerotization and increases in intensity with each successive instar.

Scorpion Lifespan
Scorpions have quite variable lifespans and the actual lifespan of most species is not known. The age range appears to be approximately 4–25 years (25 years being the maximum reported life span in the species Hadrurus arizonensis). Lifespan of Hadogenes species in the wild is estimated at 25–30 years.

Scorpions prefer to live in areas where the temperatures range from 20 °C to 37 °C (68 °F to 99 °F), but may survive freezing temperatures to the desert heat. Scorpions of the genus Scorpiops living in high Asian mountains, bothriurid scorpions from Patagonia and small Euscorpius scorpions from Central Europe can all survive winter temperatures of about 25 °C (13 °F). In Repetek (Turkmenistan), there live seven species of scorpions (of which Pectinibuthus birulai is endemic) in temperatures which vary from –31 °C to 50 °C.

They are nocturnal and fossorial, finding shelter during the day in the relative cool of underground holes or undersides of rocks and coming out at night to hunt and feed. Scorpions exhibit photophobic behavior, primarily to evade detection by their predators such as birds, centipedes, lizards, mice, possums, and rats.

Scorpions can consume huge amounts of food at one sitting. They have a very efficient food storage organ and a very low metabolic rate combined with a relatively inactive lifestyle. This enables scorpions to survive long periods when deprived of food; some are able to survive 6 to 12 months of starvation. Scorpions excrete very little; their waste consists mostly of insoluble nitrogenous waste such as xanthine, guanine and uric acid.

Reproduction
The mother scorpion produces an average of 30 living young per brood which she carries on her back for up to 15 days. It takes up to four years for most species to reach maturity. Scorpions are predators, feeding mainly on insects and spiders. They can survive without feeding for many months.

Most scorpions reproduce sexually, and most species have male and female individuals.
However, some species, such as Hottentotta hottentotta, Hottentotta caboverdensis, Liocheles australasiae, Tityus columbianus, Tityus metuendus, Tityus serrulatus, Tityus stigmurus, Tityus trivittatus, and Tityus urugayensis, reproduce through parthenogenesis, a process in which unfertilized eggs develop into living embryos. Parthenogenic reproduction starts following the scorpion's final molt to maturity and continues thereafter.

Sexual reproduction is accomplished by the transfer of a spermatophore from the male to the female; scorpions possess a complex courtship and mating ritual to affect this transfer.

Mating starts with the male and female locating and identifying each other using a mixture of pheromones and vibrational communication. Once they have satisfied the other that they are of opposite sex and of the correct species, mating can commence.

Courtship
The courtship starts with the male grasping the female's pedipalps with his own; the pair then performs a "dance" called the "*promenade à deux*". In reality this is the male leading the female around searching for a suitable place to deposit his spermatophore.

The courtship ritual can involve several other behaviors such as juddering and a cheliceral kiss, in which the male's chelicerae – claw like mouthparts – grasp the female's in a smaller more intimate version of the male's grasping the female's pedipalps and in some cases injecting a small amount of his venom into her pedipalp or on the edge of her cephalothorax, probably as a means of pacifying the female.

When the male has identified a suitable location, he deposits the spermatophore and then guides the female over it. This allows the spermatophore to enter her genital opercula, which triggers release of the sperm, thus fertilizing the female. The mating process can take from 1 to 25+ hours and depends on the ability of the male to find a suitable place to deposit his spermatophore.

If mating goes on for too long, the female may eventually lose interest, breaking off the process. Once the mating is complete, the male and female will separate. The male will generally retreat quickly, most likely to avoid being cannibalized by the female, although sexual cannibalism is infrequent with scorpions.

Birth and Development
Scorpions are viviparous. The young are born one by one, and the brood is carried about on its mother's back until the young have undergone at least one molt. Before the first molt, scorplings cannot survive naturally without the mother, since they depend on her for protection and to regulate their moisture levels. Especially in species which display more advanced sociability (e.g. Pandinus spp.), the young/mother association can continue for an extended period of time. The size of the litter depends on the species and environmental factors, and can range from two to over a hundred scorplings. The average litter however, consists of around 8 scorplings.

The young generally resemble their parents. Growth is accomplished by periodic shedding of the exoskeleton (ecdysis). A scorpion's developmental progress is measured in instars (how many molts it has undergone). Scorpions typically require between five and seven molts to reach maturity. Molting commences with a split in the old exoskeleton just below the edge of the carapace (at the front of the prosoma). The scorpion then emerges from this split; the pedipalps and legs are first removed from the old exoskeleton, followed eventually by the metasoma.

When it emerges, the scorpion's new exoskeleton is soft, making the scorpion highly vulnerable to attack. The scorpion must constantly stretch while the new exoskeleton hardens to ensure that it can move when the hardening is complete. The process of hardening is called sclerotization. The new exoskeleton does not fluoresce; as sclerotization occurs, the fluorescence gradually returns.

Relationship with Humans
Certain species of scorpion are aggressive and will attack humans with little to no provocation, while others will only attack when threatened.

Scorpion Sting and Venom
All known scorpion species possess venom and use it primarily to kill or paralyze their prey so that it can be eaten; in general, it is fast-acting, allowing for effective prey capture. It is also used as a defense against predators. The venom is a mixture of compounds (neurotoxins, enzyme inhibitors, etc.) each not only causing a different effect, but possibly also targeting a specific animal. Each compound is made and stored in a pair of glandular sacs and is released in a quantity regulated by the scorpion itself. Of the 1000+ known species of scorpion, only 25 have venom that is dangerous to humans; most belong to the family Buthidae.

First Aid
First aid for scorpion stings is generally symptomatic. It includes strong analgesia, either systemic (opiates or paracetamol) or locally applied (such as a cold compress). Hypertensive crises are treated with anxiolytics and vasodilators.

Medical Use
The key ingredient of the venom is a scorpion toxin protein. Short chain scorpion toxins constitute the largest group of potassium (K+) channel blocking peptides; an important physiological role of the KCNA3 channel, also known as KV1.3, is to help maintain large electrical gradients for the sustained transport of ions such as Ca2+ that controls T lymphocyte (T cell) proliferation. Thus KV1.3 blockers could be potential immunosuppressants for the treatment of autoimmune disorders (such as rheumatoid arthritis, inflammatory bowel disease and multiple sclerosis). The venom of Uroplectes lineatus is clinically important in dermatology.

Toxins being Investigated include:

- Chlorotoxin is a 36-amino acid peptide found in the venom of the deathstalker scorpion (Leiurus quinquestriatus) which blocks small-conductance chloride channels. The fact that chlorotoxin binds preferentially to glioma cells has allowed the development of new methods, that still are under investigation, for the treatment and diagnosis of several types of cancer.

- Maurotoxin from the venom of the Tunisian Scorpio maurus palmatus

Control of Scorpions
Sanitation is the first step in scorpion control. Loose boards, wood piles, rocks, and debris should be eliminated from areas around the home, especially near foundation walls. Spray an excellent residual insecticide in these areas. This will also reduce populations of insects that the scorpions feed on. Spray a swath outside approximately six feet around the perimeter of the home and one foot up the foundation wall.

Spray all entry points from the inside. We recommend using Suspend SC. Use a Chapin pump-up type sprayer for application. Both are excellent insecticides. Use Delta Dust to treat the electrical outlets, attic spaces and around the plumbing and electrical fixtures. Use a Hand Duster for application of the dust. Always wear Gloves and a Dust mask. Scorpion infestations can be effectively controlled with thorough applications of the above insecticides into cracks and crevices and other potential harborage areas.

Scorpions present a hazard both in the yard and in the home. They love to reside where it is moist and irrigated lawns and landscaping will naturally attract them. It is thought they are coming for the other insects on which to feed but regardless of why they come around, once they’re found in the grass and turf some will undoubtedly find their way inside.

For this reason, it is important that you address outside populations on a regular or maintenance type program. As is the case with many perimeter invading pests, by keeping outside populations in check, you can dramatically reduce the risk of any getting inside local structures. This will help to reduce contact with people which in turn will help to minimize the chance of anyone getting stung.

Scorpion Pesticide and Chemical Treatments
Scorpions and Spiders may be the toughest of all the insects to kill. Fumigation will kill living scorpions and spiders, but unless you kill every last one of them, you still have the problem. Scorpions arrive for food. If you get rid of the food, then they go away. Fill up bathtubs and sinks with water and flush them on a regular basis. Scorpions tend to come up the drainage system at night. Also they make have to put up screens on A/C ducts as well if above method does not get rid of them.

Scorpions can be controlled with pesticides, but because of the scorpions' cryptic nature, it is difficult to deliver the pesticide directly. Residual pesticides, i.e., pesticides that last a long time after application, provide a means of "indirect fire" against the scorpions. Residual pesticides should be applied to the yard and exterior of the home, paying special attention to structures that provide harborage (stone walls, etc.) and potential entry points around the home. Pesticide application must be done on a regular basis, the interval of which will be determined by the severity of the infestation and the success of your cultural and mechanical control methods. This type of pesticide application can only be done by a certified pest control operator, so consult your local pest control company for more information. Although an important part of the overall control strategy, chemical control is the one most fraught with problems. It is expensive, temporary (needs to be repeated), and environmentally and medically hazardous.

Scorpion Outside Treatments
Around the home, scorpions love to nest in flower beds, mulch piles, under wood chips or pine straw and in garages which store a lot of boxes or other items on the floor. The scorpion’s flat body lends itself well to being able to crawl under most any object. This ability to crawl into small cracks and crevices is what makes the scorpion a common invader to our living environments.

They are great climbers and will readily scale brick, wood, stucco and most any siding on a house so if you let them live around the home, some will invariably move inside. They do this seeking both warmth and refuge and once inside, will require extensive treatments to exterminate established populations.

Deltamethrin Granules
Treating them outside is both easier and less costly and should be done on a regular basis if you reside where scorpions are present. There are two types of preventive maintenance which should be done around the home. First, apply Deltamethrin Granules around the home quarterly.

The most minimal treatment needed is to disperse the granules around all sides of the home effectively establishing a "band" of treated turf. This treated band will stop scorpions from both nesting and crawling thus keeping them out of the home. Use a granule spreader when doing the application to insure uniform application. These granules pose no hazard to people or pets when applied properly and will last 2-3 months per treatment. Be sure to treat at least a 10-foot-wide area around the structure. This amount of coverage will give you adequate protection. If you are in an area which borders on woods, fields or other turf which has a high amount of scorpions present, treat as much of the yard as possible. Getting this area blanketed will cut down and all but eliminate scorpions from nesting and foraging. This will enable you to have both pets and

children use the area with minimal risk of getting stung. Since the Deltamethrin Granules are slow acting and need a week or so to "kick in", the use of a liquid material over the turf will be needed if you want immediate knockdown.

Cykick CS
Cykick CS is an excellent material for this type of application. Use it in a 20-gallon hose end sprayer. This is the type of sprayer that connects to your garden hose. Just add some water and Cykick CS, attach it to your garden hose and spray away. Getting the local turf, flower beds and mulch areas soaked will insure you penetrate down where scorpions like to hide. Be sure to spray the sides of the home with it as well.

Direct the spray at the foot of the foundation and come up at least 3 feet. Since scorpions will regularly climb up just about any building, treating the side of the home is important and should be done a regular basis.

Just keep children and pets away when the application is done but they will be able to safely access the treatment sights once all areas are dry. This will usually be within an hour of the application. If you have just a small area to treat, you could opt to use a pump sprayer for the job. Just remember that the key when spraying over flat areas for scorpions is being sure to use enough water.

The bottom line here is being sure to get the right amount of Cykick out for the area you want to treat. Using a lot of water won't hurt; in fact, more water is better at dispersing the Cykick down into the key areas where scorpions like hide.

Inside Treatment
Anyone with current nesting and scorpions active in the home should be taking a lot of precautions to insure occupants don't get stung. Be especially careful at night when walking around. Since scorpions are nocturnal, it is highly likely that you will encounter them when it is dark. Try to wear slippers, sandals or some other footwear to minimize the possibility of being stung when walking around.

Stepping on a scorpion is one of the more common ways people get stung so be careful at night! If you see scorpions on a regular basis in the home during the night, get a black light to help identify where they are located. Scorpions reflect the light making them very visible and easy to see.

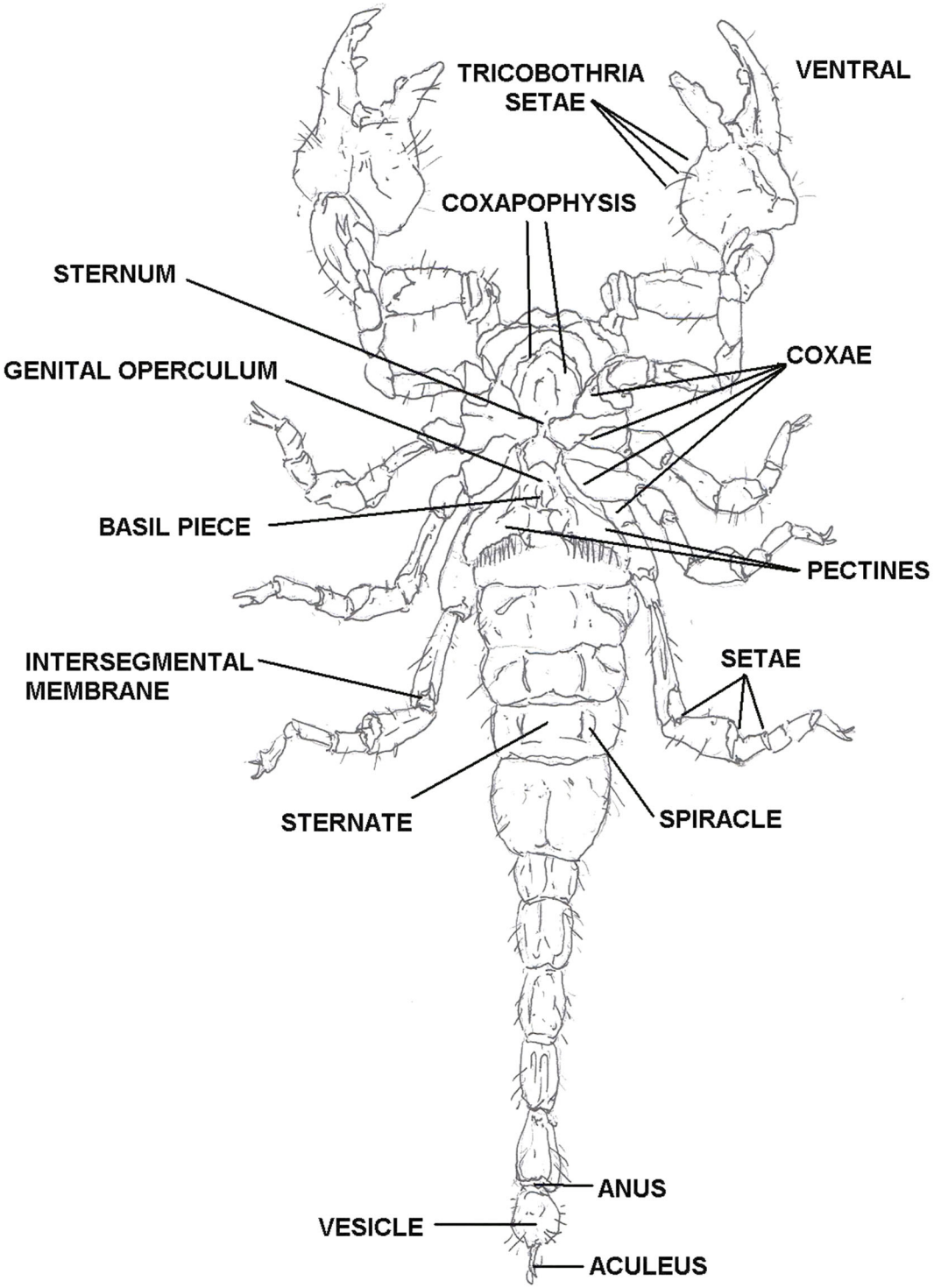
Recommended Measures for Scorpion Control:
1. Remove outdoor harborages e.g. piles of trash, stones, boards, firewood on the ground and the landscape timbers, should be removed.

2. Points of entry into buildings, e.g. siding, windows, doors, pipes and wires, should be sealed.

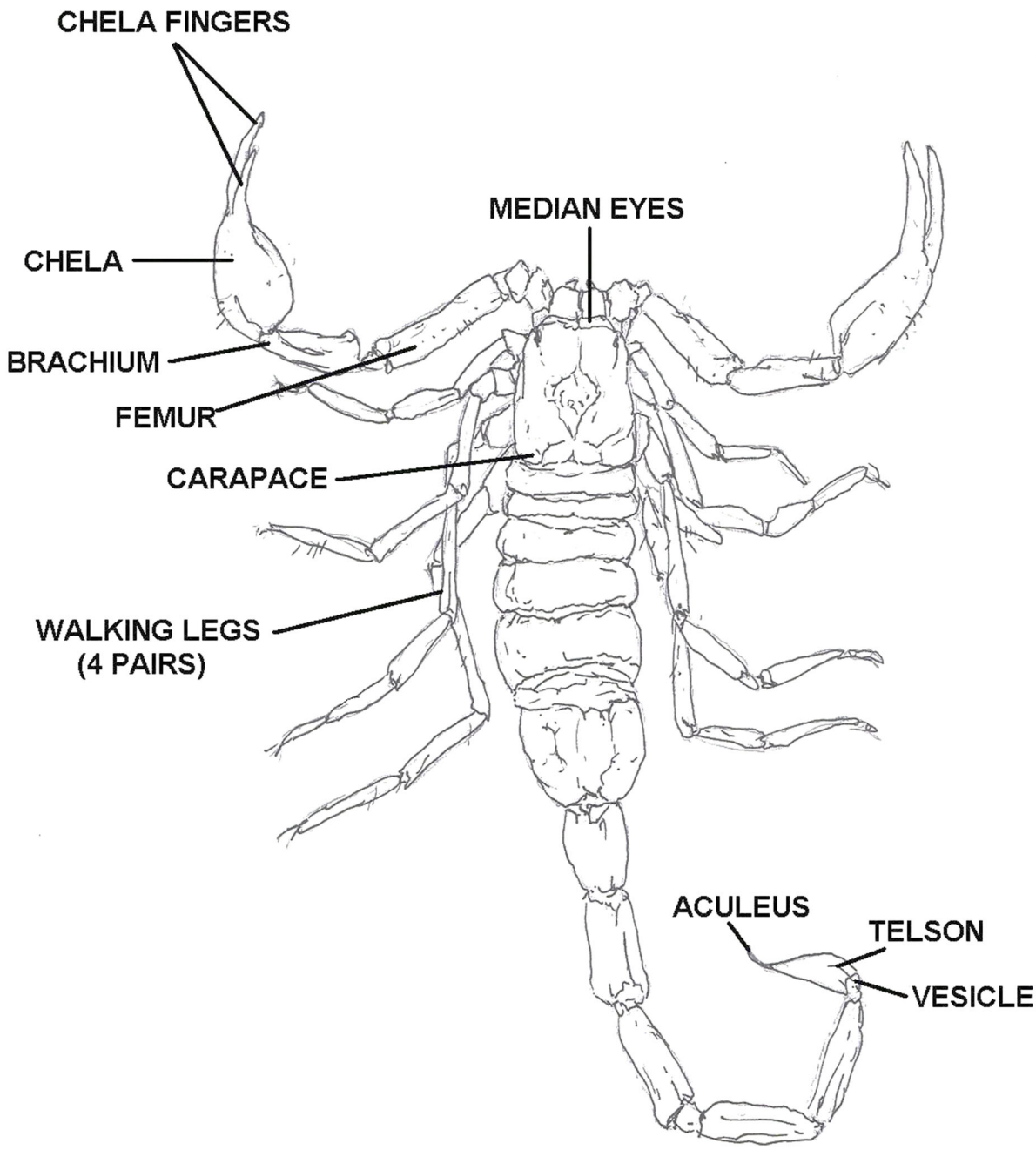
3. The use of a residual insecticide such as the wettable powders (WP**).**
Demon WP or Cyper WP should be applied as a 3- to 10-foot band around the perimeter of the structure, into harborage sites, and/or around potential entry points, such as: around all windows and doors, along baseboards, plumbing, inside closets, and garage and basement areas. Both Demon WP and Cyper WP are wettable powders that may leave a visible residue that can be seen against dark surfaces.

The next best alternative would be:
Cyonara 9.7 or Suspend SC.
These products would last just as long and cannot not be seen against dark surfaces. However, wettable powders work better against scorpions.
4. The use of dusts:
Drione Dust or Delta Dust should be used in the attic area if that is source of entry.

BARK SCORPION



SCORPION ANATOMY (UNDERSIDE)



SCORPION ANATOMY (DORSAL VIEW)

Topic 2 - Spider Identification Section

Post Quiz
Answers are found at rear of Glossary

Fill-in-the blank

Two Primary Spider Groups
1. _____construct webs in rather quiet, undisturbed places to capture their food. They live in or near their web and wait for food to come to them. They generally have poor eyesight and rely on sensing vibrations in their web to detect prey.

Jumping Spiders
2. Jumping spiders are generally small to medium-sized (about 1/5 - 1/2 inch long) and compact-looking. They are usually dark-colored with white markings, although some can be brightly colored, including some with_____.

Purseweb Spiders (Sphodros genus, Atypidae family, Mygalomorphae suborder)
3. _____are generally large spiders; though they seem to be the species most likely to inspire arachnophobia, all of the US species are harmless to humans.

Black Widow Spider
4. The female black widow spider _____her web. The web she constructs is an irregular, tangled, crisscross web of rather coarse silk. The core of the web is almost funnel shaped, woven into a silken tunnel in which the female spider spends the majority of her daylight hours.

Brown Recluse Spider
5. The most definitive physical feature of recluse spiders is their eyes: most spiders have eight eyes that typically are arranged in two rows of four, but recluse spiders have six equal-sized eyes arranged in three pairs, called dyads. There is a _____at the front of the cephalothorax (the first main body part to which the legs attach) and another dyad on each side, further back.

6. A female deposits eggs in off-white silken cases about 1/3 inch in diameter in sheltered, dark areas. Spiderlings emerge in_____and abandon the egg case.

7. Almost all species of Mygalomorphae have eight eyes, however there are some with fewer (Masteria lewisi has only six eyes). They have _____that lie entirely within their chelicerae, but only spiders of the Australian genus Atrax can be really harmful to humans. Their chelicerae and fangs are large and powerful.

8. Occasionally members of this suborder will even kill small fish, small mammals, and the like. While the _____are mygalomorphs - Theraphosa blondi has a body length of 10 cm, and a leg span of 28 cm - some species are less than one millimeter long.

9. Mygalomorphae can live for up to_____, and some don't reach maturity until they are about six years old. Some flies in the family Acroceridae which are endoparasites of mygalomorphs may remain dormant in the book lungs for as long as 20 years before beginning their development and consuming the spider.

Vinegarroons

10. Vinegarroons have_____, but they do have glands near the rear of their abdomen that can spray a combination of acetic acid and octanoic acid when they are bothered. The acetic acid gives this spray a vinegar-like smell, giving rise to the common name vinegarroon.

Topic 3 - Web Spider Section

Topic 3 - Section Focus
You will learn the basics of the web weaving spiders. At the end of this section, you will be able to understand and describe various web weaving spiders. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Topic 3 – Scope/Background
Spider identification is difficult even for experts. There are about 3,700 species of spiders in North America alone, and there are no doubt many "new" species awaiting descriptions and names from scientists. The characters needed to identify a spider, like the arrangement of its eyes, are often not visible in images. It is helpful, however, to note the kind of web you found the spider in (not all spiders spin webs, though), whether it was outdoors or indoors, and include an accurate assessment of the size of the spider (body length or legspan). Always remember to include a specific geographic location in your post. Lastly, make sure it is actually a spider that you have, and not another arachnid, or even an insect.

CELLAR SPIDER (NOT HARVESTMAN)

Cellar Spiders
Cellar spiders have long, thin legs and build sheet-like or irregular webs in dark places. They commonly hang upside down under the web.

COMB FOOTED SPIDER

Comb-footed Spiders
Also known as cobweb spiders, are very common spiders outdoors and indoors. They are small to medium-sized spiders (about 1/8 - 3/8 inch long). Comb-footed spiders are usually brownish or grayish. They build irregular webs in many places, including wood and stone piles and in quiet areas of buildings, such as basements. A common type of comb-footed spider found indoors is the house spider. It is grayish to brownish with chevron-like markings on its abdomen and a body length of over 1/4 inch.

FUNNEL WEB WEAVER

Funnel Web Weavers
Funnel web weavers (Family Agelenidae) are small to medium sized spiders often found in grassy fields, low shrubbery, or living among leaf litter in forests. They spin sheet webs of non-sticky silk with a characteristic funnel extending off to one side.

The funnel is where the spider hides while awaiting prey. There is a 3-dimensional barrier web spun above the sheet web, and when a prey item falls through onto the sheet web, the spider quickly runs out and bites its victim, then drags it back to the funnel to feed. These sheet webs are nearly invisible unless covered with dewdrops on a cool morning, and the spider can move very quickly over the surface. It almost looks as if the spider is walking on air. There are over 400 North American species. Spiders in the most common genus, Agelenopsis, are commonly called "grass spiders," after their habit of building their combination sheet-and-funnel webs in grass and low shrubs.

Venom toxicity - the bite of these spiders is of low risk to humans.

Spider Identification - are common outdoors and are occasionally found indoors. They are generally brownish or grayish with light and dark stripes near the head. They have long spinnerets and are moderate-sized (3/4 inch long). Grass spiders construct a large sheet web with a funnel they use as a retreat. These webs are commonly built on the ground, around steps, window wells, foundations, and low shrubs.

Habitat - These spiders are often called grass spiders because they construct their webs in tall grass, heavy ground cover and the branches of thick shrubs. Rarely will a funnel web spider be seen indoors, except for an occasional wandering male. They are found mostly in the Pacific Northwest states.

GRASS SPIDER

Highly Venomous


Southern Black Widow


Northern Black Widow


Brown Widow


Red Widow


Brown Recluse

Less Venomous


Banded Garden Spider


Tropical Orb-weaver


Hump-backed Orb-weaver


Spiny-backed Orb-weaver


Twin-flagged Jumping Spider


Sylvana Jumping Spider


White-banded Fishing Spider


Eastern Parson Spider


Grey House Spider


Brown Spitting Spider


Hacklemesh Weaver


Yellow Garden Spider


Golden Silk Orb-weaver

DEADLY & DANGEROUS	TOXIC W/ PAINFUL BITE	LOW RISK
 BLACK WIDOW SPIDER	 BLACK HOUSE SPIDER	 HUNTSMAN SPIDER
 BROWN RECLUSE SPIDER	 FEMALE MOUSE SPIDER	 GARDEN ORB WEAVE SPIDER
 HOBO SPIDER	 MALE MOUSE SPIDER	 ST. ANDREWS CROSS SPIDER
	 WOLF SPIDER	 TRAP DOOR SPIDER

COMMON US SPIDERS

Grass Spiders
A type of funnel weaver, are common outdoors and are occasionally found indoors. They are generally brownish or grayish with light and dark stripes near the head. They have long spinnerets and are moderate-sized (3/4 inch long). Grass spiders construct a large sheet web with a funnel they use as a retreat. These webs are commonly built on the ground, around steps, window wells, foundations, and low shrubs.

MARBLED ORB SPIDER

Orb Spiders – Human Biters
Are common spiders outdoors near buildings, but are usually not found indoors. They range in size from small to large (1/8 - 1 inch long) and are found in a variety of colors, with some being brightly colored. Orb spiders have large, swollen-looking abdomens, including some that are oddly shaped. They make the classic round, flat, wheel-like web familiar to most people.

BLACK AND YELLOW ARGIOPER

The black and yellow argioper, also known as the garden spider, is familiar to many. It is large (up to 1 inch long) and brightly colored black and yellow. Another common orb spider is the barn spider. It is large (4/5 inch long) and brownish in color.

Orb Weaving Spiders
Orb weavers (Family Araneidae) comprise a huge family of spiders, of which there are several hundred species in North America. These spiders vary greatly in color, shape and size, measuring between 2 - 30mm (1/16 -- 1 1/4") long. They have eight eyes arranged in two horizontal rows of four eyes each. The males are generally much smaller than the females and commonly lack the showy coloring of their fairer sex. They often spin their own smaller orb web near an outlying portion of the female's, and I've noticed most males give the females wide berth. Indeed, I rarely see male orb weavers, they are so reclusive.

Venom toxicity - the bite of Orb-Weaving Spiders is of low risk (not toxic) to humans. They are a non-aggressive group of spiders, seldom bite. Be careful not to walk into their webs at night - the fright of this spider crawling over one's face can be terrifying and may cause a heart attack, particularly to the susceptible over 40 year olds.

Spider Identification - an adult is about 2/3 to more than 1 inch in body length - has a bulbous abdomen - often colorful - dark to light brown pattern. The common Golden Orb-Weaver Spider has a purplish bulbous abdomen with fine hairs.

Habitat - often found in summer in garden areas around the home - they spin a large circular web of 6 feet or more, often between buildings and shrubs, to snare flying insects, such as, flies and mosquitoes.

MALE BLACK WIDOW SPIDER

Trap-Door Spiders – Human Biter

TRAP DOOR SPIDER SPECIES

Venom toxicity - the bite of the Trap-Door Spider is of low risk (non-toxic) to humans. It is a non-aggressive spider - usually timid but may stand up and present its fangs if harassed. Rarely bites - but if so it can be painful.

Spider Identification - an adult is about 1 and 1/2 inches in body length - brown to dark brown in color - heavily covered with fine hairs. The male has distinct boxing glove-shaped palps, that is, the two "sensory feelers" at front of its head.

Habitat - this spider is a ground dweller, with a burrow retreat lined with silk of up to 10 inches in depth and around 1 inch in width - prefers nesting in drier exposed locations - often has a wafer-like lid on the burrow entrance. Trap-Door Spiders are commonly found in the drier open ground areas around the home.

Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 1-800-222-1222. If you wish to report a pesticide problem, please call 1-800-858-7378.

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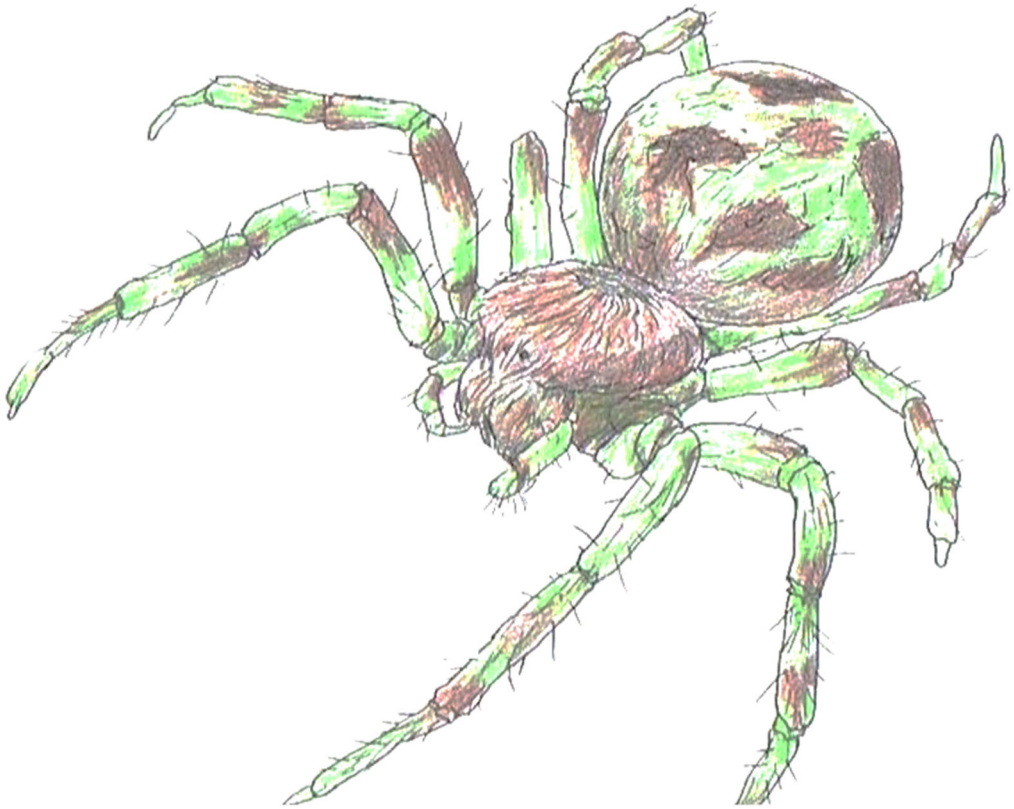
Neil Young Trap-door Spider

American rock icon Neil Young has had an honor bestowed upon him that is not received by many musicians – his own spider. Jason Bond, a biologist at East Carolina University, named a newly discovered arachnid, Myrmekiaphila neilyoungi. It is also known as a trapdoor spider.

Young isn't the first musician to have a new species named after him, which honor goes to Roy Orbison whose name graces the whirligig beetle. (Orectochilus orbisonorum)

House Spiders



AMERICAN HOUSE SPIDER
(ARANEUS DIADEMATUS)

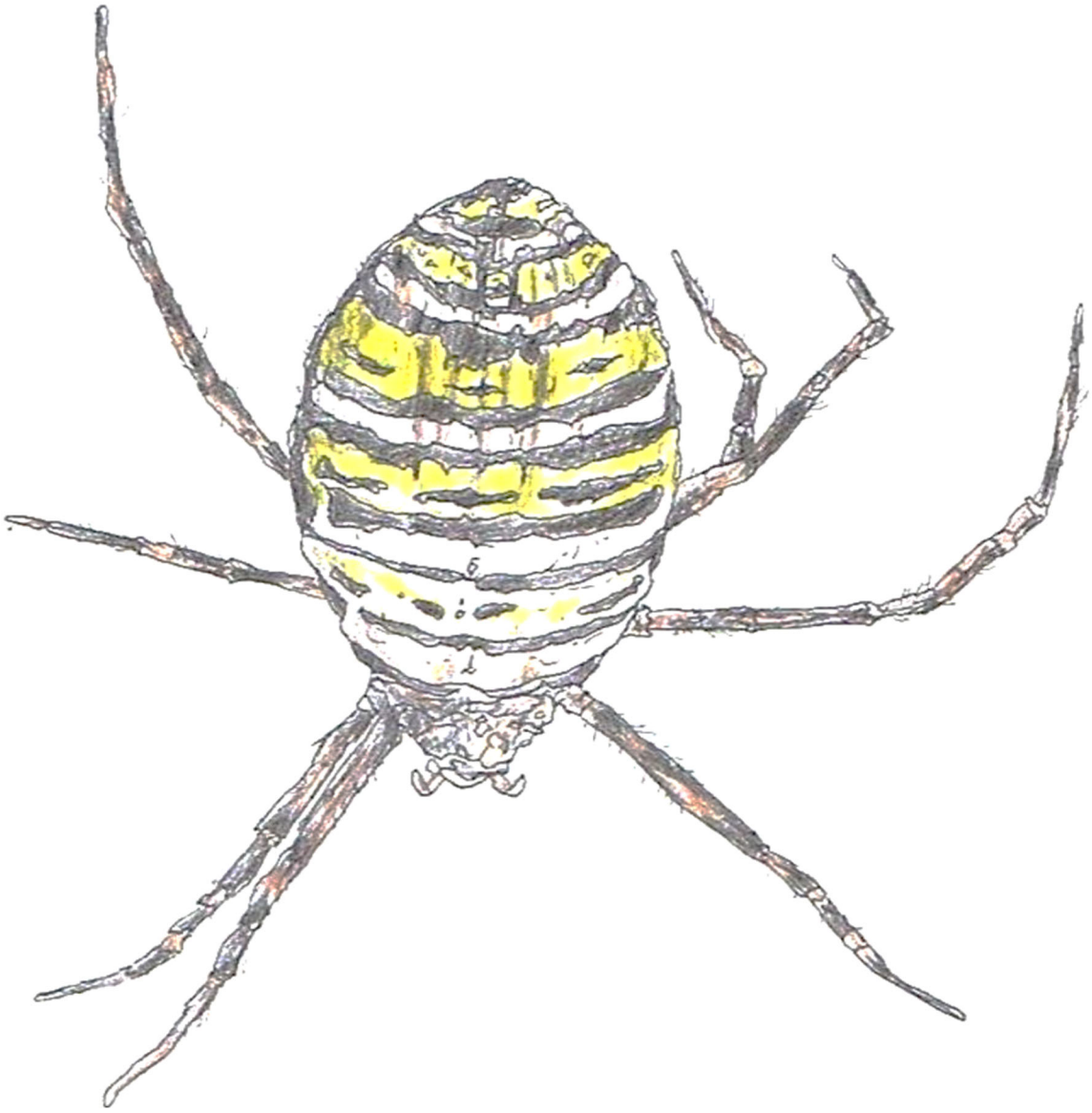
The common house spider belongs to the funnelweb spiders in the family Agelenidae in the suborder Araneomorphae. House spiders are found throughout Europe and North America. This spider is so named because its horizontal sheet web is often seen in wall corners of houses, but it can also be found in any cool, dark place, such as dense vegetation or crevices of logs or rocks. The spider's web forms a tube, and the narrowed end serves as a retreat where the spider can hide. When an insect walks over the sheet web, the spider immediately rushes out from the funnel, grabs its victim, and delivers a poisonous bite. The spider then carries its prey back to its retreat, where it begins to feed.

Sometimes house spiders leave their webs and can be seen wandering around or trapped in a bathtub. These are usually males who have given up building webs, but are always in search of a female. Male house spiders lack adhesive hairs on their feet, and therefore, cannot climb on smooth vertical surfaces, such as those found in sinks and bathtubs. Most house spiders are harmless and may actually prove beneficial to humans since they feed on insects that stray indoors.

Garden Spiders
Garden spiders belong to the family Araneidae, a group of 2,500 different species of spiders that weave orb, or circular, webs. Marked with varying shades of brown, garden spiders have a distinctive white cross on their abdomens, and some people refer to them as cross spiders.

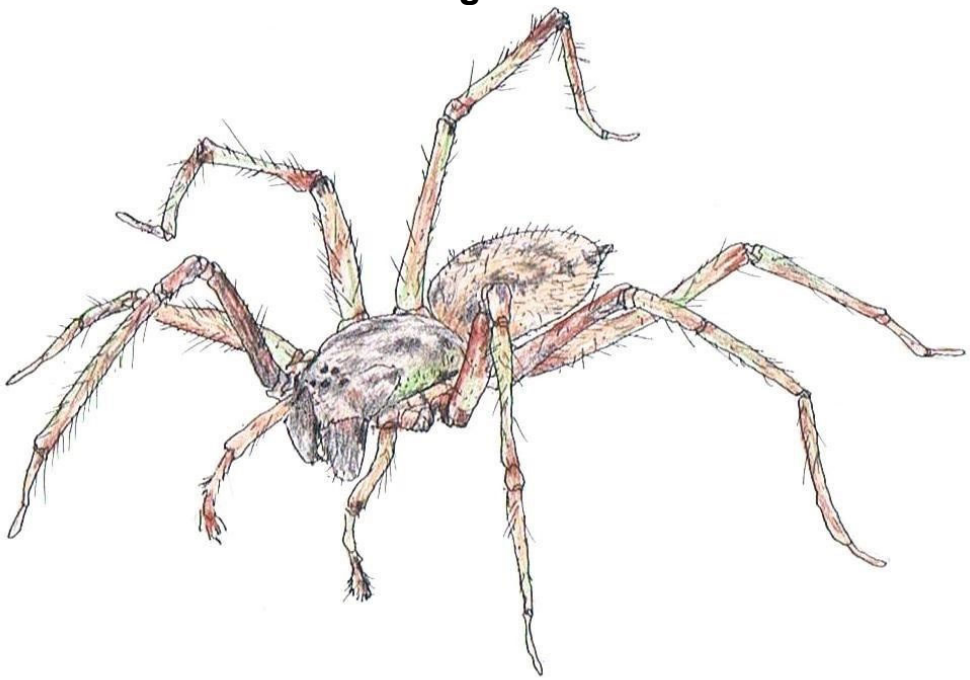
They are found throughout the continental United States, Canada, and Mexico. Some species are found in Europe and Hawaii.

Like most orb weavers, a garden spider typically sits upside down in the middle of the orb web, placing its eight feet on the threads radiating out from the center of the web. The feet act as sensors, picking up vibrations when prey enters the web. When an insect becomes stuck in the web's sticky spiral threads, the spider rushes out to wrap the victim with silk and give it a paralyzing bite. The spider then carries the prey back to the hub of the web to feed on it.



BANDED GARDEN SPIDER
(ARGIOPE TRIFASCIATA)

Hobo Spider – Human Biter – Dangerous/Venomous



HOBO SPIDER
(TEGENERIA AGRESTIA)

The hobo spider is a member of the funnel-web spider family Agelenidae. Funnel-web spiders are long-legged, swift-running spiders that build funnel or tube-shaped retreats. The hobo spider runs at an average speed of about 0.45 meters (17 inches) per second, with a maximum speed of about 1.1 meters (40 inches) per second. The hobo spider has a brown cephalothorax (the front portion to which the legs are attached) and brown legs, with darker markings on the cephalothorax. The abdomen has a distinctive pattern of yellowish markings on a grayish back ground, although this pattern can be difficult to discern without the aid of a microscope or hand lens. The pattern is generally more discernible in immature specimens. Unlike many other similar-looking spiders, hobo spiders do not have darker bands (like multiple arm bands) on their legs. Spiders with such banding can be assumed not to be hobo spiders.

Female Hobo Spider
The hobo spider is one of the most dangerously venomous spiders in the United States. The hobo's "stronghold territory" ranges from extreme southern Alaska through southern B.C. and Alberta, Canada, to central and southern California, and east into central Colorado. However, we have confirmed catches throughout the continental USA to the eastern seaboard and into all Gulf States, making the "hobo spider" a national pest.

The hobo spider, originating from Europe, began its infestation of the continental USA in the Port of Seattle some time before the 1930's. Most poisonous spider bites in the western half of the USA are due to the Hobo spider. A venomous bite from a Hobo or Brown Recluse Spider can be severe.

Necrotic arachnidism results from envenomation (venom poisoning) from the bite of Hobo, or Recluse. It occurs due to the venom's ability to clot blood which results in an area of tissue receiving inadequate blood flow and thus dying secondary to oxygen starvation.

Although the bite of the hobo spider is initially painless, the bite can be serious. After 24 hours, the bite develops into a blister and after 24-36 hours, the blister breaks open, leaving an open, oozing ulceration. Typically, when the venom is injected, the victim will experience an immediate redness, which develops around the bite.

The most common reported symptom is severe headache. Other symptoms can include nausea, weakness, fatigue, and temporary memory loss and vision impairment. In any case, first aid and medical attention should be sought, if bitten, as and when any adverse health effects are observed.

Spider Identification - they are brown in color and the adults measure roughly 1/3 to 2/3 inch in body length and 2/3 to 2 inches in leg span. Their abdomens have several chevron shaped markings. Males are distinctively different from females in that they have two large palpi (mouth parts) that look like boxing gloves. Females tend to have a larger and rounder abdomen when compared to males. Up to 50% of bites by dangerously venomous spiders are "dry," with no venom injected and no signs of poisoning developing.

Most people bitten and envenomated by Hobo or Recluse spiders do not feel the initial bite and do not see the biting spider. Bites that are more serious occur when the Hobo gets between clothes or bedding and skin and is trying to get away. Keeping clothes, bedding, and storage boxes off the floor is a wise precaution, since they are preferred hiding places for the Hobo. People often get bitten in bed, sleeping on couches or floors, when putting on clothes, coats, gloves or shoes that have been on the floor, and when picking up piles of laundry.

Seek medical attention if you think you have a Hobo or Brown Recluse spider bite. If possible, collect up the spider or what remains of it and take with you to your doctor or emergency clinic.

Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 1-800-222-1222. If you wish to report a pesticide problem, please call 1-800-858-7378.

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Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned.

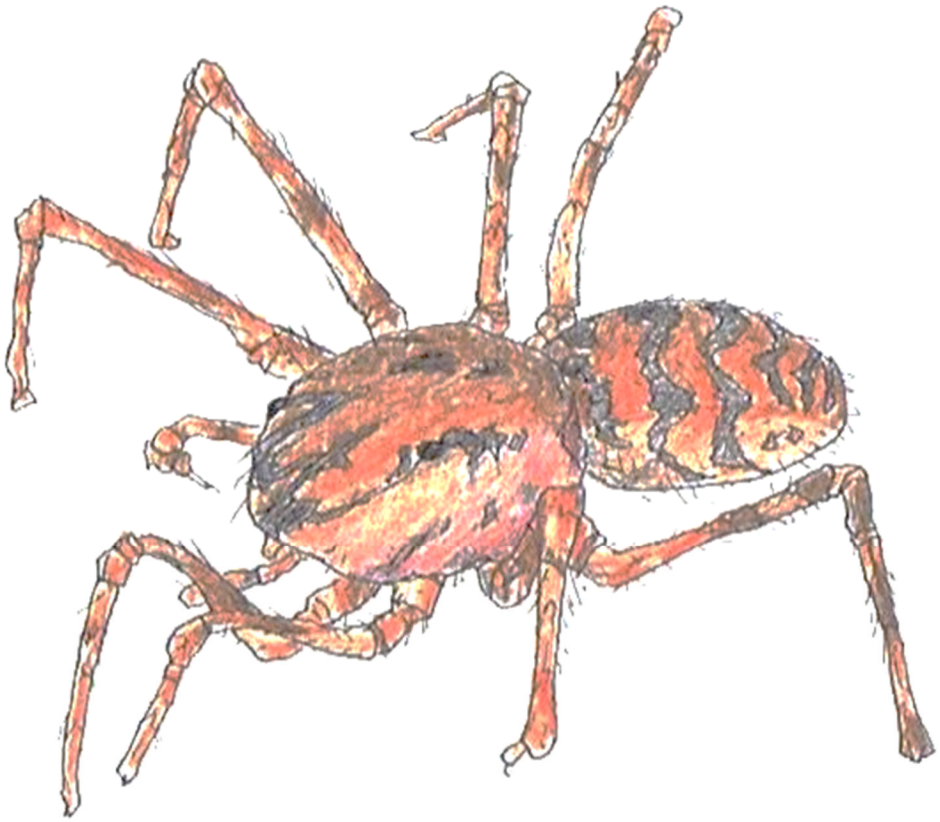
Mouse Spider- Human Biter- – Dangerous/Venomous
Not in USA

MOUSE SPIDER

Mouse Spiders are spiders of the genus Missulena. There are 11 known species in this genus, all but one of which are widespread across mainland Australia. Mouse Spiders can be found in both coastal and drier habitats, however, they do not occur in tropical rainforests. One species, Missulena tussulena, is found in Chile.

Mouse Spiders are a kind of Trapdoor spider and sometimes mistaken for Funnel Web spiders. Mouse Spiders are medium to large spiders, which range in length from 1 centimeter to 3 centimeters. Female Mouse Spiders are usually 3 centimeters long whereas males are smaller at around 2 centimeters long.

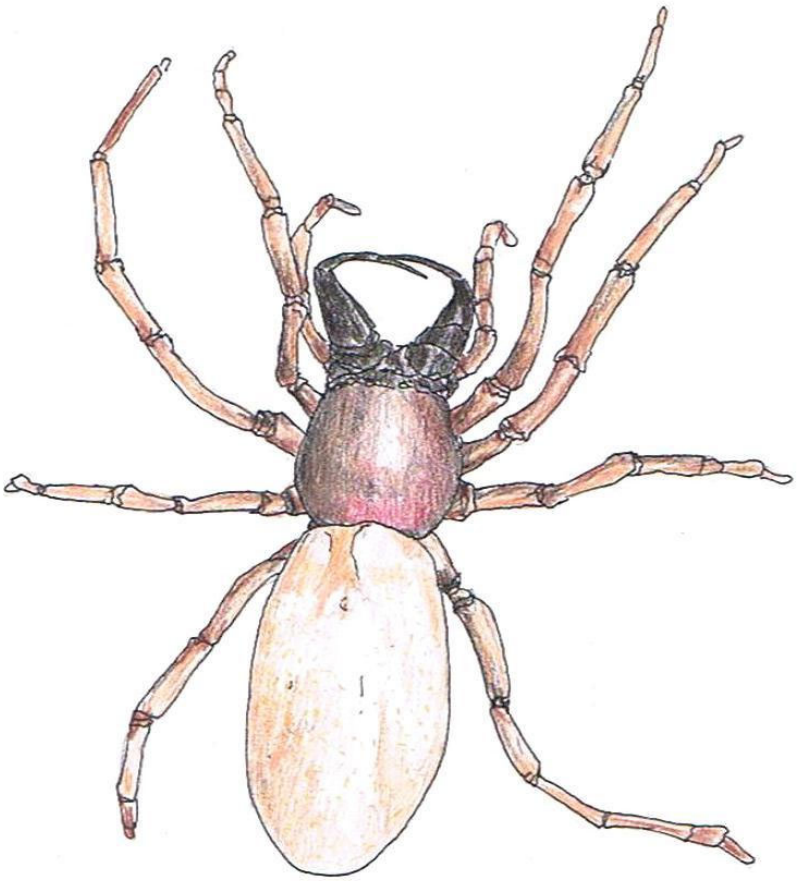
Six-Eyed Spiders



SPITTING SPIDER
(SCYTODES THORACICA)
An adult spitting spider with characteristic body coloration.

The spitting spiders (Scytodes spp.) are closely related to recluse spiders and have six eyes arranged in a similar pattern. However, they also have many black spots or lines on their bodies that would exclude them as recluses.

Seek medical attention if you think you have a spider bite. If possible, collect up the spider or what remains of it and take with you to your doctor or emergency clinic.



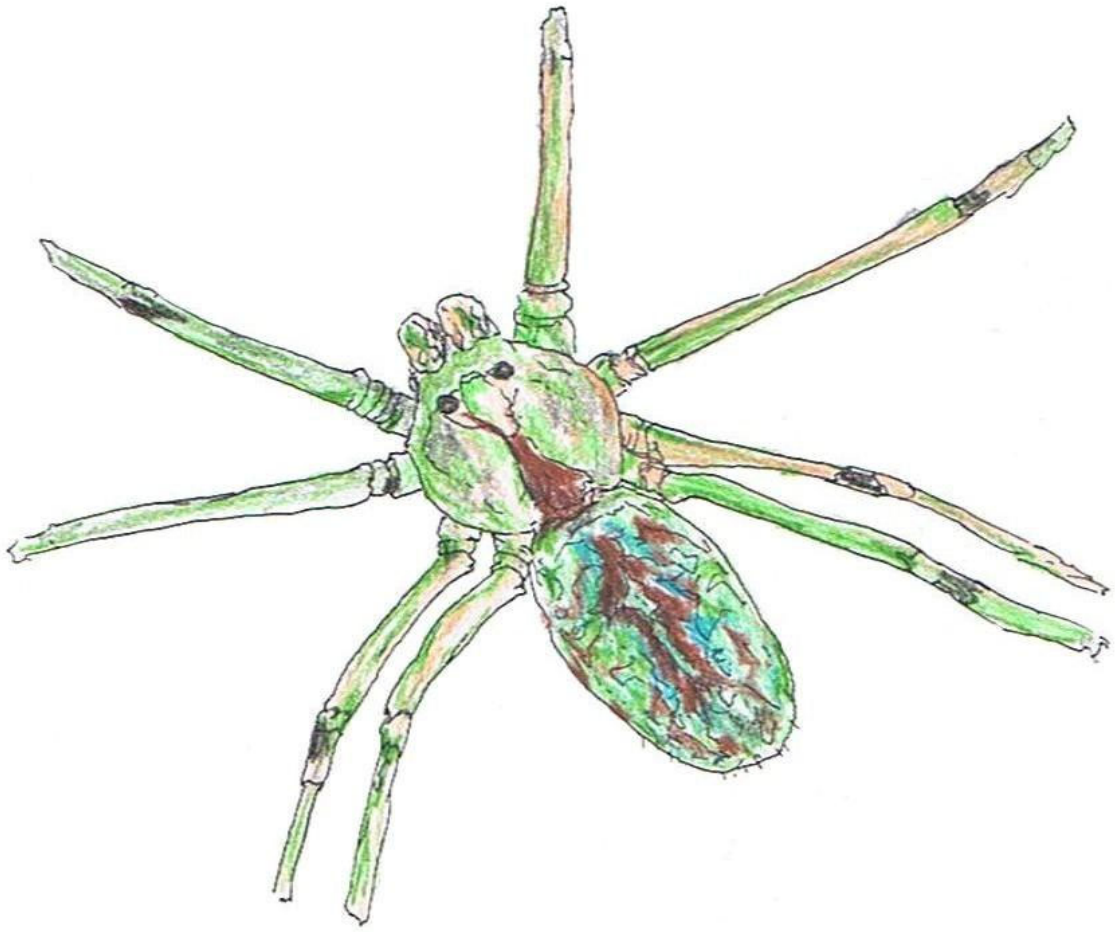
WOODLOUSE HUNTER
(DYSDERA CROCATA)

Woodlouse spider lacks any markings on its body.

The woodlouse spider, Dysdera crocata, has six eyes arranged in two groups of three (triads) and no bodily markings; nonetheless, it is commonly mistaken for a recluse in the United States.

Spiders with Violin-Shaped or Other Dark Markings
Many common tan or gray spiders have dark markings on the head region, which convinces people that they have caught a bona fide recluse spider. These spiders include cellar spiders (Psilochorus spp., Physocyclus spp.), pirate spiders (Mimetus spp.), and sheet web spiders (Linyphiidae). The marbled cellar spider, Holocnemus pluchei, also confuses people even though the dark marks are on the ventral (underside) not the dorsal (top) surface of the body.

Seek medical attention if you think you have a spider bite. If possible, collect up the spider or what remains of it and take with you to your doctor or emergency clinic.



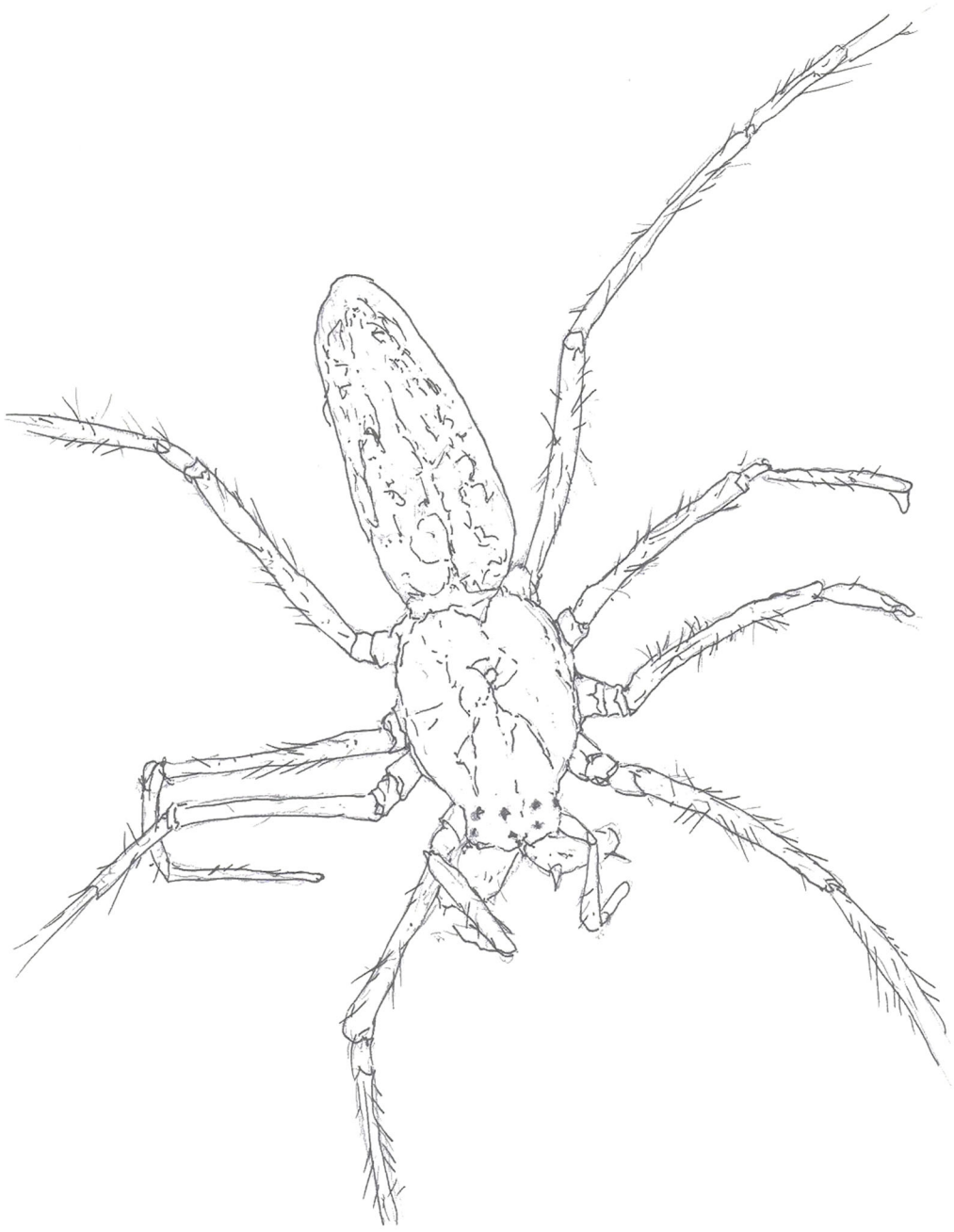
MARBLED CELLAR SPIDER
(HOLOCNEMUS PLUCHEI)

Cellar spiders have a darkened area on their cephalothorax (head region) but have 8 eyes.

Ubiquitous Brown Spiders
Virtually every spider that is tan or brown has been turned in as a potential brown recluse. There are hundreds of species of these spiders. They include ground spiders (Gnaphosidae), sac spiders (Cheiracanthium spp., Trachelas spp., and many of the liocranoid spiders), wolf spiders (Lycosidae), grass spiders (Agelenidae), orb weavers (Araneidae), and male crevice spiders (Filistatidae).

More specifically, males of both the western black widow (Latrodectus hesperus) and the false black widow (Steatoda grossa) are frequently brought in for recluse verification. All of these brown spiders have eight eyes and can quickly be eliminated from consideration.

Seek medical attention if you think you have a spider bite. If possible, collect up the spider or what remains of it and take with you to your doctor or emergency clinic.



LONG- JAWED ORB WEAVER SPECIES

Some of the spiders in this group that can cause a nasty bite include the running spider, jumping spider, wolf spider, tarantula, sac spider, orbweaver spider and the northwestern brown spider, also known as the hobo spider.

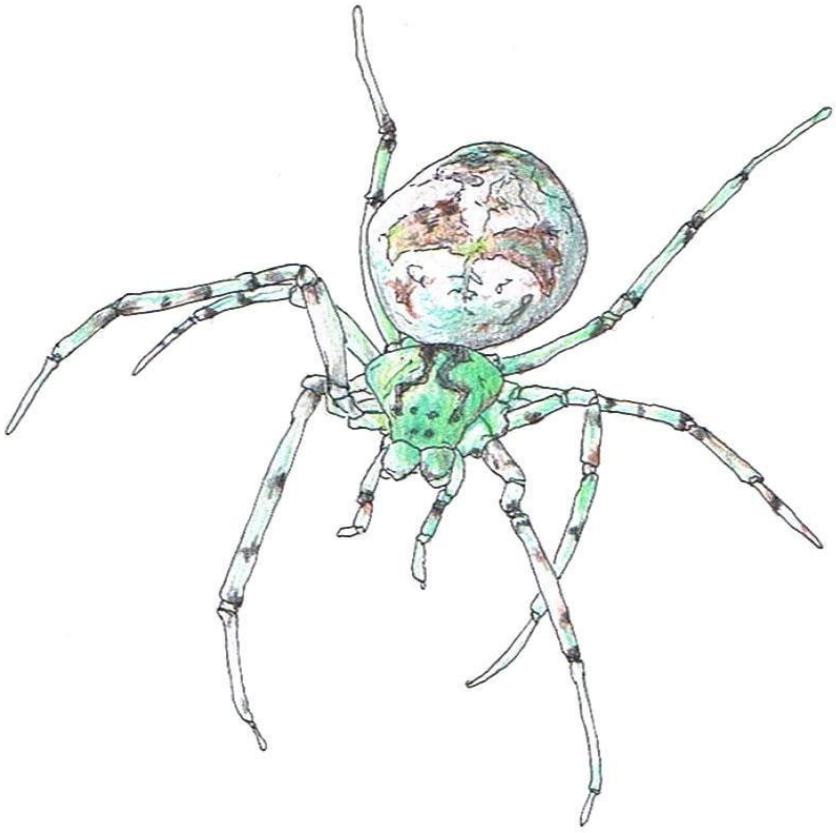
Orb Weavers Section (Araneidae) – Human Biters- Harmless

AMERICAN HOUSE SPIDER
CROSS-ORBWEAVER
(ARANEUS DIADEMATUS)

Individual spiders' coloring can range from extremely light yellow to very dark grey, but all European garden spiders have mottled markings across the back with five or more large white dots forming a cross.

The white dots result from cells that are filled with guanine, which is a byproduct of protein metabolism. The third pair of legs of garden spiders are specialized for assisting in the spinning of orb webs. These spiders also use them to move around on their web without getting stuck. These legs are useful only in the web; while on the ground, these legs are of little value.

Garden spiders have been known to stridulate when threatened. Since this tends to be a passive animal, it is difficult to provoke to bite- but if it does, the bite is just slightly unpleasant and completely harmless to humans.



ORBWEAVER SPECIES
(METELLINA SEGMENTATA)

Metellina (or Meta) segmentata. Is a colorful stretch spider that builds orb webs, and is often seen in late summer/autumn. The webs are built by the larger females who usually lie head down on the web, as in this photo, waiting for prey to get entangled in the web. The prey is then quickly captured and wrapped in silk before being eaten. Orb Spiders are said to eat their webs each night, along with many of the small insects stuck to it. They have been observed doing this within a couple of minutes. A new web is then spun in the morning. The much smaller male will approach the female cautiously in order to mate. If not careful, he could end up being eaten by her. Seek medical attention if you think you have a spider bite. If possible, collect up the spider or what remains of it and take with you to your doctor or emergency clinic.

Orb Weaving Spiders
Orb weavers (Family Araneidae) comprise a huge family of spiders, of which there are several hundred species in North America. These spiders vary greatly in color, shape and size, measuring between 2 - 30mm (1/16 -- 1 1/4") long. They have eight eyes arranged in two horizontal rows of four eyes each. The males are generally much smaller than the females and commonly lack the showy coloring of their fairer sex. They often spin their own smaller orb web near an outlying portion of the female's, and I've noticed most males give the females wide berth. Indeed, I rarely see male orb weavers, they are so reclusive.

Venom toxicity - the bite of Orb-Weaving Spiders is of low risk (not toxic) to humans. They are a non-aggressive group of spiders. Seldom bite. Be careful not to walk into their webs at night - the fright of this spider crawling over one's face can be terrifying and may cause a heart attack, particularly to the susceptible over 40 year olds.

Spider Identification - an adult is about 2/3 to more than 1 inch in body length - has a bulbous abdomen - often colorful - dark to light brown pattern. The common Golden Orb-Weaver Spider has a purplish bulbous abdomen with fine hairs.

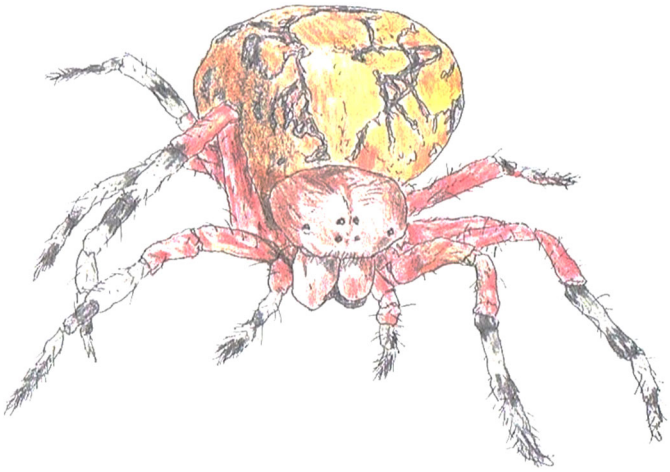
Habitat - often found in summer in garden areas around the home - they spin a large circular web of 6 feet or more, often between buildings and shrubs, to snare flying insects, such as, flies and mosquitoes.

SPINYBACK ORBWEAVER
(GASTERACACANTHA CANCRIFORMIS)

Gasteracantha cancriformis. This is a female orb weaving spider. Like Micrathena gracilis, it also has spines on its abdomen. Some of the spiders in this group that can cause a nasty bite include the running spider, jumping spider, wolf spider, tarantula, sac spider, orbweaver spider and the northwestern brown spider, also known as the hobo spider.

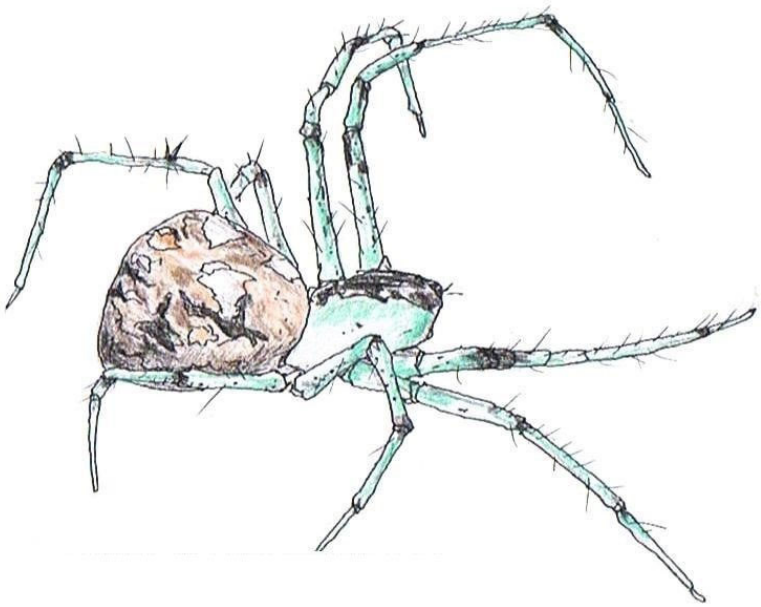
SHAMROCK SPIDER
(ARANEUA TRIFOLIUM)

Aranea trifolium is commonly named the shamrock spider. She is a rather large orb-weaver. She is off-white with dark median longitudinal stripe and with dark marginal stripes. Legs are white to yellow with dark annulations. Abdomen off-white, reddish or purplish, sometimes greenish. Colored specimens usually with paired and unpaired angular white spots. venter dark, usually unmarked.



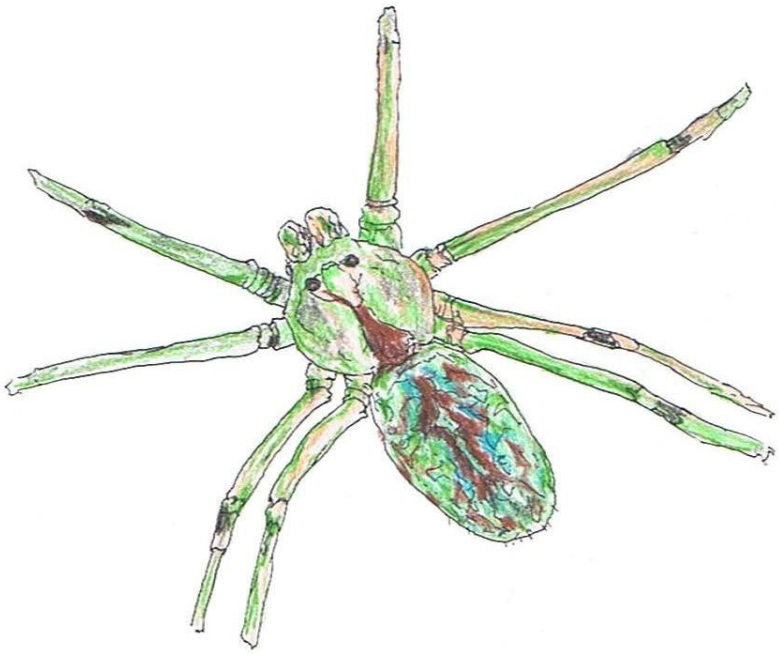
ORANGE GARDEN SPIDER
(ARANEA GIGAS)

Hentzia basilica Those who have seen a spider of this species spin its web indicate that it first produces a horizontal orb having more than 50 radii; then it attaches numerous silk threads to the outer portions of the orb, pulls them downward, and anchors them; finally it connects numerous silk threads to the more central parts of the orb, pulls them upward, and fastens them. The appearance of the final dome-shaped web with the supporting lines led to Basilica Spider as its common name.

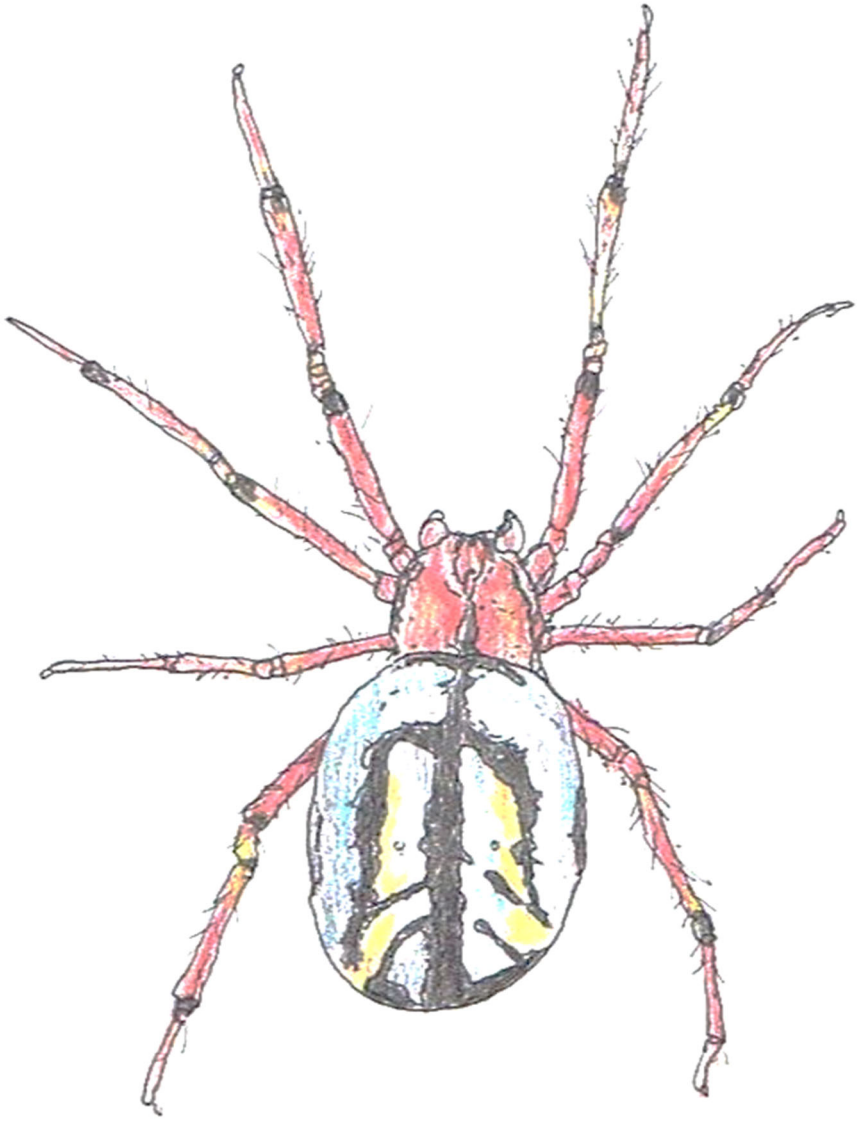


BOWL & DOILY SPIDER
(MIMETUS INTERFECTOR)

Mimetus interfector. It is an unusual spider in that it climbs into the webs of other spiders (usually orb weavers) and preys upon them. Thus, to obtain food, it does not spin a web of its own.



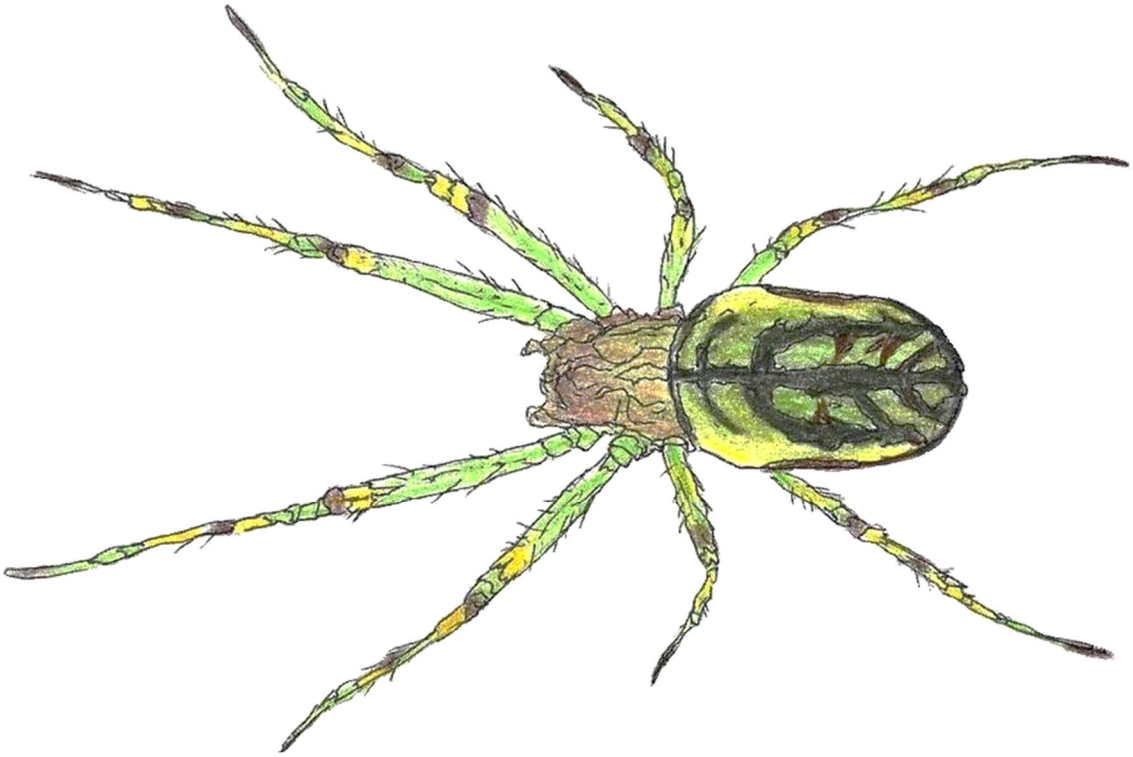
MARBLED CLEEAR SPIDER
(HOLOCNEMUS PLUCHEI)



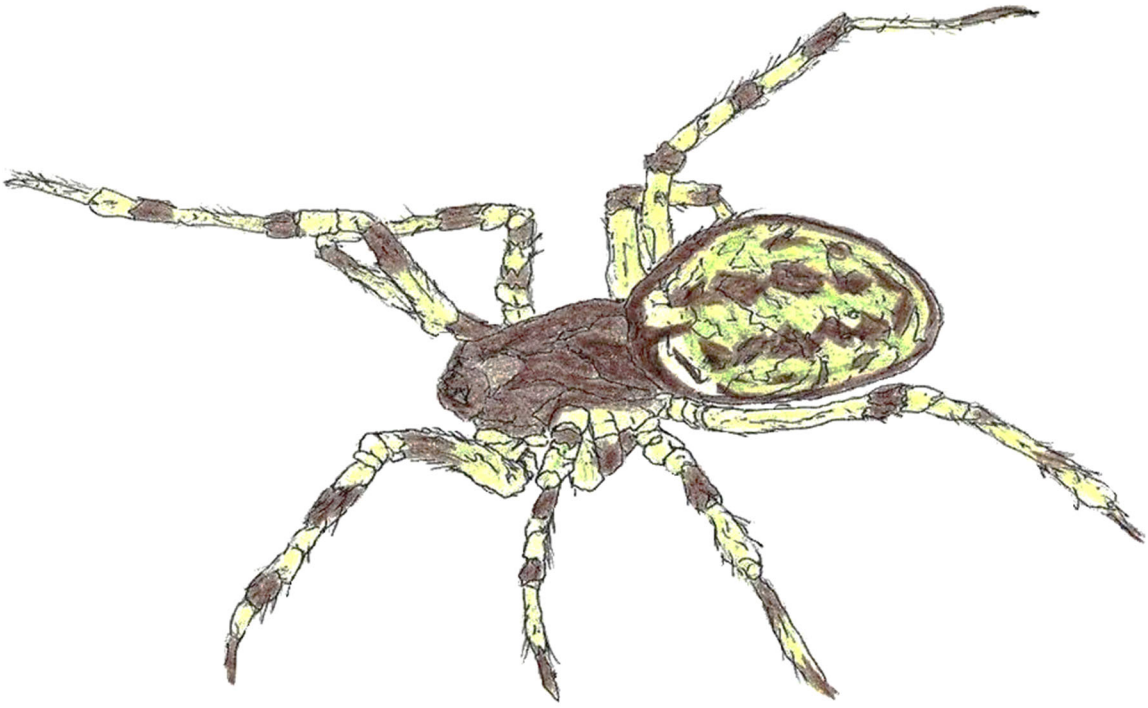
ORCHARD SPIDER
(LEUCAUGE VENUSTA)

The Orchard spider (*Leucauge venusta*) is a long-jawed, orbweaver spider that may be found from the East Coast, reaching into the central US. The web is often oriented horizontally, with the spider hanging down in the center.

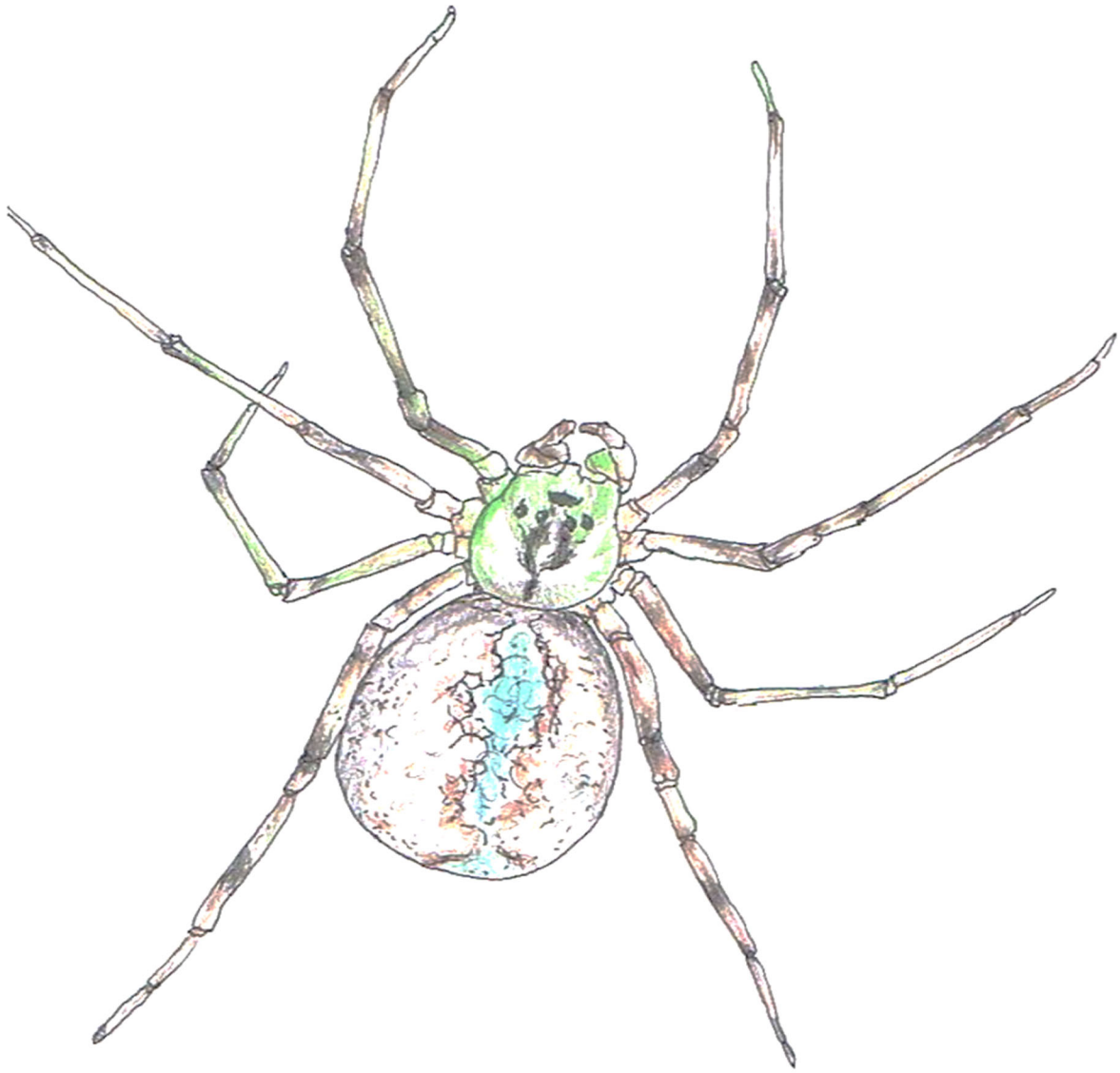
The neon yellow, orange, or red spots on the rear of the abdomen are variable in size among individuals and sometimes absent. This species is parasitized by a wasp larva, which attaches itself externally at the junction of the cephalothorax and abdomen.



ORCHARD SPIDER



AMERICAN HOUSE SPIDER



HAMMOCK SPIDER
(LINYPHIA PHRYGIANA)

This is a common group of small spiders (order Araneida), numbering about 2,000 species throughout the world. Most are less than 6 mm ($^1/_4$ inch) in length and are seldom seen. Their webs are flat and sheet like and dome- or cup-shaped. The spider is usually found on the lower side of the web and often between two layers of webbing. The hammock spider (*Linyphia phrygiana*), native to North America, builds a hammock-shaped web.

Joro Spider – Human Biter

Trichonephila clavata, also known as the **Jorō spider** *Jorō-gumo*), is a member of the Trichonephila genus. The spider can be found throughout Japan (except Hokkaidō), in Korea, Taiwan, China and, since 2014, in northeast Georgia and western South Carolina in North America. Due to its large size and the bright, unique colors of the female *Trichonephila*, the spider is well-favored in Japan.

Joro Spider

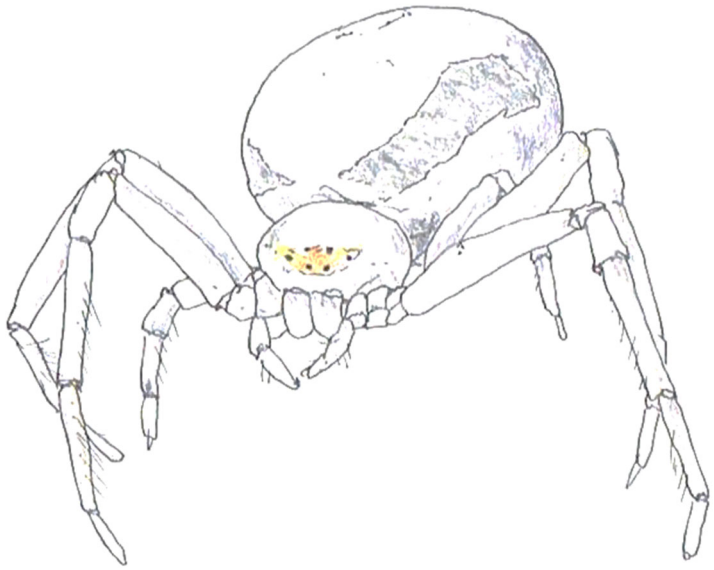
Arrival in America
In 2014, scientists confirmed the first known occurrence of *T. clavata* in North America. In 2019, this species was moved from the genus *Nephila* to *Trichonephila*. *T. clavata*'s congener *Trichonephila plumipes* is commonly found in Australia. It was also moved from *Nephila* to *Trichonephila*, along with other 11 species including *T. clavata.*

Trichonephila clavata pass winter as eggs and scatter as tiny juveniles in the spring. The adult female's body size is 17–25 mm, while the male's is 7–10 mm. The web of females can reach several meters in length; the yellow threads appear rich gold in sunlight. The structure of the web seen in cross-section is unusual for an orb web; it has three layers: the central orb, plus two irregular layers in front and behind the orb.

Female Description
The adult female individual has stripes of yellow and dark blue, with red towards the rear of the abdomen. In autumn, smaller males may be seen in the females' webs for copulating. After mating, the female spins an egg sack on a tree, laying 400 - 1500 eggs in one sack. The lifecycle ends by late autumn or early winter. Although the spider is not aggressive, they will bite to protect themselves. The bite is considered painful but not life-threatening

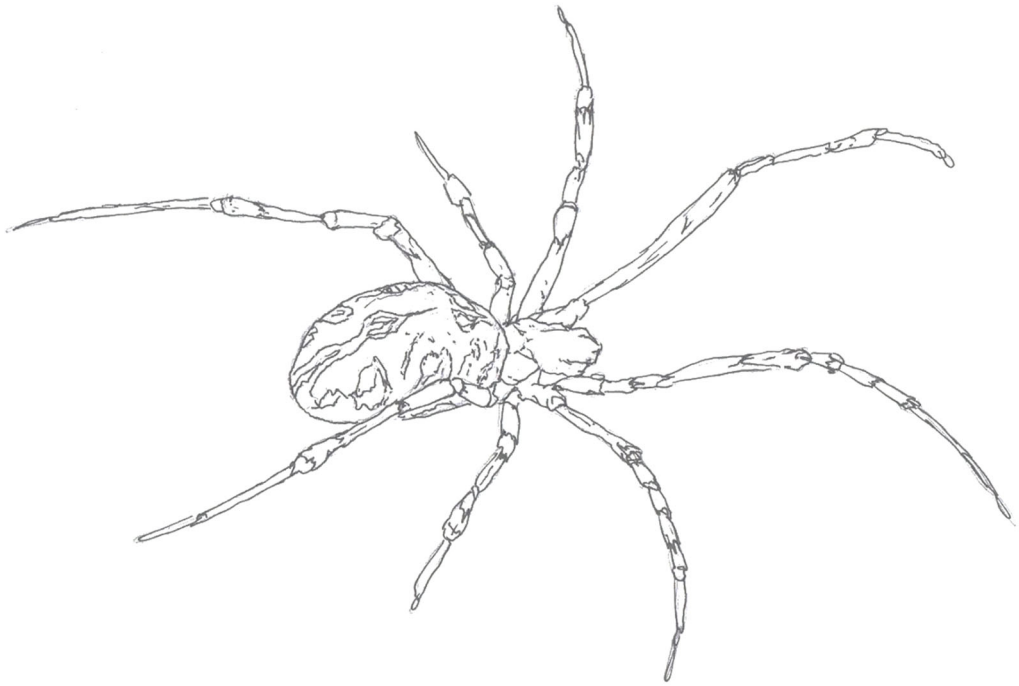
This spider has become an invasive species in northeast Georgia and western South Carolina in North America. They were first spotted in 2013 in Hoschton, Georgia. Since then the spiders have been spotted in numerous locations in northeast Georgia and also in Greenville, South Carolina. It is believed that species will become naturalized. Their impact on their new ecosystem is unknown as of 2020. They have been observed catching the Brown marmorated stink bug, another invasive species that native spiders have not been known to eat.

Joro Spider, looks like a Wasp Spider

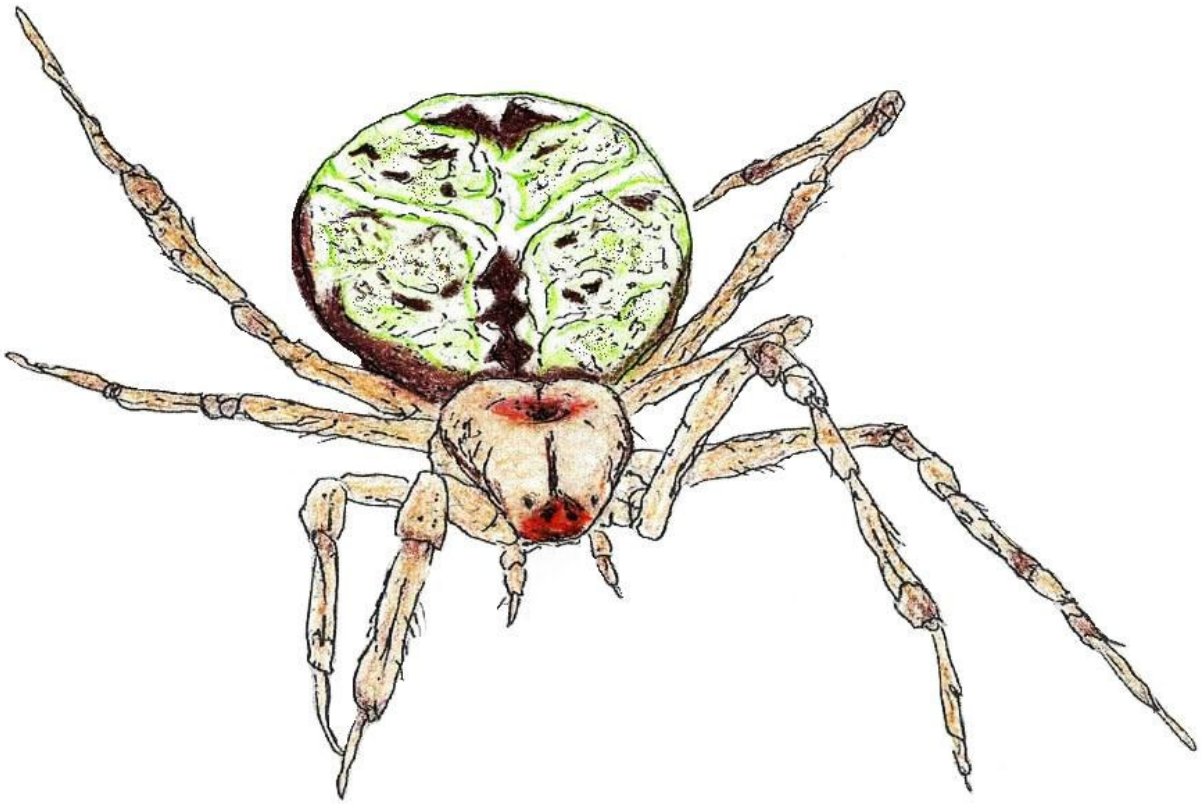


CRAB SPIDER
(MISUMENA VATIA)

Misumena vatia is one of the crab spiders. Crab spiders are masters of disguise, and some, such as this one, they can gradually change their color to that of the flower in which they hide to ambush unobservant insects.

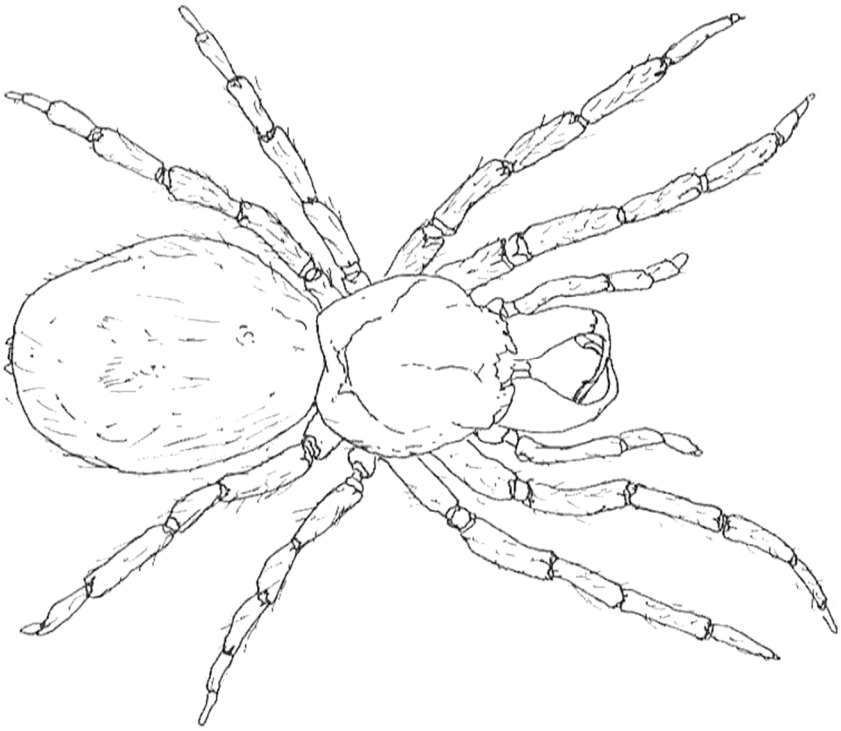


BROWN WIDOW SPIDER



THERIDION FORDUM

Parson Spiders – Human Biter- Mostly Harmless

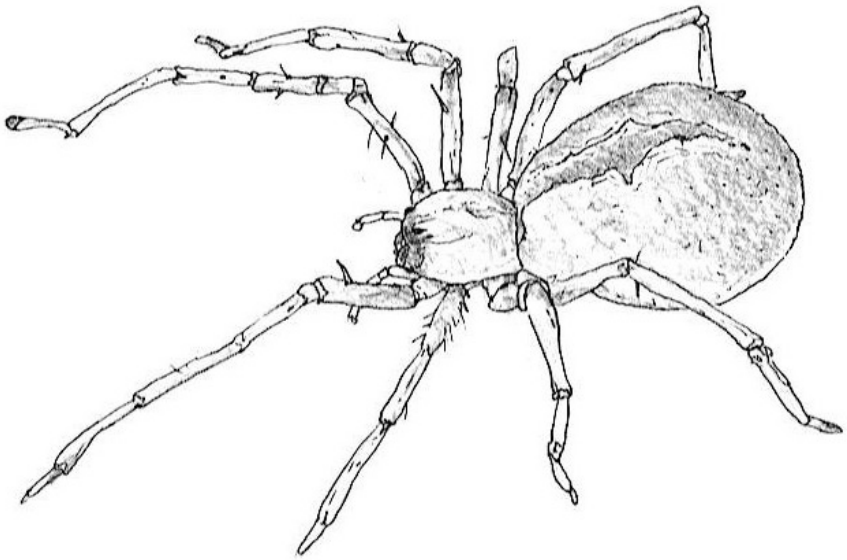


PARSON SPIDER
(HEPYLLUS ECCLESIASTICUS)

The parson spider is a nuisance in homes and is generally nontoxic; although some people may experience allergic reactions to the bites. The parson spider is about 1/2 inch long and may vary in color from brown to black. The front segment of the body tends to be a chestnut color, while the abdomen is grayish, with a distinctive white or pink pattern along its middle. The body is covered with fine hairs, giving a velvety appearance. The parson spider is usually found outdoors under rocks or in piles of brush or firewood. This spider does not spin a web, but wanders on the ground in search of prey.

Indoors, this spider wanders about at night and conceals itself beneath objects or in clothing during the day. Most bites from this spider occur at night or when it is trapped in clothing. While the parson spider is not considered poisonous, bite symptoms vary in severity.

Some people may experience localized allergic swelling and itching, in addition to initial pain. A few persons may experience excessive swelling, nervousness, nausea, sweating, and elevated temperatures from the bites.



SAC SPIDER
(CHEIRACONTHIUM MILDEI)

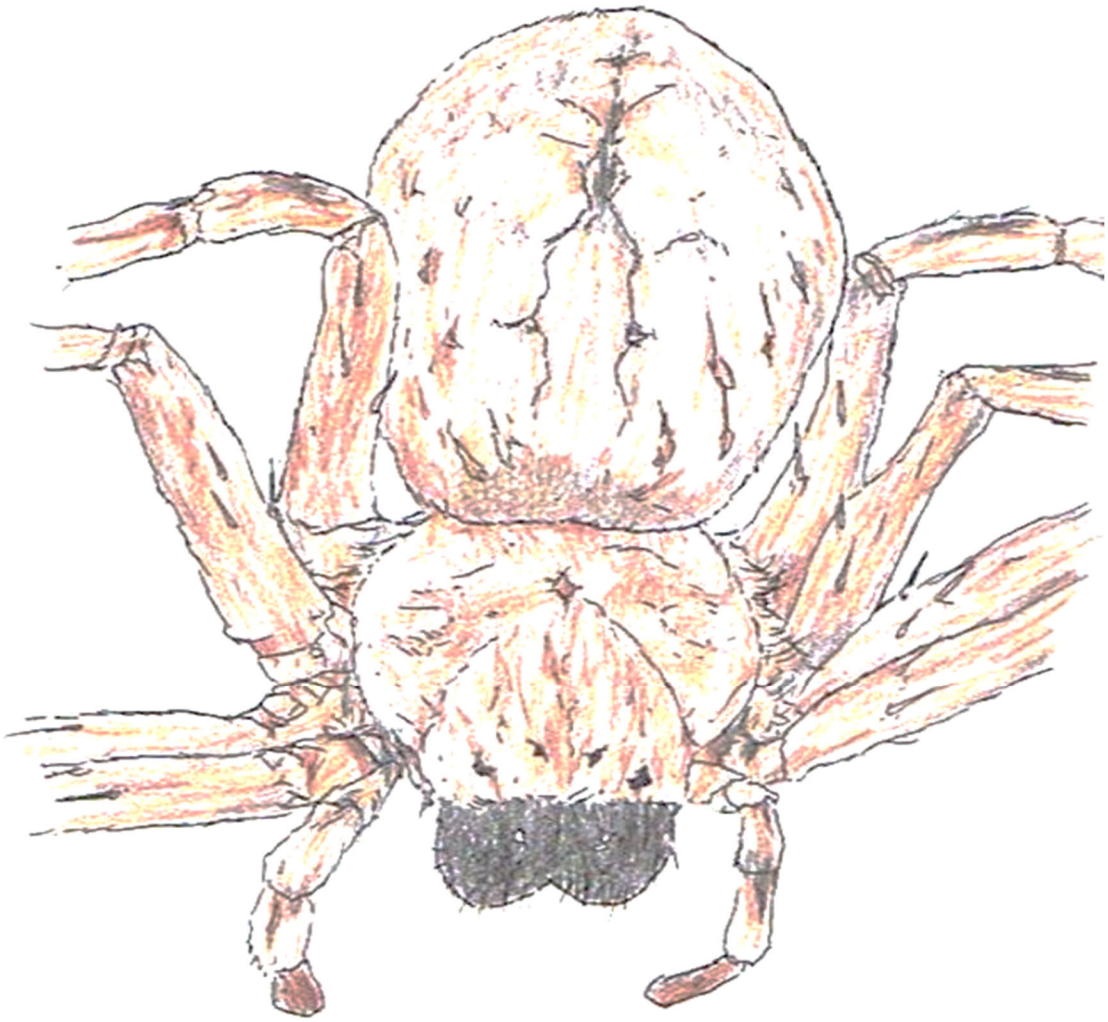
Sac Spiders

Some members of this group of spiders are quite common in homes. These spiders are light or dark-colored and have a darker coloration on the cephalic (head) region. The body is covered with short hairs, which give it a silky appearance.

The nighttime feeding behavior of sac spiders is similar to that of the parson spider. These spiders do not capture prey in webs, but actively hunt their prey at night. During the day, they hide in tubular silken capsules that they construct, which gives them their common name. You may be able to find silken capsules on walls, ceiling, draperies, and other locations. Bites from these spiders may result in localized allergic reactions in some individuals.

Crab Spider Section

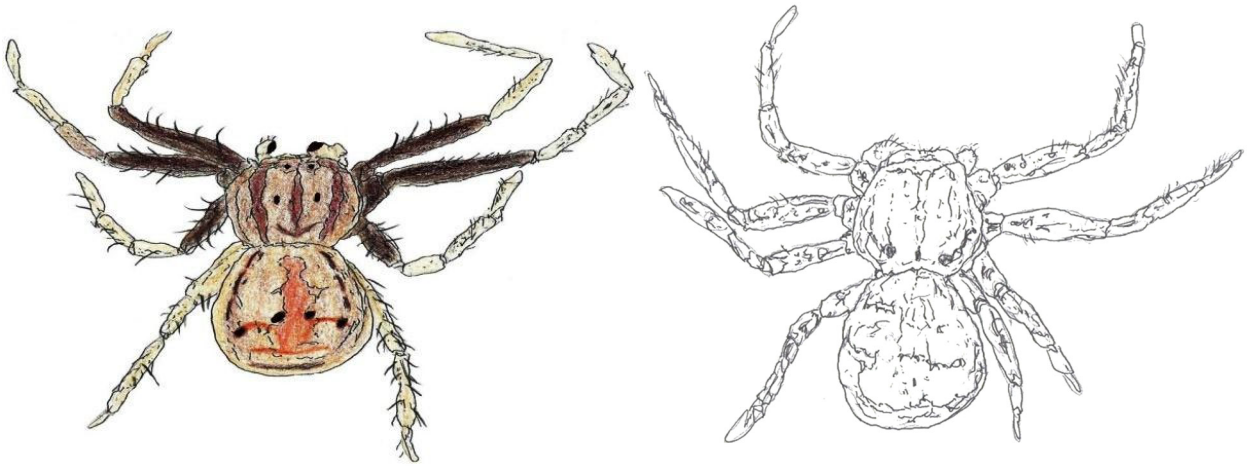
CRAB SPIDERS



GIANT CRAB SPIDER
(OILIOS GIGANTEUS)

Crab Spider
Small crab spiders are dark or tan; some are lightly colored orange, yellow or creamy white. Their legs extend out from their sides causing them to scuttle back and forth in a crab-like fashion. These spiders hide in flower blossoms and may be brought inside in cut flowers.

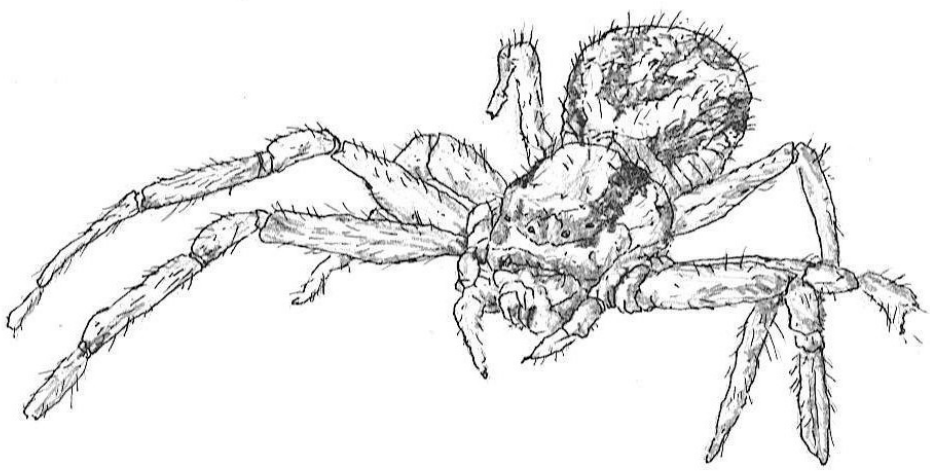
These spiders catch prey in open flowers. They catch insects, such as bees, flies, and butterflies, which come to the flower for nectar. Crab spiders are capable of camouflage changing color to match the color of the flower. They can change to white, yellow, or pink within several days. One of the best ways to find crab spiders is by looking in flowers for insects that seem to be at an odd angle these are insects that are being eaten! Crab spiders are distinguished by their sideways, crab-like walk.



XYSTICUS LUCTANS **XYSTICUS FEROX**

Xysticus luctans (left) and ***Xysticus ferox*** (right) (Comstock, pp. 549-551) are small crab spiders. The crab-like reach of its legs is useful for grabbing its prey and holding on until its venom has its effect. The bees and other insects that crab spiders attack in flowers are generally quite a bit larger than the crab spider itself. Thus, crab spiders can easily lose part of a foreleg even when their victim is overcome. Given time, they have the ability to regrow missing parts of limbs.

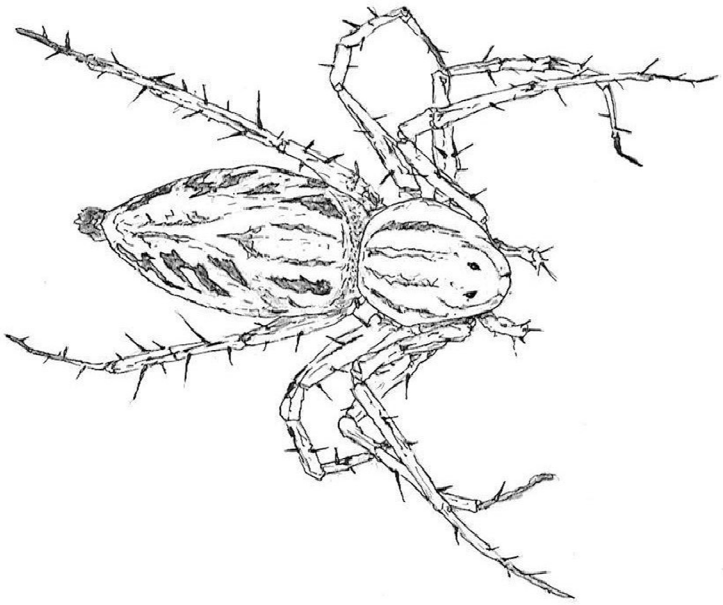
CRAB SPIDER SPECIES



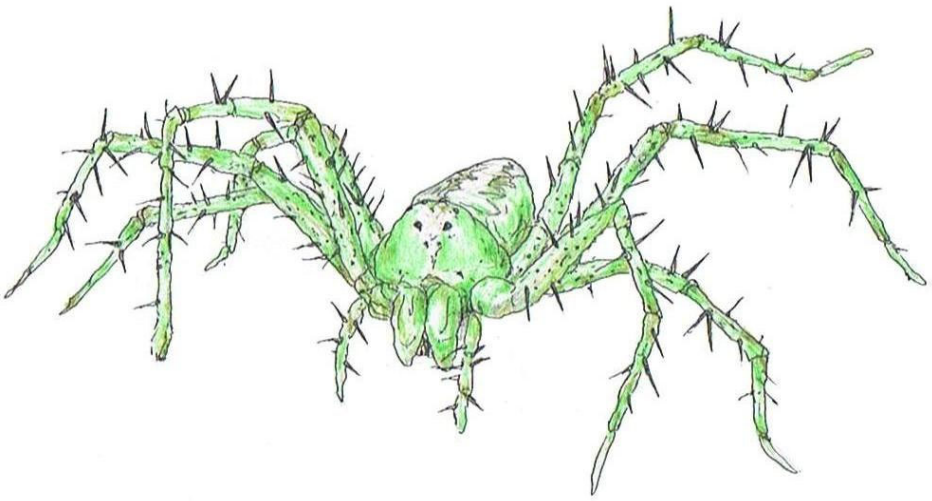
CRAB SPIDER ***(Misumenops Asperatus)***

One of the “flower spiders” (so-called because they generally hunt in similarly colored flowers for visitors such as bees and flies, and they are very happy), ***Misumenops asperatus*** is a much smaller relative of the better-known goldenrod spider *Misumena vatia*.

M. asperatus is easily told by the markings on its abdomen (a "capped" V, with the point of the V at the end of the somewhat angular abdomen) and its striped legs. The background colors of the abdomen is often whitish or even a pale greenish color, in contrast to its larger relatives, which may be white, but are more often yellow.



LYNX SPIDER
(OXYOPES SALTICUS)



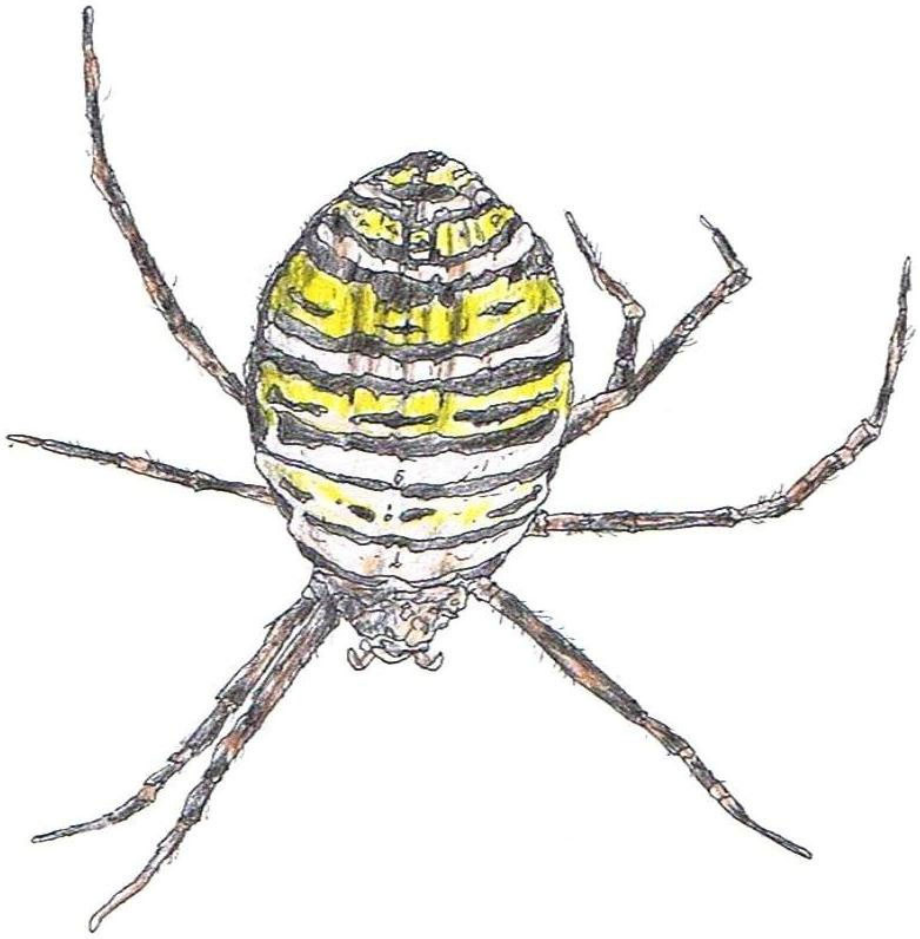
GREEN LYNX SPIDER
(PEUCETIA VIRIDANS)

Peucetia viridans is one of the Lynx spiders. They catch their prey in several ways. They can run rapidly about plants and jump from branch to nearby branch and they can wait in ambush (like a wildcat) and drop down on their prey. This species has an interesting eye arrangement with two small eyes in front, then two larger eyes behind them, and a row of four eyes behind them. This is a large spider, and it has excellent vision as well as depth perception.

MICRATHENA GRACILIS

Micrathena gracilis Unlike various insects where numerous similar species can occur, there appear to be relatively few species of spiders that give similar difficulty. However, the names of more than a few spiders have led to controversy among experts. While Professor Comstock's book lacks some of the latest professionally approved scientific names, its descriptions are accurate and very useful (Reference: Professor Comstock's "*The Spider Book*").

Miranda aurantia (Comstock, pp. 448-452) has been given the common names: the "Orange Garden Spider," the "Black and Yellow Garden Spider," “Zig Zag Spider,” and the "Writing Spider". The female shown above is a large orb-weaving spider. Its web is frequently found constructed close to the ground in grassy fields in late summer and early autumn when grasshoppers are abundant. From the time a grasshopper lands in its web, it takes the spider just a few seconds to wrap the grasshopper in a shroud of silk and store it for later consumption. To illustrate how different names have been used, B. J. Kaston in "*The Spiders*," (William Brown Col. Publishers, Dubuque, Iowa, Second Edition, 1972) refers on page 172 to this spider as Argiope aurantia. Photo from Rusty Randall.

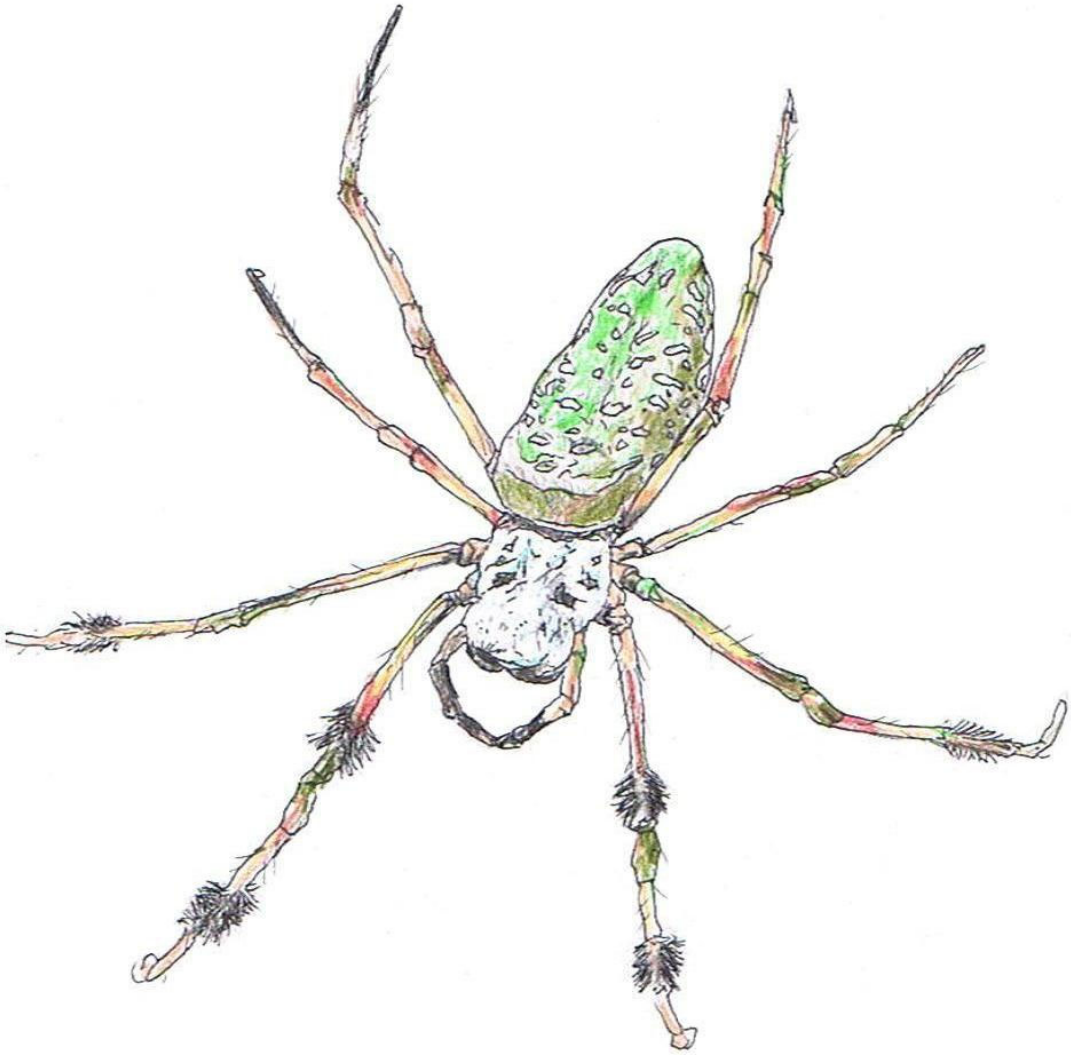


BANDED GARDEN SPIDER
(ARGIOPE TRIFASCIATA)

Argiope aurantia and ***Argiope trifasciata*** are common spiders throughout most of the US. They can often be found building webs side by side, but *A. trifasciata* tends to favor slightly drier habitats. *A. trifasciata* lacks the strong black patches of *A. aurantia*, although it often has thin black bands on its abdomen.

While *A. aurantia* includes a stabilimentum in almost every single web it builds, *A. trifasciata* only sometimes builds a stabilimentum. Silk stabilimenta can be a good defense against predators but also cost spiders prey so they have to decide carefully whether or not to include a stabilimentum in each web. *Argiope* uses its past foraging success to help make this decision. Hungry spiders, which most need to capture prey, are less likely to build stabilimenta.

Metargiope trifasciata is also known as the Banded Garden Spider.

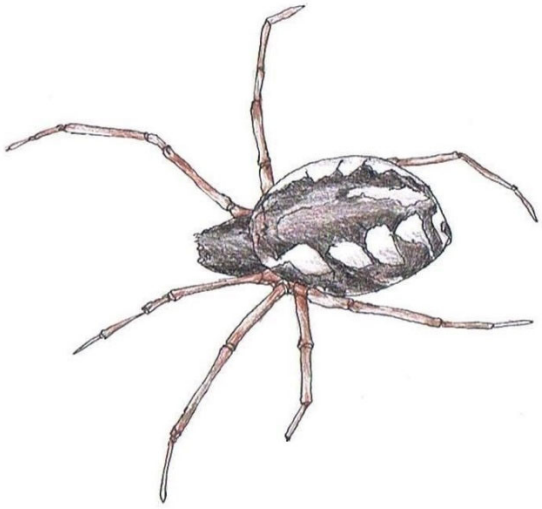


GOLDEN SILK SPIDER
(NEPHILA CLAVIPES)

Nephila clavipes Is a very large orb-weaving southern spider whose web is unusually strong. Small birds can even become fatally trapped. Because the lowest part of its web is usually at least 7 feet above the ground, with long support threads between tall shrubs or trees, it creates an interesting silhouette against a blue sky, particularly when the sun is low in the sky. It has remarkable tufts of hair in patches on its legs.

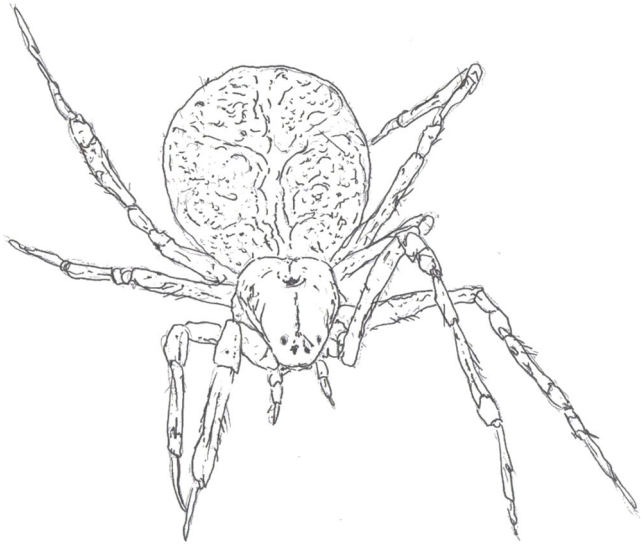
When its strong web is freshly made, has the unusual character that the spiral strands make angles with the radial strands that are closer to right angles than is the case with other orb-weavers.

Tetragnatha elongata (Comstock, pp. 425-426) Has its chelacerae conspicuously extend forward. Its two fangs are at the ends of the two chelacerae. This is an orb-weaving spider that, unlike the orb weavers of most other genera, spins its web in a plane that is tilted about 45 degrees from the vertical and usually positions it near or over a body of water, such as a creek or lake.



BOWL & DOILY SPIDER
(LINYPHIA COMMUNIS)

Linyphia communis the spider's common name of bowl-and-doily spider. When waiting for a prey, it resides on the bowl-like upper portion. Captured insects are usually ones that have flown between the bowl and doily parts of the web and become trapped therein, or on the top of the doily. From the spider's position on the bowl, it walks on the bowl until it is above the trapped insect and then approaches the insect directly.



THERIDION FORDUM

Theridion fordum (Comstock, pp. 361-362) It is a near (but much larger) relative of the common house spider (Theridion tepadariorum) and has a similar helter-skelter type of web. Its web is certainly not confined to one plane, as in the case of orb-weavers, and it does not have a simple geometric outline as, for example, the two parts to the web of the bowl-and-doily spider.

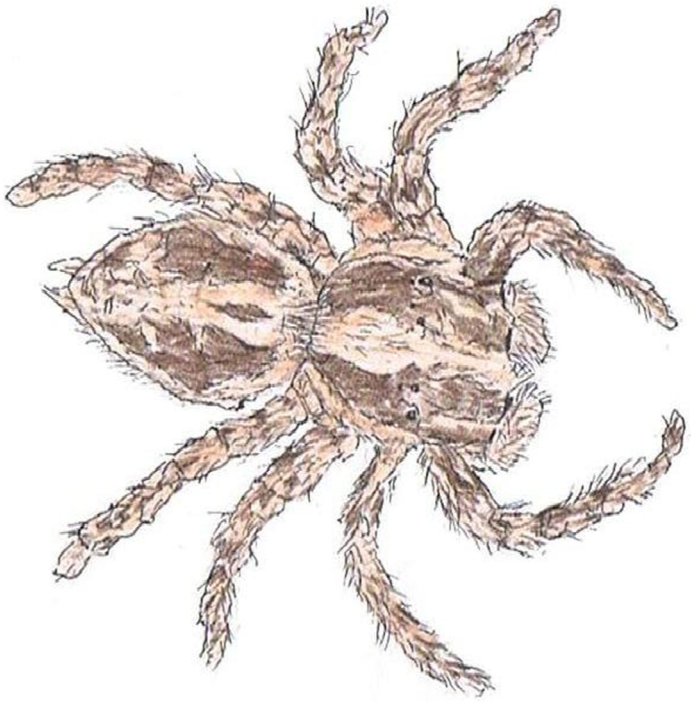
Jumping Spider Section – Human Biters

JUMPING SPIDER
(THIODINA SYLVANA

Jumping spiders appear to operate in a stealth mode, moving and turning slowly to face objects of interest in their surroundings. This genus of spiders is known for their scanning telescopic anterior medial eyes, and both extension and retraction of the articulated foot pads. A God-designed hunting machine that will hunt other spiders.

Phidippus audax (Comstock, pp. 689-690) is a type of jumping spider. Unlike spiders that spin a web to catch their prey, the vision of jumping spiders (and wolf spiders) is excellent. Jumping spiders like to turn and look directly at the person who is taking their photograph.

You may have noticed the greatest variety of jumping spiders at golf courses in the autumn of years having drought conditions, where such spiders can be observed on golf-ball washers waiting for an insect to land for moisture. Then the jump is short and precise. By attaching a silk line to the washer, they can jump, catch their prey, swing around on the line with their prey in their fangs, and climb right up the short silk line to their starting point on the washer.



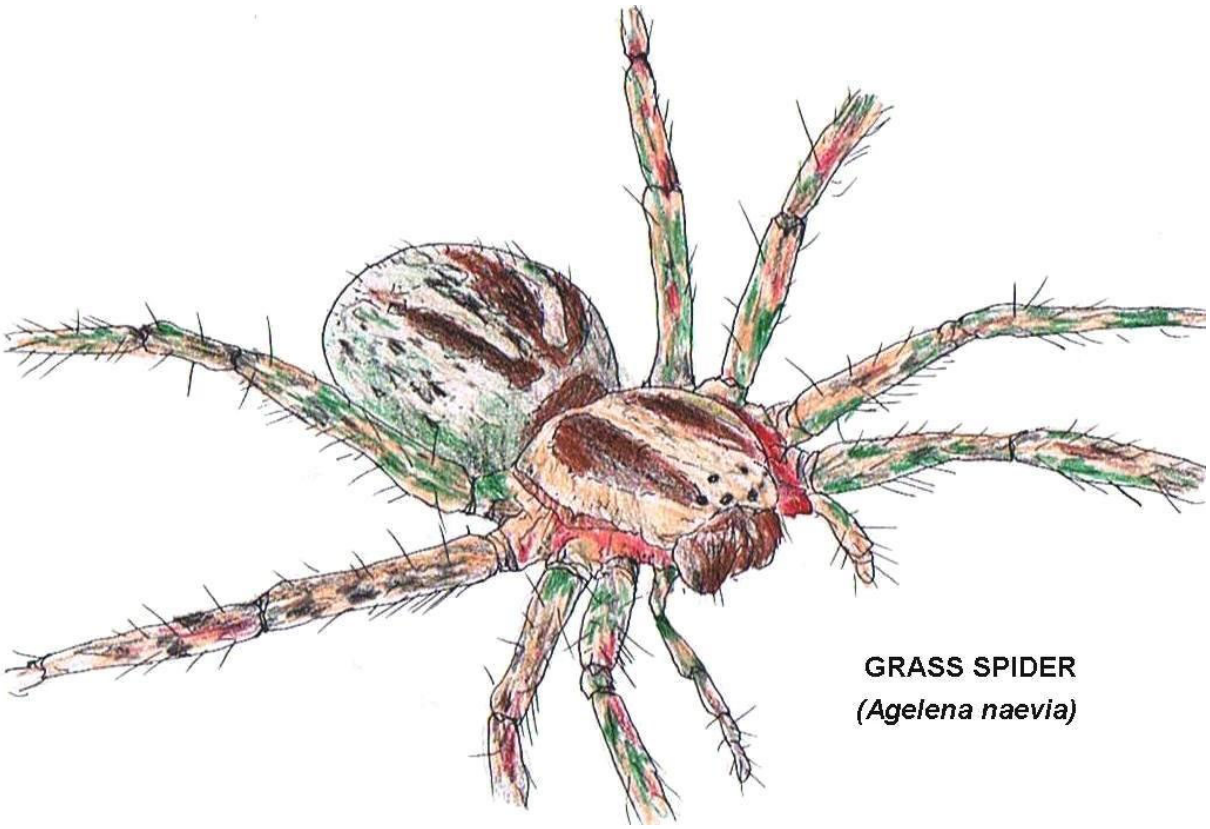
PANTROPICAL JUMPING SPIDER
(PLEXIPPUS PAYKULLI)

Plexippus paykulli The four largest of the eight simple eyes are clearly visible. The other four are much smaller ones behind them and are not noticeable here.

Spiders have eight legs, two chelicerae (the first two appendages of the head, here iridescent greenish-blue) having retracted fangs at their extremities, and two pedipalps, which are short appendages attached to the head on each side of chelicerae. Here, the tips of the pedipalps are enlarged. This distinguishes male spiders from female spiders of all species. Usually, a mature female spider is from somewhat to considerably larger than a mature male spider of the same species. In the case of jumping spiders, the size difference is less accentuated.

Grass Spider Section

GRASS SPIDER
LOOKS LIKE WOLF SPIDER



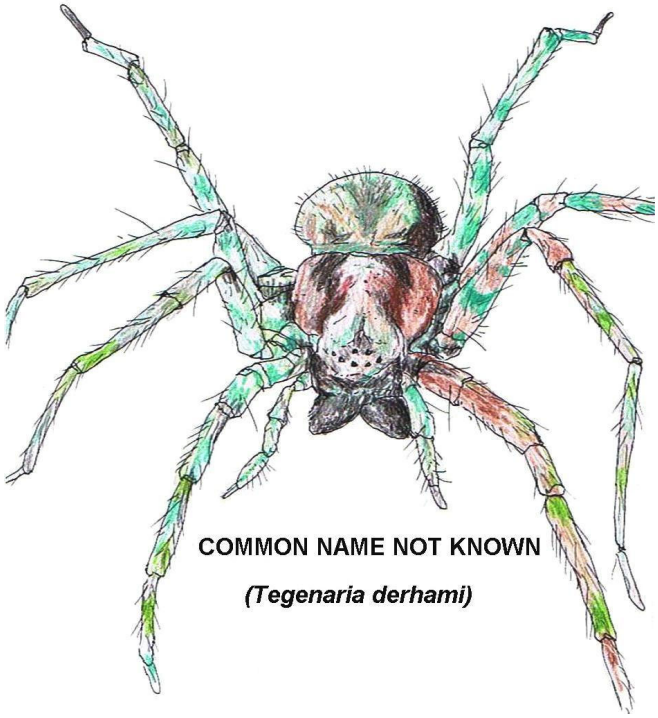
Grass spiders have scientific name Agelenidae, which means saccadic running. Other siblings, in general, move straightly and constantly. These arthropods are also known as funnel weaver spiders. They are dark-yellowish with prolonged cephalothorax and banded limbs. Their front legs are usually longer than hind ones. Male species are at a maximum of 2 cm in size. As for females, they are 1 cm longer. The most distinctive feature is that grass spiders have dark stripes on their back, which stretch from a rear part to its front. Babies don't possess such a trait. Adult species are often mistaken for wolf spiders.

Agelena naevia is commonly called the grass spider. It constructs a web over which it can run quite rapidly. When waiting for prey, it resides hidden in the funnel portion at the upper left of center. When it detects that some part of its web has undergone at least a small relative motion, it emerges rapidly from the inner portion of the funnel and, guided by web vibrations, runs rapidly to the area of disturbance before its visual reflexes dictate what it should then do.

For example, a gentle touch of the web with the tip of a pencil will bring the spider out of its funnel over to the pencil tip in a fraction of a second, before the spider quickly retreats to its hiding place.

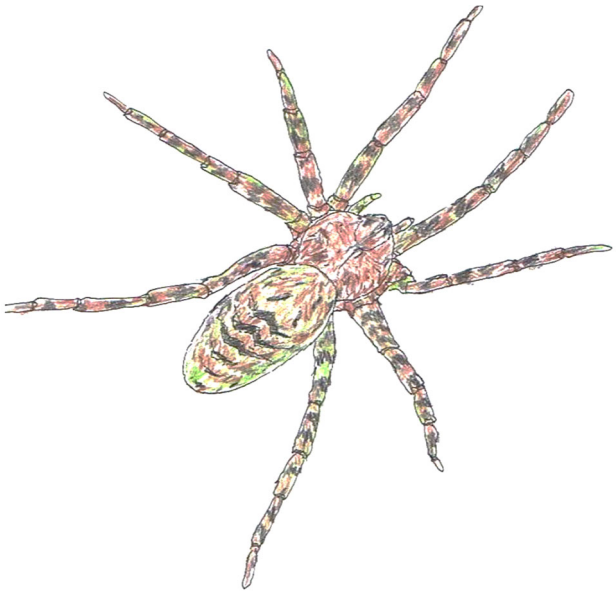
Because the web is reasonably horizontal and without gaps, the spider can run rapidly without concern for the particular strands on which it places its feet. Of course, the eye arrangement of spiders corresponds to their hunting styles.

Grass spiders have their eight simple eyes of approximately the same size arranged in two rows of four each. Jumping spiders have excellent vision; for them depth perception is important. Wolf spiders, photographs of which will be encountered later, run over the ground the way grass spiders run over their web. The eye arrangement of wolf spiders is somewhat like that of grass spiders and their vision is also good.

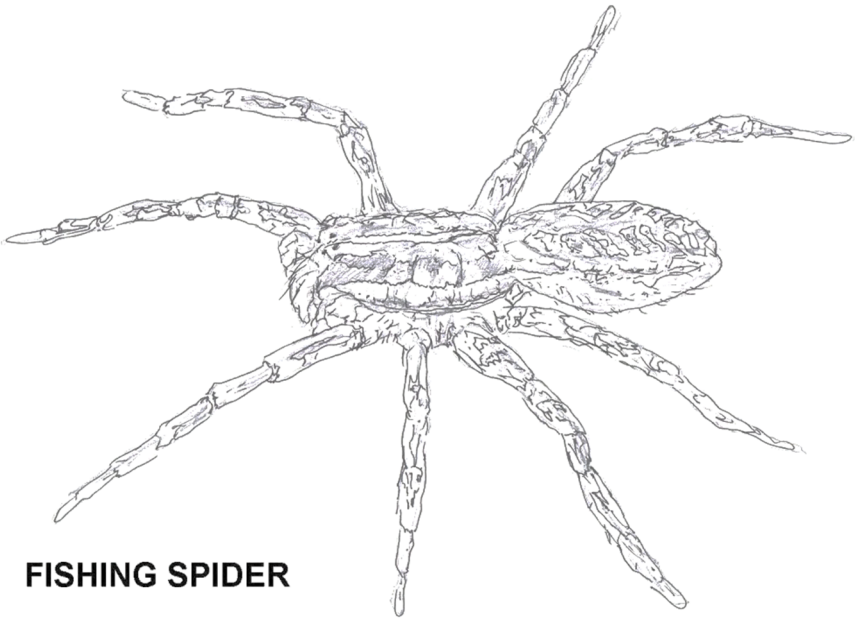


Tegenaria derhami. This spider spins a web somewhat like that of a grass spider and employs similar tactics.

Fishing Spider Section – Human Biter



FISHING SPIDER
(DOLOMEDES TENEBROSUS



FISHING SPIDER

One of the so-called fishing spiders. They have the ability to run rapidly on the surface of the water in undisturbed pools of creeks and ponds. The nature of their feet and the surface tension of the water make this possible. Their eight simple eyes are clearly arranged in two curved rows, with the eyes in the second row somewhat larger. Their vision is excellent and of a far-sighted character. For that reason, their hunting style on water is like that of wolf spider on a smooth forest floor.

FISHING SPIDER

D. tenebrosus is a fairly large spider. The females are 15 to 26 millimeters in length; males are 7 to 13 millimeters. Both sexes are brownish gray in color with black and lighter brown markings. The legs of both male and female are banded with alternating brown/black, scalloped annulations on the femora and reddish-brown/black annulations on the tibia. A closely related species, D. scriptus, is similar but has white “W" markings on the posterior portion of the abdomen.

Dolomedes tenebrosus is frequently found far away from water, usually in wooded settings. They hibernate as immature adults (penultimate instar) under stones or loose bark, in tree cavities, and in human-made structures and mature in the spring.

Mature individuals may be found from early May through September. The egg sacs are deposited in June and are carried around by the females until the spiderlings are ready to hatch. Young spiderlings may be found from July through September. The young are guarded by the female in a nursery web and may number 1,000 or more.

Fishing spiders are quite shy and generally run from humans at the slightest movement. Bites are typically no more severe than a bee or wasp sting. Exceptions do occur in individuals who are sensitive to spider venoms.

Pirate Spiders

PIRATE SPIDER – SPIDER EATER
(GENUS MINETUS)

The family Mimetidae are commonly called pirate spiders. Which typically feed on other spiders. The family Mimetidae contains roughly 200 species divided among 12 genera, of which *Mimetus* and *Ero* are the most common. Mimetids are usually yellow and brown and are usually 3 to 7 mm long.

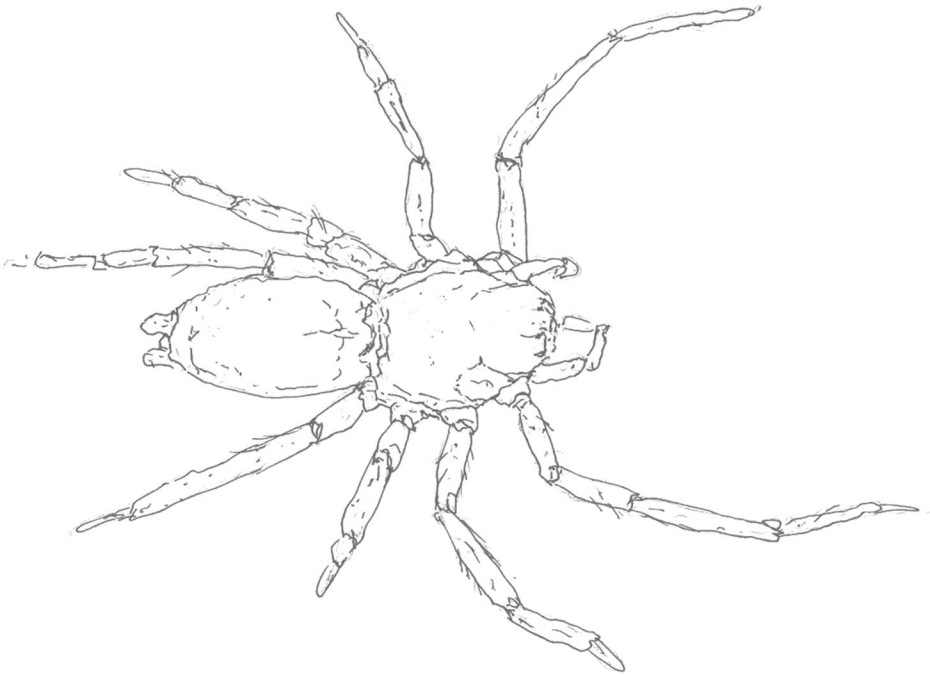
Mimetids can be recognized by the rows of spine-like hairs on their long front legs; the rows consist of a long spine, followed by a series of progressively shorter ones.

Mimetidae usually hunt other spiders by picking at the strands on their prey's web to simulate the movements of either a trapped insect or a potential mate. When their prey comes to investigate, they are instead captured and eaten.

Some mimetids have been observed to feed on insects as well. The spider-feeding habit presents problems in mating, and little is known about how the males court females to avoid being eaten.

PIRATE SPIDERS – SPIDER HUNTERS & EATERS

Sac Spiders – Human Biter
Often confused with Brown Recluse



SAC SPIDER

Sac spider, (family Clubionidae), also called two-clawed hunting spider, any member of a relatively common, widespread family of spiders (order Araneida) that range in body length from 3 to 15 mm (about 0.12 to 0.6 inch) and build silken tubes under stones, in leaves, or in grass.

BROAD FACED SAC SPIDER

The **Yellow Sac Spider** (Cheiracanthium inclusum) is also known as the **Black-Footed Spider**. The Yellow Sac Spider is one of a group of spiders in North America whose bites are generally considered to be medically significant.

The Yellow Sac Spider is very common in most of the United States and is the cause of a lot of spider bites and other unwanted encounters. Yellow Sac Spiders are light yellow to pale yellowish green, sometimes with an orange-brown stripe on top of the abdomen. The cephalothorax (fused head and thorax) of the Yellow Sac Spider is orange brown to reddish and the abdomen is pale yellow to light grey. An adult female sac spider's body is typically 1/4 to 3/8 inches long and its leg span is up to 1 inch.

Males are more slender, with a slightly larger leg span. The first pair of legs is longer than the fourth. Yellow Sac Spiders have eight similarly-sized dark eyes arranged in two horizontal rows.

Some of the spiders in this group that can cause a nasty bite include the running spider, jumping spider, wolf spider, tarantula, sac spider, orbweaver spider and the northwestern brown spider, also known as the hobo spider.

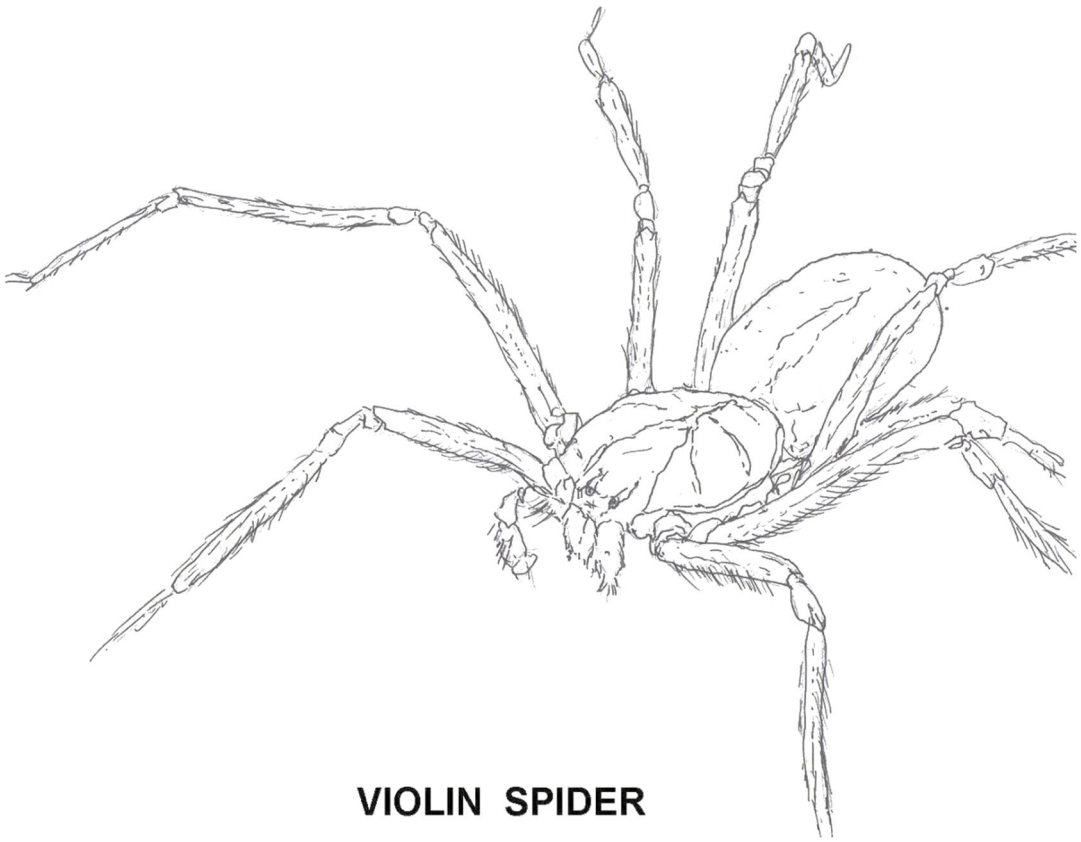
Violin Spiders – Human Biter
AKA Brown Recluse

VIOLIN SPIDER AKA BROWN RECLUSE

Family: Loxoscelidae (venomous six-eyed spiders) in the order Araneae (spiders)
Description: The name “violin spider” describes a characteristic marking on the brown recluse: there is a violin-shaped patch on the broad, almost heart-shaped cephalothorax (the head, as opposed to the abdomen). The overall color is usually a grayish-yellow-brown, the oblong abdomen covered with gray hairs. The legs are darker than the body and are long and slim. Females are larger than males. The webs are small, irregular, and untidy. These spiders are usually seen walking or running around, not in a web.

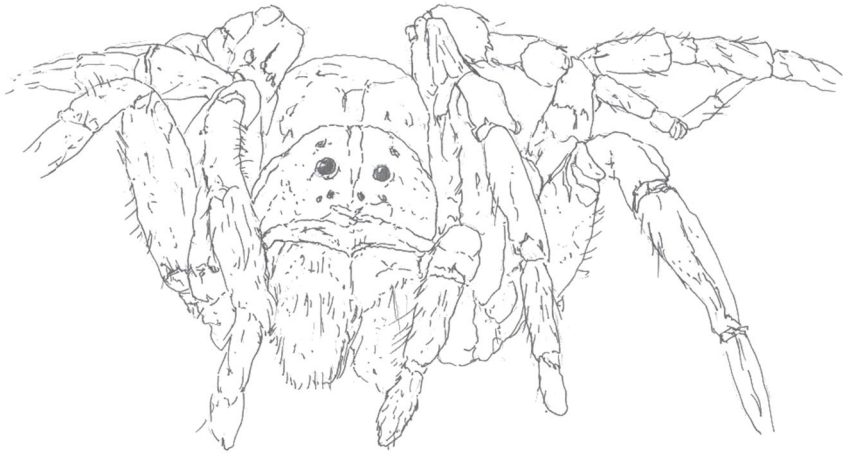
Size: Length: females to ¼ inch, not counting legs; including legs in a typical pose, they are about 1 inch long.

Some of the spiders in this group that can cause a nasty bite include the running spider, jumping spider, wolf spider, tarantula, sac spider, orbweaver spider and the northwestern brown spider, also known as the hobo spider.



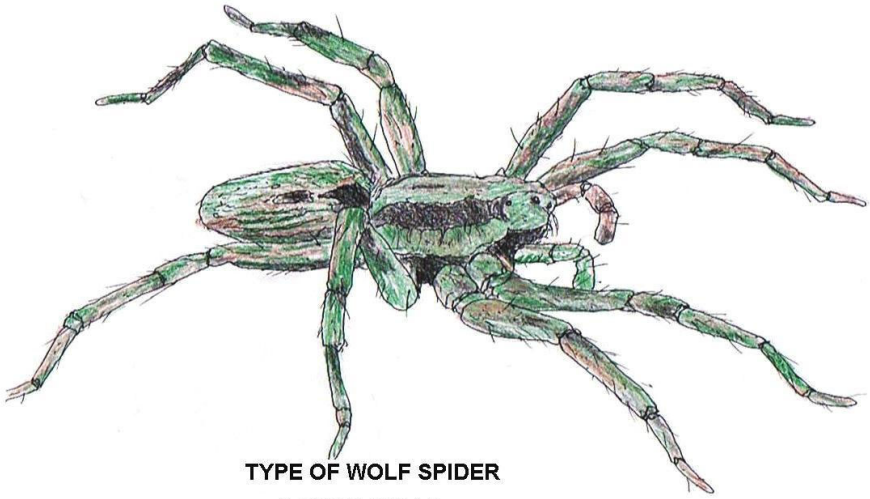
VIOLIN SPIDER

Wolf Spiders – Human Biters



LYCOSA ASPERSA

It has four simple eyes in a fairly straight first row and four larger simple eyes behind them at the vertices of a trapezoid. (The shorter of the two parallel sides of the trapezoid is just behind the row of four smaller eyes.) It is a large spider that has excellent vision and can run rapidly. It simply overpowers its prey. Also, it has considerable poise and is fearless. For instance, when a hand is placed flat on the ground beside the spider, it will permit itself to be nudged to move over, stand on the hand, and then remain completely motionless while the fingers of the hand remain outstretched and the hand is elevated upward while remaining horizontal. Wolf spiders like to look directly at the person who is observing them.



TYPE OF WOLF SPIDER

(Lycosa gulosa)

Is easily identified by her egg sac containing hundreds of unhatched eggs which is securely attached to her spinnerets; she can hunt efficiently with this arrangement. Female wolf spiders in this situation can become particularly fine mothers. Namely, after the individual spiders hatch from their eggs in this egg sac, they are gathered together and carried around on the back of the female spider. As she captures prey, she shares the food. Spiders can be considered particularly dainty eaters; it is as if they drink their food through soda straws.

WOLF SPIDER

Spider Bite Sub-Section

Spiders suffer an unsavory reputation, perhaps because of their appearance, their tendency to lurk in dark places or dangle ominously from a thread, and a gross exaggeration of their ability to poison humans. Some people are absolutely terrified at the mere sight of a spider, a condition known as arachnophobia.

Although all spiders have poison glands that they use for defense and to kill or paralyze prey, only about 30 of the 40,000 spider species produce venom that can cause serious illness in humans. Humans are more likely to be harmed by bee or wasp stings than by the relatively few spider species that can inflict a harmful bite.

Some of the spiders most dangerous to humans are the black widow spider, the brown recluse spider, the Australian funnelweb spider, and the South American hunting spider. Bites from these spiders can be fatal to humans without proper treatment. For instance, the bite of a black widow spider causes severe pain that may last for days. If not treated properly with an injection of calcium and a specific antivenin, a person may take weeks to recover, and in rare cases the bite may result in death.

Most spiders that are poisonous to humans prefer to avoid human contact and only bite when they feel threatened. The South American hunting spider is an exception—it is quite aggressive. Its bite is very painful, but it is rarely deadly for humans, most likely because the spider uses only a small amount of venom when it bites.

Although spiders pose minimal danger to humans, human activity seriously threatens some spider species. Such activities include habitat destruction, in which forestlands are destroyed for agriculture or for building homes and business developments. The widespread use of pesticides in agriculture targets specific insect pests but also kills harmless spiders and their insect prey. To protect spider populations, 16 spider species are included on the 2000 Red List of Threatened Species compiled by the World Conservation Union (IUCN), a nongovernmental organization that compiles global information on endangered species.

All spiders (except the family Uloboridae) have venom glands, but not all are venomous to man. In fact very few species pose a threat to man. Some spider bites might need medical attention even if the species is recognized as not being venomous to man, as secondary infections can occur. Spider venom, like snakebite venom, is generally either neurotoxic or cytotoxic. Generally, it is the web dwellers that have neurotoxic venom, and the non-web dwellers have the cytotoxic venom.

What are the symptoms of a bite from these kinds of spiders?
In most cases of bites from these spiders, there is pain or burning at the bite site in the first 10 minutes. The bite from this group is usually described as looking like a "target" or "bull's-eye." The center of the wound is usually a blister surrounded by a reddened area. A pale or blanched area may surround the discolored reddened area.

The blister may rupture, leaving an open ulcer. In severe cases the ulcer can become deep and infected causing tissue breakdown or tissue death (necrosis).

Worsening pain, itching and a burning sensation develop. A patient may also have symptoms such as a red, itchy rash over the torso, arms and legs that is usually seen in the first 24-72 hours.

Patients may have pain in the muscles and joints, fever, chills, swollen lymph nodes, headaches, and nausea and vomiting.

How are these bites treated?
Frequently, when people with spider bites call the Poison Center, they think there is some special treatment that is necessary for their bite. There is no specialized therapy other than treating the symptoms. Most importantly, keep the wound clean to prevent infection. If the wound does not heal or does develop an infection, see your physician. Do not wait days and weeks while the wound continues to get worse.

There are tales of people having limbs amputated after spider bites. These involve people who refused to see a physician even though they had massive wounds that did not heal and became grossly infected. A wound that may have been originally treated with simple oral antibiotics, but left untreated, may require surgical intervention in extreme cases.

What else can cause a nasty looking wound?
Kissing bugs, fleas, bed bugs, flies, mites, wasps, ants and blister beetles have produced lesions similar to a brown recluse spider bite. Many skin disorders and medical conditions can produce lesions that can also mimic a brown recluse spider bite. Some of these include infected herpes outbreaks, bedsores, diabetic ulcers, poison oak and Lyme disease. Again, use common sense: If there is a wound that is not healing as expected or getting worse, see a physician.

Cytotoxic venom affects the cellular tissue, usually restricted to the area of the bite, but it can spread. The bite is at first painless, with symptoms developing about 2 to 8 hours after the bite. It starts by resembling a mosquito sting, becoming more painful and swollen. Eventually it ulcerates into a large surface lesion (up to 10 centimeters) that will require medical attention. This type of bite would result from members of the genera *Loxosceles* (family Sicariidae) and *Cheiracanthium* (family Miturgidae).

Treatment with antibiotics might be required to treat secondary infections. The wound will take between two and 4 weeks to heal, but the lesion might take months to improve. In some cases, ugly scarring might occur that might require plastic surgery.

Sac spider, *Cheiracanthium fulcatum*

Sac spider bite at 6 weeks.

Sac spider bite at 3 days. (Photo by A. Pollard)

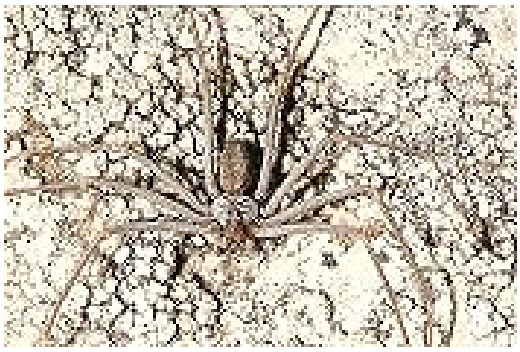
Sac spider bite at 10 days. (Photo by A. Pollard).

Sac spider bite.

More specifically, the bite of *Cheiracanthium* presents as two spots, 4-8 mm apart, where the fangs penetrated the skin and are yellow-green, the color of the venom. After 4 to 8 hours, mild inflammation, swelling and pain develop. A blister may form over the necrotic lesion after a few days.

After this sloughs, an irregular round, ulcerated wound of about 10mm remains. The wound is inflamed, swollen, and painful. The wound could start to heal after 10 days, but occasionally takes months. In some extreme cases, skin grafts have been necessary. The use of antibiotics is usually required should secondary infections set in, but this could be prevented by the use of an antibacterial cream, such as Betadine.

There is no anti-venom and an anti-tetanus injection is usually necessary. Some patients develop a mild fever and headaches after about 3 days, and the condition is sometimes misdiagnosed as tick bite fever. However, tick bite fever symptoms develop after about a 10 day incubation period after being bitten, by which stage the bite will have turned black and the surrounding area swollen and red. The venom of violin spider (Loxosceles) is also cytotoxic with similar symptoms to the sac spider.



Violin spider, *Loxosceles* sp.

Violin spider bite at 3 days.

Violin spider bite at 11 days.

Violin spider bite at 14 days.

Violin spider bite at 4 weeks.

Tissue damage from a bite by *Sicarius* (family Sicariidae) is far more extensive and severe. Bites to humans are not well documented. However, experimental rabbits died within 4-6 hours and autopsies revealed extensive damage to sub-dermal tissue and skeletal muscle. There was swelling of the liver and damage to heart and kidney tissue as well as blocked pulmonary arteries. Not everyone will be affected in the same way by a spider bite. The severity would depend on the amount of venom injected, the health of the patient or if the patient has allergies, the age of the patient (small children and the elderly would be more adversely affected) and the site of the bite. Some patients display symptoms of stress that can be misleading, leading one to fear the worst of a harmless spider bite.

Neurotoxic venom affects the neuromuscular junctions, and bite symptoms involving this type of venom are:

- severe pain in the chest and abdomen.
- anxiety, raised blood pressure.
- breathing difficulties and heart palpitations.
- nausea and vomiting.
- sweating, excessive salivation, and watery eyes.
- the body temperature could either fall or rise above normal, and the blood pressure may rise with an increased pulse rate.
- a rash might develop.

In this venom category, it is only the back widow and the black button *Latrodectus indistinctus* bites that would require urgent medical attention, although *Latrodectus geometricus* envenomation will also require medical attention, especially in the case of children and the elderly.

The main signs and symptoms of Latrodectism
(Button spider envenomation):

- sharp burning pain at the site.
- pain spreads to lymph nodes within 15 minutes.
- severe muscle pain and cramps within an hour, resulting in tightness in the chest and difficulty with walking.
- anxiety, sweating, fever, slurred speech, nausea, and headaches.

Less than 5% of untreated cases result in death, usually as a result of respiratory failure. In fact, there have been no deaths from button spiders in the last 4 to 5 decades. Those more severely affected are children (smaller blood volume) and the elderly who might suffer respiratory or heart failure.

Symptoms are less severe with the brown button spider, *Latrodectus geometricus*. All *Latrodectus* bites should be treated and monitored.

When someone is bitten:

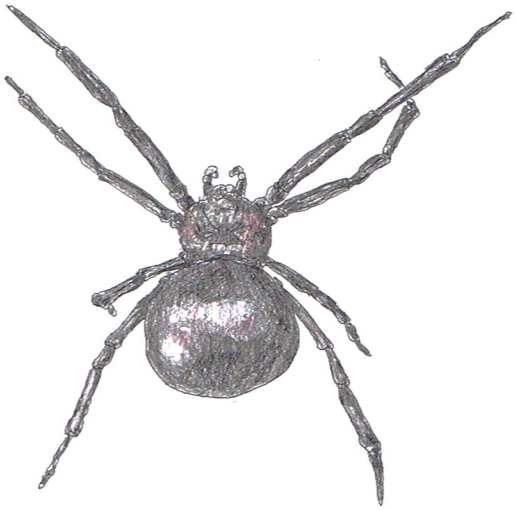
- Keep the culprit, if possible. An identification of the spider would be necessary to determine the appropriate treatment, if any.
- Keep the patient or the affected part as motionless as possible. However, this might not be practical if one is out in the wild. It is then preferable to get to help as soon as possible, even if the patient has to walk.
- Eating, drinking, and smoking should be avoided.
- Call for medical assistance.

- Keep the patient on his/her back with feet raised above the rest of the body. Cover with a blanket and keep the head to one side in case of vomiting.
- Loosen tight clothing.
- Apply artificial respiration should breathing stop.

Apply crushed ice to the affected area. The cold helps to retard the venom action and reduces pain. This must be done within minutes of being bitten. Do not cool for an extended period, and remove ice periodically for the feeling to return; otherwise, tissue damage might result.

DO NOT
- Use alcoholic drinks, as this could mask certain symptoms or exacerbate them.
- Use potassium permanganate on the wound.
- Cut the wound.
- Use a tourniquet, as this could aggravate local effects of the venom.
- Use snakebite venom antidote on spider bite and scorpion sting patients.

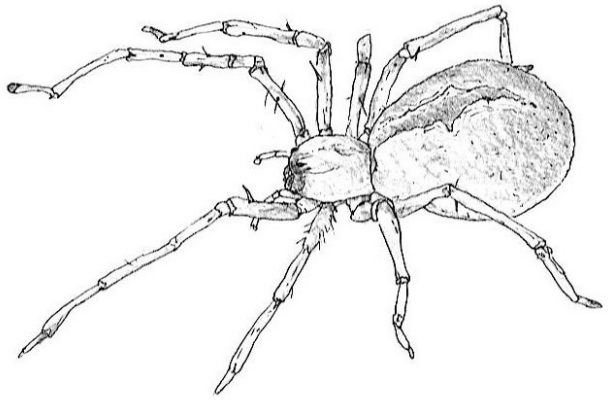
Seek medical attention if you think you have a spider bite. If possible, collect up the spider or what remains of it and take with you to your doctor or emergency clinic.



BLACK WIDOW SPIDER
(LATRODECTUS MACTANS)

The male black widow's abdomen is more elongated than that of the female, with white and red markings on its sides. The female's abdomen is almost spherical, usually with a red hourglass mark below or with 2 transverse red marks separated by black. The legs of the male are much longer in proportion to his body than those of the female. The female is more easily recognized, her shiny black body giving great contrast to the red hourglass marking on her round abdomen.

The black widow's range is from Massachusetts to Florida and west to California, Texas, Oklahoma and Kansas. Although they can be found in almost every state (and some portions of Canada), this spider is most common in the Southern locales of the United States. Black widow spiders are common around wood piles, and are frequently encountered when homeowners carry firewood into the house. Also found under eaves, in boxes, underneath unused construction materials, inside wooden toy boxes, firewood boxes, outdoor toilets, meter boxes, and other unbothered places.



SAC SPIDER
(Cheiraconthium mildei)

Sac Spiders (*Cheiracanthium*) These are wandering spiders that are found on vegetation and the ground. They are important predators of pests in gardens. They make their retreat sacs in folded leaves or grass blades. Sac spiders are light colored and have apparent spinnerets.

Necrotic Arachnidism – Spider Bites Part 2

Necrotic arachnidism is the potential cutaneous reaction to spider bite venom. In the United States, members of 7 spider families may be responsible for envenomation sufficiently severe to warrant treatment. Characteristics of several spiders, in particular Loxosceles spiders, whose bite is toxic to humans, are described, and diagnostic standards, preventive measures, and treatment options are reviewed.

NECROTIC ARAHNIDISM- SPIDER BITES

Necrotic arachnidism is a syndrome caused by the venom of certain spiders: Tegenaria agrestis (the hobo spider), Loxesceles reclusa (the brown recluse) and other Loxesceles species, and Cheiracanthrium spp. (yellow sac spiders). Latrodectus spp. (widow spiders) are also venomous, particularly the black widow spider, but cause a different set of symptoms.

HOBO SPIDER – HUMAN BITER

Recently, the Centers for Disease Control and Prevention (CDCP) reported that hobo spider bites are increasing in the Pacific Northwest. Also known as the aggressive house spider, the hobo spider causes a local reaction similar to that of the brown recluse; indeed, bites are often attributed to the brown recluse. But according to the CDCP, the brown recluse and other Loxesceles species are not found in the Pacific Northwest.

Hobo Spider
The hobo spider is large, brown with gray markings, and fast moving; it bites if provoked, according to the CDCP, especially the male during midsummer through fall when it wanders in search of a mate. It is native to Europe, was introduced into the Seattle area during 1920 to 1930, and has now spread as far as central Utah and the Alaskan panhandle. It builds funnel-shaped webs in dark, moist areas such as under wood piles, in crawl spaces, and along foundations. The spider doesn't climb, so is rarely found above basement or ground level.

The hobo spider bite is usually painless at first, according to the CDCP, but a hot, swollen, erythematous lesion with central blistering develops at the site of the bite, accompanied by nausea and severe headaches.

Lesions are characterized by induration (usually within 30 minutes), blistering (15-35 hours), and ulceration or necrosis with skin sloughing (within a week). Lesions usually heal in 45 days, but can require up to 3 years. Systemic symptoms include a severe headache (developing within a half hour or up to 10 hours after the bite, and lasting a week), nausea, weakness, fatigue, dizziness, temporary memory loss, and vision impairment. Serious side effects include aplastic anemia, intractable vomiting, and profuse watery diarrhea.

Chronic Arachnidism or Necrotic Arachnidism
While most spider bites are not dangerous, there is a group of spiders that can produce bite wounds that look similar to a brown recluse spider bite. Unless the spider was actually seen, captured and brought to the physician, the brown recluse spider is not likely to be the culprit.

Some of the spiders in this group that can cause a nasty bite include the running spider, jumping spider, wolf spider, tarantula, sac spider, orbweaver spider and the northwestern brown spider, also known as the hobo spider.

Validity of Necrosis Claims
It is estimated that 80% of reported brown recluse bites may be misdiagnosed. The misdiagnosis of a wound as a brown recluse bite could delay proper treatment of serious diseases. There is now an ELISA-based test for brown recluse venom that can determine whether a wound is a brown recluse bite, although it is not commercially available and not in routine clinical use; clinical diagnoses often use Occam's razor principle in diagnosing bites based on what spiders the patient likely encountered and what previous diagnoses are similar.

RUNNING SPIDER – HUMAN BITER

There are numerous documented infectious and noninfectious conditions (including pyoderma gangrenosum, bacterial infections by Staphylococcus and Streptococcus, herpes, diabetic ulcer, fungal infections, chemical burns, toxicodendron dermatitis, squamous cell carcinoma, localized vasculitis, syphilis, toxic epidermal necrolysis, sporotrichosis, and Lyme disease) that produce wounds that have been initially misdiagnosed as recluse bites by medical professionals; many of these conditions are far more common and more likely to be the source of mysterious necrotic wounds, even in areas where recluses actually occur.

The most important of these is methicillin-resistant Staphylococcus aureus ("MRSA"), a bacterium whose necrotic lesions are very similar to those induced by recluse bites, and which can be lethal if left untreated; misdiagnoses of MRSA as "spider bites" are extremely common (nearly 30% of patients later documented to have MRSA initially reported that they suspected a spider bite), and can have fatal consequences. In addition, published work has shown that tick-induced Lyme disease rashes are often misidentified as brown recluse spider bites.

Reported cases of bites occur primarily in Arkansas, Colorado, Kansas, Missouri, Nebraska, Oklahoma and Texas. There have been many reports of brown recluse bites in California (though a few related species may be found there and elsewhere outside the range of the brown recluse, none of these are known to bite humans).

To date the reports of bites from areas outside of the spider's native range have been either unverified, or—if verified—the spiders have been moved to those locations by travelers or commerce. Many arachnologists believe that many bites attributed to the brown recluse in the West Coast are not spider bites at all but possibly instead the bites of other spider species. For example, the bite of the hobo spider has been reported to produce similar symptoms, and is found in the northwestern United States and southern British Columbia. However, the toxicity of hobo spider venom has been called into question as bites have not been proven to cause necrosis, and this spider is not considered a problem in Europe.

Numerous other spiders have been associated with necrotic bites in medical literature. Other recluse species, such as the desert recluse (found in the desert southwestern United States), are reported to have caused necrotic bite wounds, though only rarely. Other spiders that have been reported to cause necrotic bites include the hobo spider and the yellow sac spiders. However, the bites from these spiders are not known to produce the severe symptoms that often follow from a recluse spider bite, and the level of danger posed by each has been called into question. So far, no known necrotoxins have been isolated from the venom of any of these spiders, and some arachnologists have disputed the accuracy of many spider identifications carried out by bite victims, family members, medical responders, and other non-experts in arachnology.

There have been several studies questioning danger posed by some of these spiders. In these studies, scientists examined case studies of bites in which the spider in question was positively identified by an expert, and found that the incidence of necrotic injury diminished significantly when "questionable" identifications were excluded from the sample set. (For a comparison of the toxicity of several kinds of spider bites, see the list of spiders having medically significant venom.)

Bite Treatment
First aid involves the application of an ice pack to control inflammation, the application of aloe vera to soothe and help control the pain, and prompt medical care. If it can be easily captured, the spider should be brought with the patient in a clear, tightly closed container so it may be identified. There is no established treatment for necrosis, though many claim to find pain relief, venom elimination, and even complete healing through the use of inexpensive active carbon (or charcoal) salves.

Routine treatment should include elevation and immobilization of the affected limb, application of ice, local wound care, and tetanus prophylaxis. Many other therapies have been used with varying degrees of success including hyperbaric oxygen, dapsone, antihistamines (e.g., cyproheptadine), antibiotics, dextran, glucocorticoids, vasodilators, heparin, nitroglycerin, electric shock, curettage, surgical excision, and antivenom. None of these treatments have been subjected to randomized controlled trials to conclusively show benefit. In almost all cases, bites are self-limited and typically heal without any medical intervention.

It is important to seek medical treatment if a brown recluse bite is reasonably suspected. In the rare cases of necrosis the effects can quickly spread, particularly when the venom reaches a blood vessel. Cases of brown recluse venom traveling along a limb through a vein or artery are rare, but the resulting tissue mortification can affect an area as large as several inches and in extreme cases require excising of the wound.

Other Spider Bites and Treatments

Jumping Spiders
The jumping spider is probably the most common biting spider in the United States. People are caught by surprise and scared when they see the spider jump, especially if it jumps towards them. Bites from a jumping spider are painful, itchy and cause redness and significant swelling. Other symptoms may include painful muscles and joints, headache, fever, chills, nausea and vomiting. The symptoms usually last about 1-4 days.

Wolf Spiders
Wolf spiders are commonly found in California. They are large hairy spiders, up to 3-4 inches across. They are a mottled gray-brown color, which helps them hide in sand, gravel, leaves and other debris. Female wolf spiders carry their young on their backs. Except for one group, wolf spiders do not spin webs. They tend to burrow into the earth and hide.

They are aggressive, come after their prey and are fast runners. Because of their impressive size and aggressiveness, wolf spiders can easily incite panic. Bites from a wolf spider can cause pain, redness and swelling. The large jaws/fangs can cause a tear in the skin as they bite. Swollen lymph glands may develop. The skin area at the bite may turn black. Swelling and pain can last up to ten days.

Tarantulas
Tarantulas are also large hairy spiders. In fact, some people call any large hairy or fuzzy spider a tarantula. Tarantulas are very hairy with sharp bristles. The hairs are easily shed or can be rubbed off. Handling a tarantula can result in irritation to the skin. If hands are not washed after handling a tarantula and eyes are touched, the sharp hairs can cause eye irritation that may require a trip to the physician.

Tarantulas are sensitive to vibrations and hunt at night by touch. If cornered, the tarantula will make a purring sound and may rear up on its back legs. Even though tarantulas are scary looking to most people, most bites do not produce any significant poisoning symptoms. However, the bites can be quite painful because of the large size of the spider. Wash your hands well with soap and water after handling a tarantula.

Northwestern Brown Spider or the Hobo Spider
The northwestern brown spider or hobo spider (Tegenaria agretis) is well known in Oregon and Washington and is also quite common in Utah. Spider bites by this spider are becoming recognized more often in California, which may be due to the fact that the spider is becoming better known. The hobo spider often causes a bite that leaves an open, slow-healing wound.
Bites from this spider are frequently and mistakenly thought to be brown recluse spider bites.

Keep the wound clean and prevent infection. If the bite becomes infected or does not seem to heal, see a physician.

Daddy Longlegs Spiders
The Daddy Longlegs is not a true spider in that it cannot make silk and does not have fangs or venom glands. Daddy Longlegs have long thin legs with flexible claw-like "fingers". Daddy Longlegs can pinch but rarely penetrate human skin. They have scent glands on the front part of their bodies that can give-off a bad-smelling fluid. This stinky fluid is used as a defense mechanism to keep enemies away.

Some people might have a reaction to the fluid but Daddy Longlegs are not considered dangerous to humans. Daddy Longlegs are usually found hanging upside down in corners, eaves or basements. They are very common and are found in most homes. Because they eat insects and other spiders, they are considered beneficial.

Bug Bites and Stings Response

Bug bites and stings usually are just nuisances. They bring momentary alarm, temporary discomfort and pain, but no serious or lasting health problems. But on occasion, they can cause infections that require treatment and allergic reactions that can be serious, even fatal.

Parents should know the signs of an infection or allergic reaction and when to get medical attention. Inform all caregivers if a child has any history of complications so they know what to do in the event of a bug bite or sting.

What to Do About:
Bee and Wasp Stings

- A bee will leave behind a stinger attached to a venom sac. Try to remove it as quickly as possible. (Wasps don't leave their stingers in the skin after stinging, which means they can sting more than once.)
- Wash the area carefully with soap and water. Do this two to three times a day until the skin is healed.
- Apply an ice pack wrapped in a cloth or a cold, wet washcloth for a few minutes.
- Give acetaminophen or ibuprofen for pain.
- For pain and itching, give an over-the-counter oral antihistamine if your child's doctor says it's OK; follow dosage instructions for your child's age and weight. You could also apply a corticosteroid cream or calamine lotion to the sting area.
- A sting anywhere in the mouth warrants immediate medical attention because stings in oral mucous membranes can quickly cause severe swelling that may block airways.
- Seek medical care if you notice a large skin rash or swelling around the sting site, or if swelling or pain persists for more than 3 days, which could indicate an infection.
- Get medical help right away if you notice any of the following signs, which may indicate a serious or potentially life-threatening allergic reaction:
    - wheezing or difficulty breathing
    - tightness in throat or chest
    - swelling of the lips, tongue, or face
    - dizziness or fainting
    - nausea or vomiting

Spider Bites

- Wash the area carefully with soap and water. Do this two to three times a day until skin is healed.
- Apply cool compresses.
- Give acetaminophen or ibuprofen for pain.
- To protect against infection, apply an antibiotic ointment and keep the child's hands washed.

If you have any reason to suspect a bite by a black widow or brown recluse spider, apply ice to the bite site and take your child to the emergency room. Even if a child doesn't show any symptoms, get medical attention right away.

Most spiders found in the United States are harmless, with the exception of the black widow and the brown recluse spider. The brown recluse spider — a tiny oval brown spider with a small shape like a violin on its back — is found mostly in midwestern and southern parts of the United States. The bites usually don't hurt at first, and a child might not even be aware of the bite, but in some cases they cause swelling and changes in skin color and a blister.

The black widow spider, which is found all over North America, has a shiny black body and an orange hourglass shape on its underbelly. The venom (poison) in a black widow bite can cause painful cramps that show up within a few hours of the bite. The cramps can start in the muscles around the bite and then spread. The bite may also lead to nausea, vomiting, chills, fever, and muscle aches. If your child has any of these symptoms — or you know that he or she has been bitten — go to the emergency room right away.

In the southwest United States, an unidentified “bite” may be caused by a scorpion sting. Take your child to the emergency room immediately.

Tick Bites
Check kids and pets for ticks carefully after you've been in or around a wooded area. Common types of ticks include dog ticks and deer ticks (deer ticks may be carriers of Lyme disease).

If you find a tick on your child:

- Call your doctor, who may want you to save the tick after removal (you can put it in a jar of alcohol to kill it).
- Use tweezers to grasp the tick firmly at its head or mouth, next to the skin.
- Pull firmly and steadily on the tick until it lets go, then swab the bite site with alcohol.
- Don't use petroleum jelly or a lit match to kill and remove a tick.

Reviewed by: Elana Pearl Ben-Joseph, MD

Topic 3 - Web Spiders

Post Quiz
Answers are found at rear of Glossary

Fill-in-the blank

Orb Weaving Spiders
1. Venom toxicity - the bite of Orb-Weaving Spiders is of low risk (not toxic) to humans. They are a non-aggressive group of spiders, _____.

Trap-Door Spiders
2. Venom toxicity - the bite of the Trap-Door Spider is of _____to humans. It is a non-aggressive spider - usually timid but may stand up and present its fangs if harassed. Rarely bites - but if so it can be painful.

House Spider
3. The common house spider belongs to the funnelweb spiders in the family Agelenidae in the suborder Araneomorphae. House spiders are found throughout Europe and North America. This spider is so named because its _____is often seen in wall corners of houses, but it can also be found in any cool, dark place, such as dense vegetation or crevices of logs or rocks.

4. Spider venom, like_____, is generally either neurotoxic or cytotoxic. Generally, it is the web dwellers that have neurotoxic venom, and the non-web dwellers have the cytotoxic venom.

What are the symptoms of a bite from these kinds of spiders?
5. In most cases of bites from these spiders, there is pain or burning at the bite site in the first 10 minutes. The bite from this group is usually described as looking like a _____.

6. Worsening pain, itching and a burning sensation develop. A patient may also have symptoms such as a red, itchy rash over the torso, arms and legs that is usually seen in the first_____. Patients may have pain in the muscles and joints, fever, chills, swollen lymph nodes, headaches, and nausea and vomiting.

What else can cause a nasty looking wound?
7. _____, fleas, bed bugs, flies, mites, wasps, ants and blister beetles have produced lesions similar to a brown recluse spider bite. Many skin disorders and medical conditions can produce lesions that can also mimic a brown recluse spider bite. Some of these include infected herpes outbreaks, bedsores, diabetic ulcers, poison oak and Lyme disease. Again, use common sense: If there is a wound that is not healing as expected or getting worse, see a physician.

8. **Cytotoxic venom affects the cellular tissue,** usually restricted to the area of the bite, but it can spread. The bite is at first painless, with symptoms developing about _____after the bite. It starts by resembling a mosquito sting, becoming more painful and swollen.

9. Treatment with antibiotics might be required to treat secondary infections. The wound will take between _____to heal, but the lesion might take months to improve. In some cases ugly scarring might occur that might require plastic surgery.

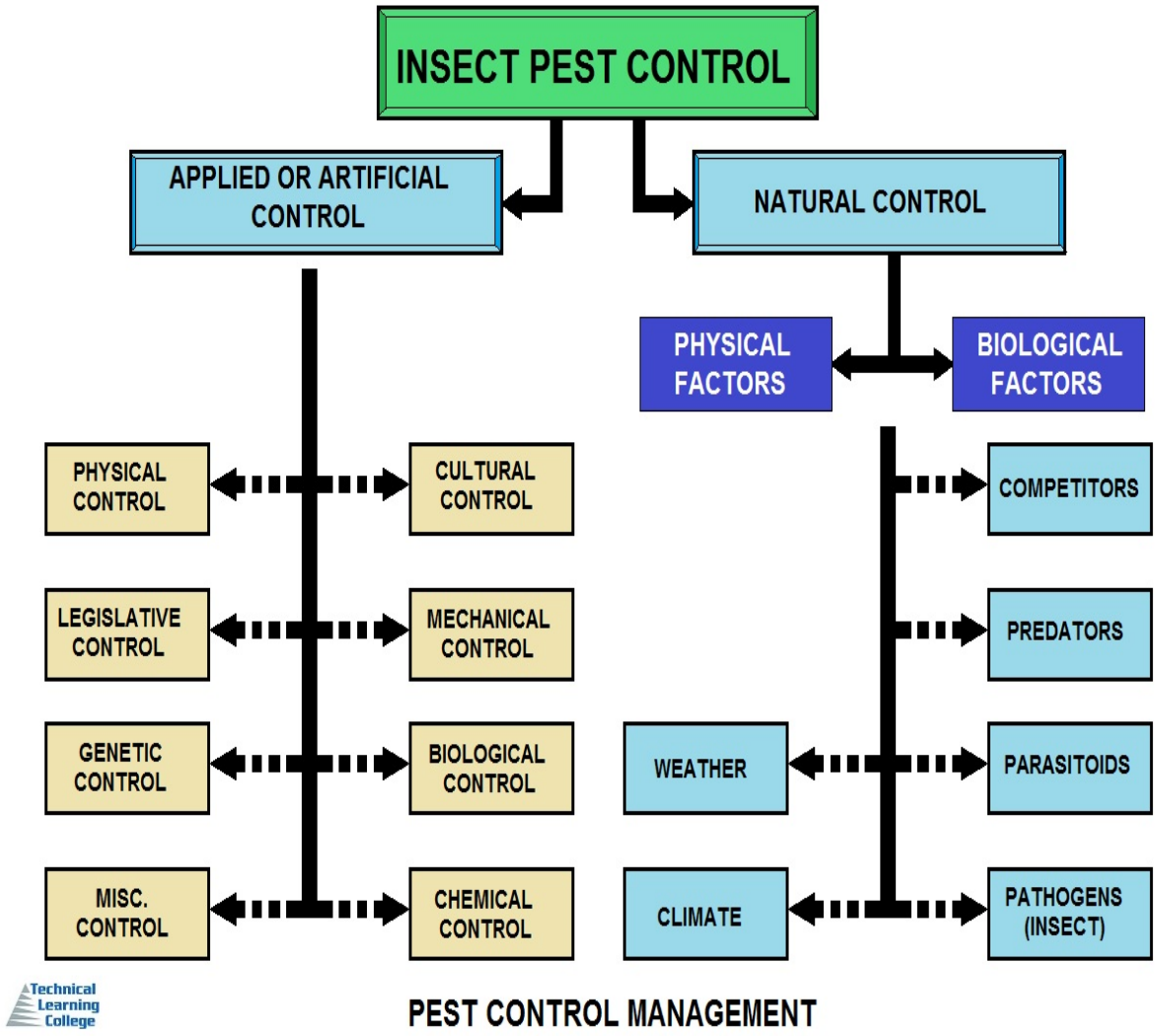
Jumping Spiders

10. The jumping spider is probably the most common biting spider in the United States. People are caught by surprise and scared when they see the spider jump, especially if it jumps towards them. Bites from a jumping spider are painful, itchy and cause redness and significant swelling. Other symptoms may include painful muscles and joints, headache, fever, chills, nausea and vomiting. The symptoms usually last about _____.

Topic 4 - Spider Control Section

Topic 4 - Section Focus
You will learn the basics of spider control/treatments. At the end of this section, you will be able to understand and describe various spider controls / treatments. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Topic 4 – Scope/Background
Once monitoring, identification, and action thresholds indicate that pest control is required, and preventive methods are no longer effective or available, IPM programs then evaluate the proper control method both for effectiveness and risk. Effective, less risky pest controls are chosen first, including highly targeted chemicals, such as pheromones to disrupt pest mating, or mechanical control, such as trapping or weeding. If further monitoring, identifications and action thresholds indicate that less risky controls are not working, then additional pest control methods would be employed, such as targeted spraying of pesticides. Broadcast spraying of non-specific pesticides is a last resort.



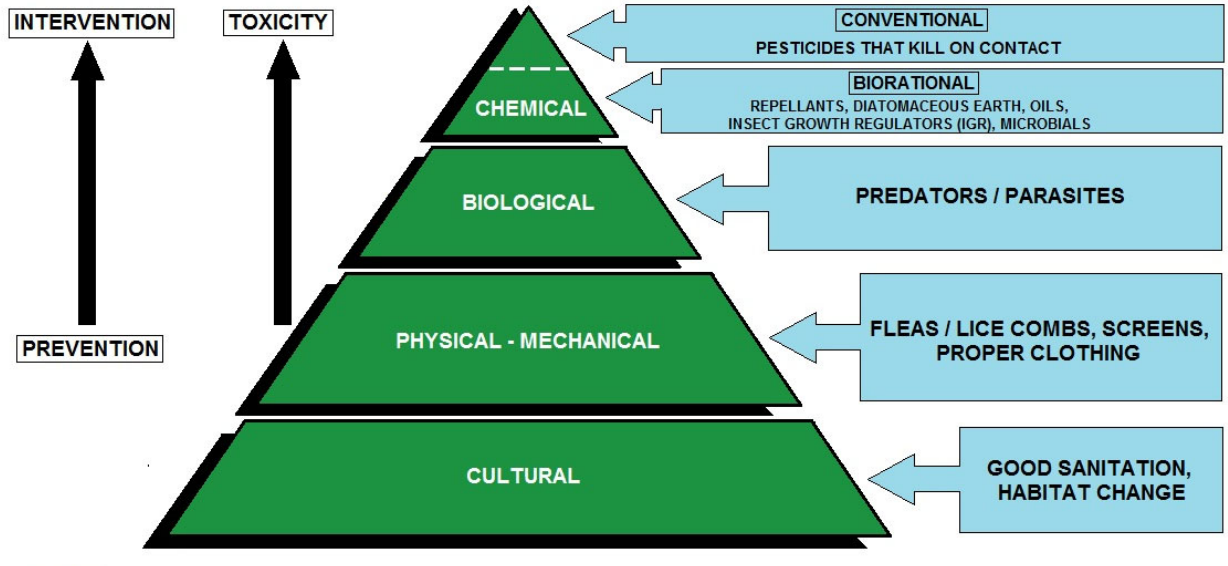
From a biological standpoint, it is rarely necessary to control spiders. However, if it is desirable to get rid of spiders in the home, a combination of sanitation and pesticides should be effective. Pesticides alone, without some effort to remove or modify favorable spider habitats, will not be effective.

Remove rocks, wood piles, compost piles, old boards, and other sheltering sites adjacent to the home. Eliminate migration of spiders into homes by caulking cracks and crevices around the foundation. Make sure all screens and doors are sealed tight. Keep crawl spaces free of debris and limit boxes and other potential hiding places from basements and other dark storage areas. Regularly vacuum or brush spider webs. The elimination of other insects that are prey can limit spider development.

Occasional spiders can be removed by hand (wear gloves or grasp the spider with a tissue) or with a vacuum. Sticky traps, used to control cockroaches and rodents, can capture spiders when placed along baseboards or other migration areas.

Residual insecticides can be used to control spiders when applied to corners and other sites where spiders tend to breed. Household insecticide products containing various pyrethroids (bifenthrin, cyfluthrin, permethrin, tetramethrin) are commonly available for this purpose and should be applied in accordance with the label's instructions. Total release foggers, containing pyrethrins, probably will have little effect on spiders.

Where spiders and webbing occur in nuisance numbers on the outside of buildings they can be washed off with a forceful jet of water. Reduction of outdoor lighting, or replacing lighting with yellow or sodium vapor lights that are not attractive to insects, can limit spider web building. Dark colored siding seems to be less attractive than white siding to the insects on which spiders feed.



Habitat Control: Landscaping for spider control
There are many ways to make your property less hospitable to spiders and the insects they are after. Making these changes will decrease the amount of spiders in your yard, as well as reduce the likelihood that they'll migrate indoors. Get rid of rock and wood piles. Decorative rock piles and wood piles are a favorite dwelling place for ground spiders. Get them away from the house. If possible, keep wood piles off the ground and only bring into your home as much as you immediately need. Similarly, it is best to just get rid of other spider shelters adjacent to the home - bricks, building materials, compost piles, debris, trash, etc.

Remove excess vegetation for spider control. Let the sun in, keep the spiders out. Thick vegetation makes for great spider habitat. Keep vegetation around your home trim and away from the house. Clear away ivy, bushes, shrubs, and grasses – anything that fosters large spider populations near your home. Promptly clean up leaf litter and debris. Mow your lawn regularly, and trim tree branches that are too near or overhang your home. Plant trees and shrubs away from structures to allow for light.

Physical Controls: Keeping the spiders out
Get rid of spider entry points. Exclusion – also known as pest-proofing – is an essential part of spider control and indeed all pest control. Here are some things you can do to keep spiders out of your home.

- Apply weather stripping to all doors and windows. Also, it is a good idea to install door sweeps. You need a tight seal to keep spiders out.
- Repair all window and door screens using silicone caulk or screen patches. Windows are a common spider entry point, so be sure that each layer, from screen to glass to trim, is sealed completely.
- Buy some outdoor sealant and a caulking gun. Walk around your home looking for cracks and crevices around your foundation and fill them in. Next look at your siding. You may need a specialized sealant depending on your siding material and color. Be sure to check the lowest edge of your siding for cracks and holes. Lastly, fill in all holes created by utilities: cables, wires, pipes, faucets, outlets, plumbing…etc. Concrete, mortar, or expandable foams are also options for filling in holes.
- Screen all vents leading into the home.

Spider Harborages
Get rid of spider harborages (hideouts). Once you've worked to spider-proof outside, head indoors and start again. First stop is the basement, crawl space, or lowest level. Fill in any cracks or crevices in the foundation and around windows. Find the same utilities you sealed around outside (pipes, plumbing, wires, etc.) and seal them inside. Work your way up from the basement. Spiders hide in cracks in trim, flooring, behind outlets, countertops – any dark secluded space. Of course it would be difficult, if not impossible, to seal all such areas inside the home. Focus your energies where you've seen the most spider activity and where your spider traps (mechanical control below) have killed the most spiders.

Mechanical control: Spider traps and manual spider removal
Use glue boards for spider control and monitoring. While sticky traps won't work for web- building spiders, they are outstanding for the many ground-dwelling, hunting spider species, including funnel-web, wolf, and brown recluse spiders. With glue boards, more is better. Place them along walls, in corners, behind furniture, and in dark, protected areas, in outbuildings and garages, in window sills and near doors, as well as places you've seen spider activity.

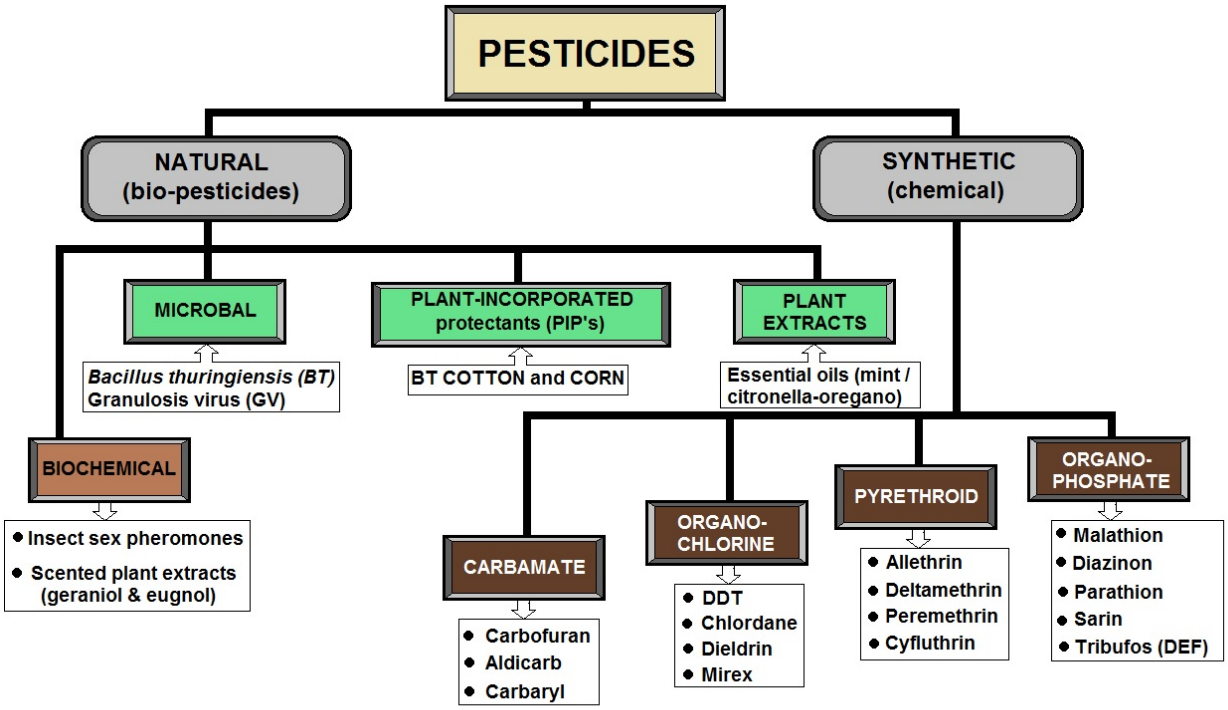
- ✓ Glue boards not only kill spiders in a spiteful, inhumane fashion, they also help you monitor spider activity as well as that of other pests. By routinely checking and replacing glue boards, you'll be able to determine whether your spider control strategies are working. Full, disgusting traps help pinpoint areas with the most spider activity so you'll be able to focus your efforts in the right places. The best sticky spider traps are those that are not raised and do not have a lip, but lie flat against surfaces.
- ✓ Replace outdoor lights with "bug lights." Lights near doors and porches attract hoards of insects, which in turn attract armies of spiders to eat them. Many of these spiders may migrate into your home.
- ✓ Replace your blue wave lights with yellow bug lights, LED lights, or sodium vapor lights, which do not attract insects or their predators. It also helps to draw shades around windows during darkness.
- ✓ Utilize a hose or pressure sprayer for outdoor spider removal. Entrenched between two lakes and much wilderness, my neighborhood is spider prone. We generally wash them off our homes a few times a year using a pressure sprayer or a simple hose attachment. It's effective and chemical free.
- ✓ Kill spiders with a vacuum. Break out the vacuum hose and all its spider-killing attachments as often as necessary to remove webs, egg sacs, and spiders. Focus on suspected sites, corners, window sills, along trim, closets, behind furniture, and any dark, protected areas. You may need to gather your courage and adorn a rosary before bringing your vacuum into your attic, basement, and similar spider hot spots. When finished, remove the vacuum bag (or contents) and seal it in a plastic bag and toss it in an outside trash can. You can rest easy knowing that the spiders that survived the violence of your domestic killing machine will no doubt liquefy and eat one another.

Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 1-800-222-1222. If you wish to report a pesticide problem, please call 1-800-858-7378.

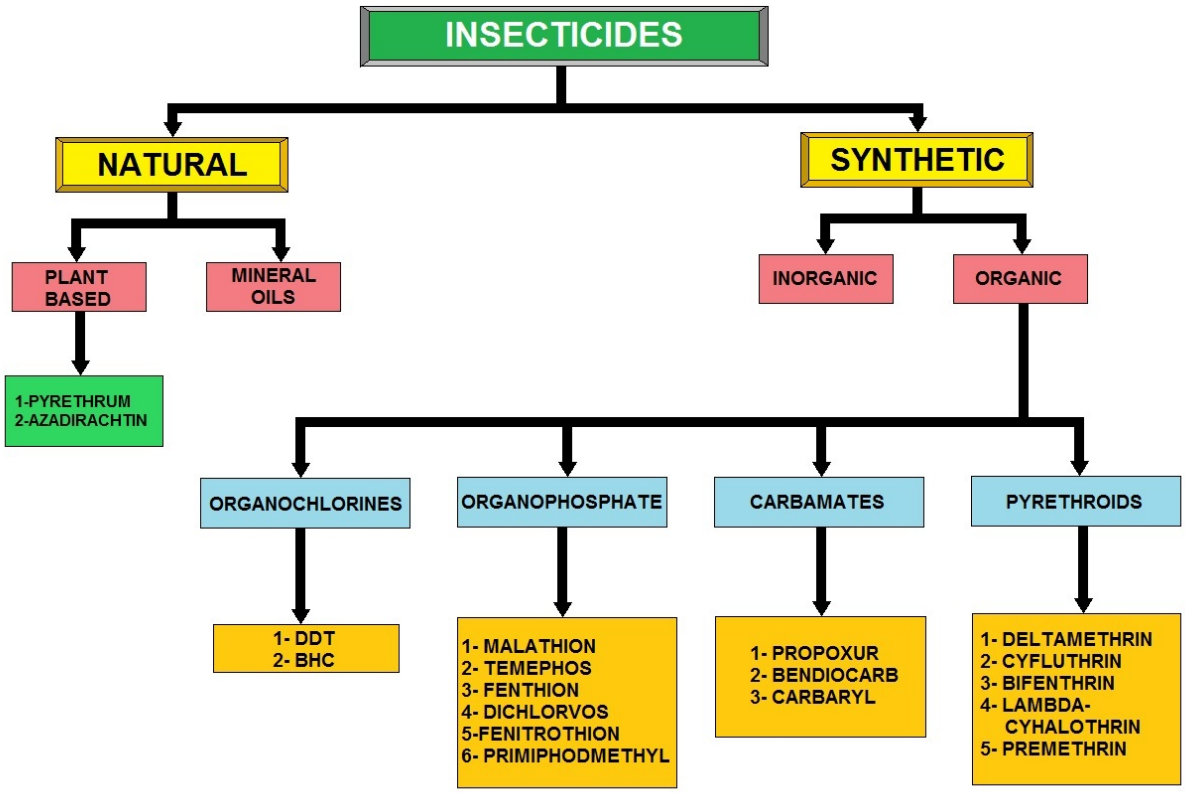
NOTE: When pesticides are used, it is the applicator's legal responsibility to read and follow directions on the product label. Not following label directions, even if they conflict with information provided herein, is a violation of federal law.

This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them.

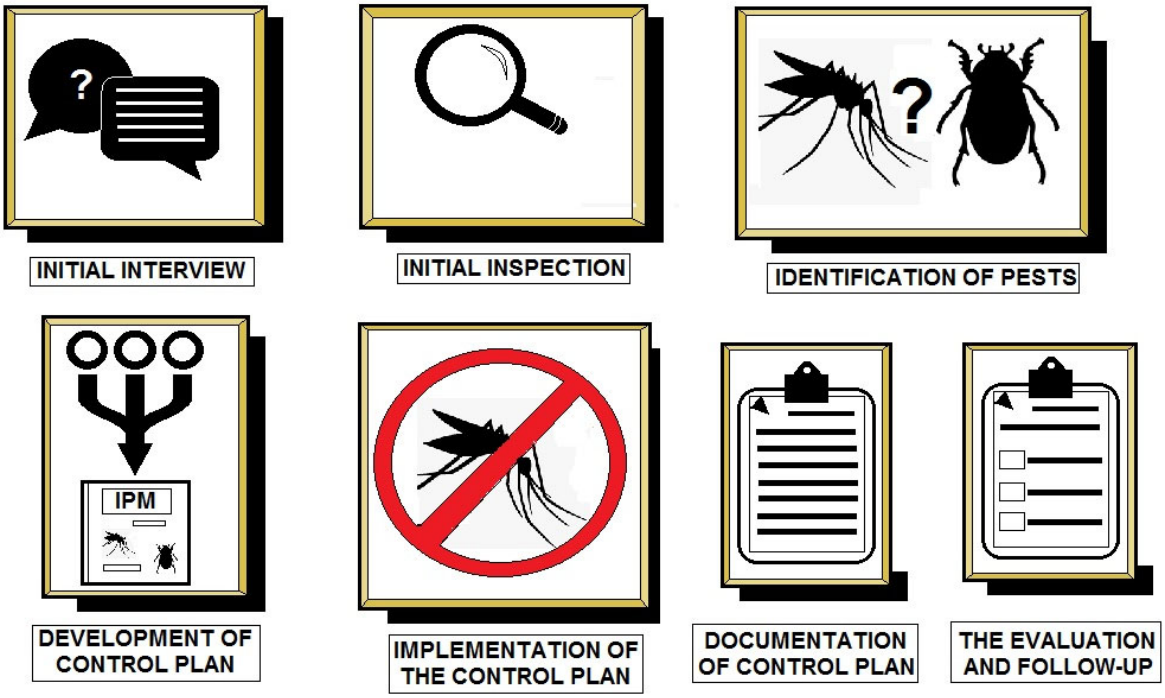
If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and Technical Learning College (TLC) assume no liability resulting from the use of these recommendations.



DIFFERENT CLASSIFICATIONS OF PESTICIDES

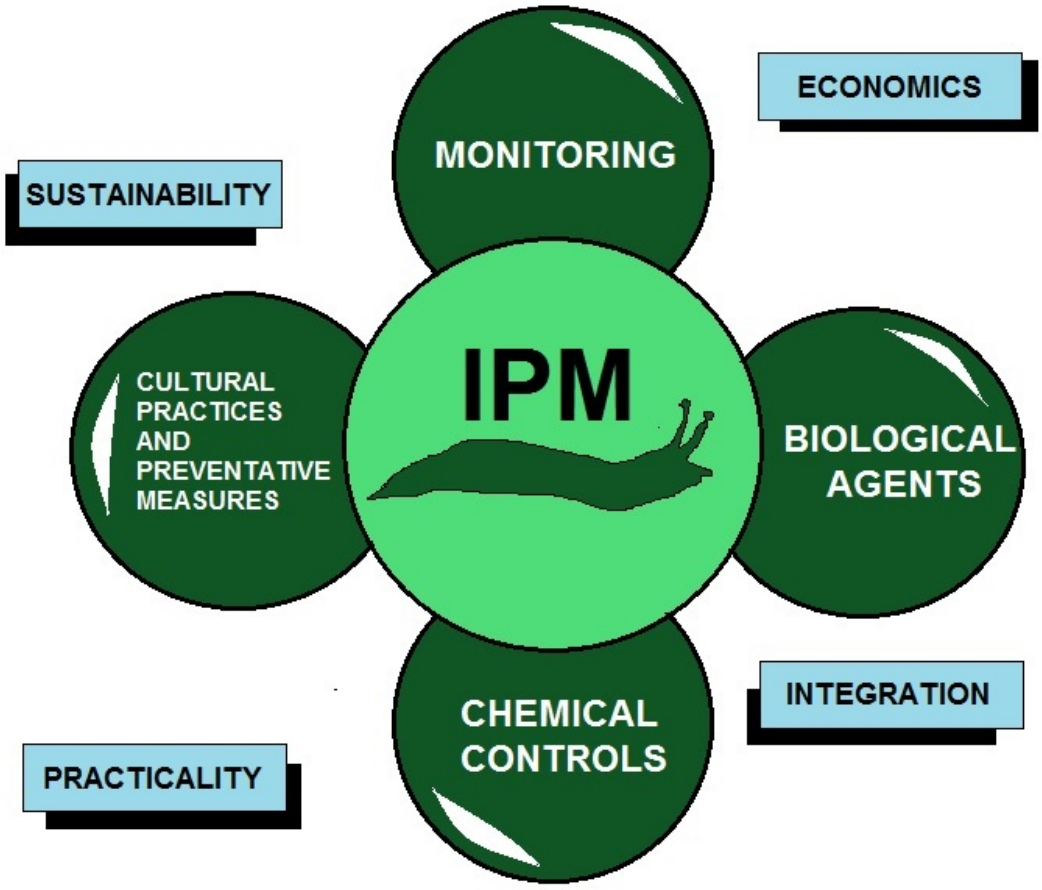


PESTICIDES BASED UPON CHEMICAL COMPOSITION



DEVELOPING AN INTEGRATED PESTICIDE MANAGEMENT PROGRAM (IPM)

IPM Methods (Types of Pest Control)



INTEGRATED PEST MANAGEMENT APPROACH DIAGRAM

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.

The IPM approach can be applied to both agricultural and non-agricultural settings, such as the home, garden, and workplace. IPM takes advantage of all appropriate pest management options including, but not limited to, the judicious use of pesticides. In contrast, organic food production applies many of the same concepts as IPM but limits the use of pesticides to those that are produced from natural sources, as opposed to synthetic chemicals.

IPM is not a single pest control method but, rather, a series of pest management evaluations, decisions and controls. In practicing IPM, growers who are aware of the potential for pest infestation follow a four-tiered approach.

The four steps include:
Set Action Thresholds
Before taking any pest control action, IPM first sets an action threshold, a point at which pest populations or environmental conditions indicate that pest control action must be taken. Sighting a single pest does not always mean control is needed. The level at which pests will either become an economic threat is critical to guide future pest control decisions.

Monitor and Identify Pests
Not all insects, weeds, and other living organisms require control. Many organisms are innocuous, and some are even beneficial. IPM programs work to monitor for pests and identify them accurately, so that appropriate control decisions can be made in conjunction with action thresholds. This monitoring and identification removes the possibility that pesticides will be used when they are not really needed or that the wrong kind of pesticide will be used.

Prevention
As a first line of pest control, IPM programs work to manage the crop, lawn, or indoor space to prevent pests from becoming a threat. In an agricultural crop, this may mean using cultural methods, such as rotating between different crops, selecting pest-resistant varieties, and planting pest-free rootstock. These control methods can be very effective and cost-efficient and present little to no risk to people or the environment.

Control
Once monitoring, identification, and action thresholds indicate that pest control is required, and preventive methods are no longer effective or available, IPM programs then evaluate the proper control method both for effectiveness and risk. Effective, less risky pest controls are chosen first, including highly targeted chemicals, such as pheromones to disrupt pest mating, or mechanical control, such as trapping or weeding. If further monitoring, identifications and action thresholds indicate that less risky controls are not working, then additional pest control methods would be employed, such as targeted spraying of pesticides. Broadcast spraying of non-specific pesticides is a last resort.

Six Basic Components
An IPM system is designed around six basic components: The US Environmental Protection Agency has a useful set of IPM principles.
1. Acceptable pest levels: The emphasis is on control, not eradication. IPM holds that wiping out an entire pest population is often impossible, and the attempt can be economically expensive, environmentally unsafe, and frequently unachievable. IPM programs first work to establish acceptable pest levels, called action thresholds, and apply controls if those thresholds are crossed. These thresholds are pest and site specific, meaning that it may be acceptable at one site to have a weed such as white clover, but at another site it may not be acceptable. By allowing a pest population to survive at a reasonable threshold, selection pressure is reduced. This stops the pest gaining resistance to chemicals produced by the plant or applied to the crops. If many of the pests are killed then any that have resistance to the chemical will form the genetic basis of the future, more resistant, population. By not killing all the pests there are some un-resistant pests left that will dilute any resistant genes that appear.

2. Preventive cultural practices: Selecting varieties best for local growing conditions, and maintaining healthy crops, is the first line of defense, together with plant quarantine and 'cultural techniques' such as crop sanitation (e.g. removal of diseased plants to prevent spread of infection).

3. Monitoring: Regular observation is the cornerstone of IPM. Observation is broken into two steps, first; inspection and second; identification. Visual inspection, insect and spore traps, and other measurement methods and monitoring tools are used to monitor pest levels. Accurate pest identification is critical to a successful IPM program. Record-keeping is essential, as is a thorough knowledge of the behavior and reproductive cycles of target pests. Since insects are cold-blooded, their physical development is dependent on the temperature of their environment. Many insects have had their development cycles modeled in terms of degree days. Monitor the degree days of an environment to determine when is the optimal time for a specific insect's outbreak.

4. Mechanical controls: Should a pest reach an unacceptable level, mechanical methods are the first options to consider. They include simple hand-picking, erecting insect barriers, using traps, vacuuming, and tillage to disrupt breeding.

5. Biological controls: Natural biological processes and materials can provide control, with minimal environmental impact, and often at low cost. The main focus here is on promoting beneficial insects that eat target pests. Biological insecticides, derived from naturally occurring microorganisms (e.g.: Bt, entomopathogenic fungi and entomopathogenic nematodes), also fit in this category.

6. Responsible Pesticide Use: Synthetic pesticides are generally only used as required and often only at specific times in a pests' life cycle. Many of the newer pesticide groups are derived from plants or naturally occurring substances (e.g.: nicotine, pyrethrum and insect juvenile hormone analogues), but the toxophore or active component may be altered to provide increased biological activity or stability. Further 'biology-based' or 'ecological' techniques are under evaluation.

Main Focus of IPM Programs
An IPM regime can be quite simple or sophisticated. Historically, the main focus of IPM programs was on agricultural insect pests. Although originally developed for agricultural pest management, IPM programs are now developed to encompass diseases, weeds, and other pests that interfere with the management objectives of sites such as residential and commercial structures, lawn and turf areas, and home and community gardens.

IPM is applicable to all types of agriculture and sites such as residential and commercial structures, lawn and turf areas, and home and community gardens.

Reliance on knowledge, experience, observation, and integration of multiple techniques makes IPM a perfect fit for organic farming (sans artificial pesticide application). For large-scale, chemical-based farms, IPM can reduce human and environmental exposure to hazardous chemicals, and potentially lower overall costs of pesticide application material and labor.

1. Proper identification of pest - What is it?
Cases of mistaken identity may result in ineffective actions. If plant damage due to over-watering are mistaken for fungal infection, spray costs can be incurred, and the plant is no better off.

2. **Learn pest and host life cycle and biology.**
At the time you see a pest, it may be too late to do much about it except maybe spray with a pesticide. Often, there is another stage of the life cycle that is susceptible to preventative actions. For example, weeds reproducing from last year's seed can be prevented with mulches. Also, learning what a pest needs to survive allows you to remove these.

3. Monitor or sample environment for pest population - How many are here?
Preventative actions must be taken at the correct time if they are to be effective. For this reason, once the pest is correctly identified, monitoring must begin before it becomes a problem. For example, in school cafeterias where roaches may be expected to appear, sticky traps are set out before school starts. Traps are checked at regular intervals so populations can be monitored and controlled before they get out of hand. Some factors to consider and monitor include: Is the pest present/absent? What is the distribution - all over or only in certain spots? Is the pest population increasing or decreasing?

4. Establish action threshold (economic, health or aesthetic) - How many are too many?
In some cases, a certain number of pests can be tolerated. Soybeans are quite tolerant of defoliation, so if there are a few caterpillars in the field and their population is not increasing dramatically, there is not necessarily any action necessary. Conversely, there is a point at which action must be taken to control cost. For the farmer, that point is the one at which the cost of damage by the pest is more than the cost of control. This is an economic threshold. Tolerance of pests varies also by whether or not they are a health hazard (low tolerance) or merely a cosmetic damage (high tolerance in a non-commercial situation). Different sites may also have varying requirements based on specific areas. White clover may be perfectly acceptable on the sides of a tee box on a golf course, but unacceptable in the fairway where it could cause confusion in the field of play.

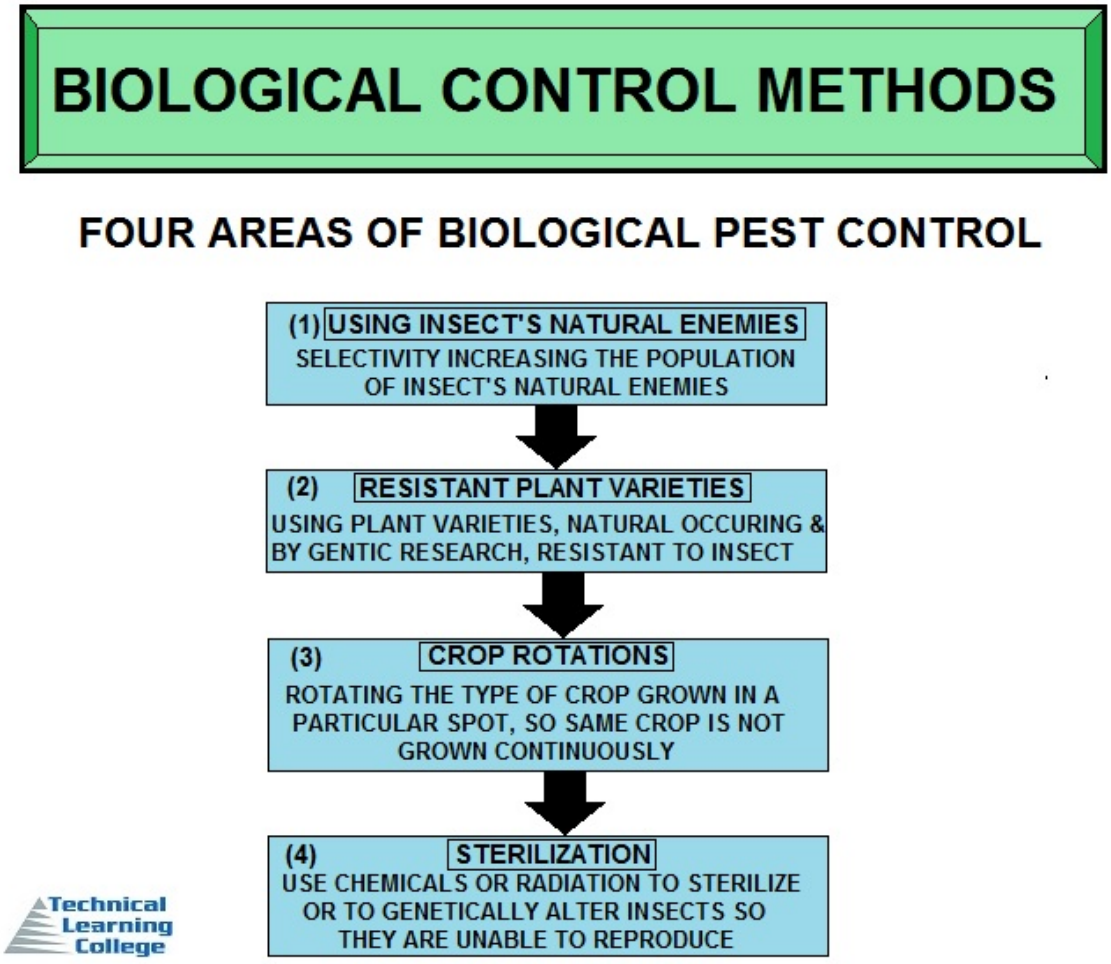
5. Choose an appropriate combination of management tactics
For any pest situation, there will be several options to consider. Options include mechanical or physical control, cultural controls, biological controls and chemical controls. Mechanical or physical controls include picking pests off plants, or using netting or other material to exclude pests such as birds from grapes or rodents from structures. Cultural controls include keeping an area free of conducive conditions by removing or storing waste properly, removing diseased areas of plants properly. Biological controls can be support either through conservation of natural predators or augmentation of natural predators.

Augmentative control includes the introduction of naturally occurring predators at either an inundative or inoculative level. An inundative release would be one that seeks to inundate a site with a pest's predator to impact the pest population. An inoculative release would be a smaller number of pest predators to supplement the natural population and provide ongoing control.

Chemical controls would include horticultural oils or the application of pesticides such as insecticides and herbicides. A Green Pest Management IPM program would use pesticides derived from plants, such as botanicals, or other naturally occurring materials.

6. Evaluate results - How did it work?
Evaluation is often one of the most important steps. This is the process to review an IPM program and the results it generated. Asking the following questions is useful: Did actions have the desired effect? Was the pest prevented or managed to farmer satisfaction? Was the method itself satisfactory? Were there any unintended side effects? What can be done in the future for this pest situation? Understanding the effectiveness of the IPM program allows the site manager to make modifications to the IPM plan prior to pests reaching the action threshold and requiring action again.

Biological Controls: Natural Spider Control



Diatomaceous Earth (DE)
Diatomaceous earth is made of the fossilized remains of ancient algae called diatoms. It is a food-grade, pet and child friendly dust that can be used in the same fashion as other insecticidal dusts. When spiders (or any creature blessed with an exoskeleton) walk over a thin layer of DE, they leak fluids, dehydrate, and die. Apply DE as a perimeter barrier around your home. You can also dust wood and rock piles. Indoors, use DE in basements, crawl spaces, cracks and crevices, door and window thresholds – anywhere you've seen spider activity.

Natural spider repellents
Though you won't find much research to back them up, there are a variety of popular natural spider repellents. Of these, the most widely-used are Osage hedge balls, which can be found in the produce section of some grocery stores (you can ask your grocer to order some). You place them in corners of rooms and windows and apparently spiders don't like this. Horse chestnuts and eucalyptus are other popular spider repellents that are used in the same manner.

Chemical Control: Spider control products
There are many consumer products on the market that effectively kill spiders, and I will make some recommendations below. However, chemicals for spider control are often discouraged unless you're dealing with the black widow or brown recluse spider. When it comes to chemical spider control, more important than what you use is how you use it. First of all, chemicals alone won't solve your problem; if you don't make the changes listed above, your property will still have the same spider population potential. Secondly, use chemicals in a focused manner, not indiscriminately all over the place. Lastly, always pay close attention to directions when dealing with pesticides. They are only deemed safe by the EPA when used according to the label.

For outdoor spider control
Barrier treatments, in conjunction with pest proofing, can effectively protect your home from spiders. Before sealing off cracks and crevices in siding and foundation, apply something like Delta Dust Insecticide (deltamethrin) or Drione Dust (pyrethrins, pipernyl butoxide, and silica gel). Besides the cracks and crevices, you may want to treat under the eaves of the roof, under porches, along the base of the foundation, the lowest edge of siding, behind shutters, and around doors and windows. For these areas you'll want a non-dust outdoor insecticide for spider control. Good options are Bayer Advanced Home Pest Control: Indoor and Outdoor Insect Killer (cyfluthrin) and Ortho Home Defense Perimeter & Indoor Insect Killer (bifenthrin).

Classes of Pesticide Examples
Carbamates -Carbaryl
Pyrethroids -Permethrin, deltamethrin, cyfluthrin
Pyrethrums- Plant extracts called pyrethrins, primarily for use inside the home because they break down so quickly.

Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 1-800-222-1222. If you wish to report a pesticide problem, please call 1-800-858-7378.

NOTE: When pesticides are used, it is the applicator's legal responsibility to read and follow directions on the product label. Not following label directions, even if they conflict with information provided herein, is a violation of federal law.

This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and Technical Learning College (TLC) assume no liability resulting from the use of these recommendations.

Liquid insecticide formulations include:

- ✓ Products containing the botanical insecticide pyrethrin, which gives quick knockdown but little long-term control;
- ✓ Various synthetic pyrethroid products (cyhalothrin, bifenthrin, deltamethrin, and permethrin); and
- ✓ Newer types of products including the pyrrole insecticide chlorfenapyr (Phantom) and the insect growth regulator hydroprene (Gentrol), which cause sterility in adults.

There is growing interest in the last two products, because some bed bug populations have developed resistance to pyrethroid insecticides and no longer can be effectively controlled by them. However, both newer products take up to several days to be effective.

Insecticides applied as dusts cling to the pest's cuticle, wearing away the insect's protective wax covering or poisoning the insect when it grooms itself. Several dust products used in bed bug management include boric acid, diatomaceous earth, fumed silica, and formulations of pyrethroids. These materials can provide long-term control as part of an integrated program if they are placed in out of-the-way places—such as under baseboards or in wall voids—that don't get wet.

For trees, vegetation, and lawn
Two respected yard spider control products are Spectricide Triazicide Insect Killer (lambda-cyhalothrin) and Ortho BugBGon Max Garden & Landscape Insect Killer Concentrate (Esfenvalerate).

For indoor spider control
Insecticide dusts like Drione Dust, Delta Dust Insecticide, and EcoExempt D (plant based) are ideal for wall voids, basements, behind power outlets and light switches, cracks and crevices, and other spider retreats. For direct contact spider killing, use a non-residual aerosol like CB-80 Extra or 565 Plus XLO (your shoe can be just as effective). For a longer lasting residual treatment, try Cy-Kick Aerosol, D-Force HPX, Demon WP Insecticide, or Cynoff WP (or Cynoff EC). Many of the products listed above for outdoor use can also be used to spot treat indoors, so read labels.

Bifenthrin
Bifenthrin is a pyrethroid insecticide that affects the nervous system of insects. It was discovered and developed by FMC Corporation. Products containing bifenthrin include Talstar, Maxxthor, Capture, Brigade, Bifenthrine, Ortho Home Defense Max, Bifen IT, Bifen L/P, and Scotts LawnPro Step 3.

Cyfluthrin
Cyfluthrin is a synthetic pyrethroid derivative that is used as an insecticide. Like most pyrethroids, it is highly toxic to fish. It is generally supplied as a 10-25% liquid concentrate for commercial use and is diluted prior to spraying onto agricultural crops and outbuildings. Excessive exposure can cause nausea, headache, muscle weakness, salivation, shortness of breath and seizures. In humans, it is deactivated by enzymatic hydrolysis to several carboxylic acid metabolites, whose urinary excretion half-lives are in a range of 5–7 hours. Worker exposure to the chemical can be monitored by measurement of the urinary metabolites, while severe over-dosage may be confirmed by quantification of cyfluthrin in blood or plasma. Cyfluthrin is a skin and eye irritant in humans, but overall poisonings from pyrethroid chemicals are rare. In humans pyrethroids are rapidly broken down by the liver proteins. In addition pyrethroids are not absorbed into the

bloodstream very well. Cyfluthrin may cause itching, burning, or stinging if it comes in contact with human skin which may last up to 24 hours. The onset of these symptoms can take 1 or 2 days to appear after initial exposure but may also occur at the time of the exposure. Sweating and/or exposure to sun/heat may exacerbate skin irritation

Lambda-cyhalothrin
Cyhalothrin is a pyrethroid insecticide, an ingredient in the Karate brand of pesticides sold by Syngenta. Cyhalothrin is a fluorinated pyrethrin analog. Lambda-cyhalothrin is a mixture of highly active isomers of cyhalothrin. Brand names include 'Karate', 'Kung-fu', 'Matador', and 'Demand CS' (Syngenta); in the USA, 'Triazicide' and 'Hot Shot' are used in the Home Landsape and Garden markets. Home Depot carries a brand of the insecticide under the brand name Real Kill. Terro also makes an outdoor ant and other insect prevention treatment similar to Home Defense using this ingredient. Sygenta held the patent for Lambda-cyhalothrin. This patent expired in most major markets in 2003.

Esfenvalerate
Trade names for the older compound fenvalerate included Ectrin, Sanmarton, Sumifly, Sumiflower, Sumitick and Pydrin. The trade name for the new product, Esfenvalerate, is Asana XL. The compound may also be listed as S-fenvalerate. Fenvalerate is an insecticide. It is a mixture of four optical isomers which have different insecticidal activities. The 2-S alpha (or SS) configuration is the most insecticidally active isomer. Fenvalerate consists of about 23% of this isomer. Fenvalerate is an insecticide of moderate mammalian toxicity. In laboratory animals, central nervous system toxicity is observed following acute or long-term exposure. Fenvalerate has applications against a wide range of pests. Residue levels are minimized by low application rates. Fenvalerate is most toxic to bees and fish. It is found in some emusifiable concentrates, ULV, wettable powders, slow release formulations, insecticidal fogs, and granules. It is most commonly used to control insects in food, feed, and cotton products, and for the control of flies and ticks in barns and stables. Fenvalerate does not affect plants, but is active for an extended period of time. Fenvalerate may irritate the skin and eyes on contact, and is also harmful if swallowed.

Pyrethroids
To mimic the insecticidal activity of the natural compound pyrethrum another class of pesticides, pyrethroid pesticides, has been developed. These are non-persistent, which is a sodium channel modulators, and are much less acutely toxic than organophosphates and carbamates. Compounds in this group are often applied against household pests. The pyrethroids are a large family of modern synthetic insecticides similar to the naturally derived botanical pyrethrins. They are highly repellent to MOST INSECTS AND ESPECIALLY termites, which may contribute to the effectiveness of the termiticide barrier. They have been modified to increase their stability in the natural environment. They are widely used in agriculture, homes, and gardens. Some examples are bifenthrin, cyfluthrin, cypermethrin, deltamethrin, and permethrin. They may be applied alone or in combination with other insecticides. Pyrethroids are formulated as emusifiable concentrates (EC), wettable powders (WP), granulars (G), and aerosols.

Certain pyrethroids exhibit striking neurotoxicity in laboratory animals when administered by intravenous injection, and some are toxic by the oral route. Systemic toxicity by inhalation and dermal absorption are low, however—there have been very few systemic poisonings of humans by pyrethroids. Though limited absorption may account for the low toxicity of some pyrethroids, rapid biodegradation by mammalian liver enzymes (ester hydrolysis and oxidation) is probably the major factor responsible. This course contains pesticide recommendations that are subject to change at any time.

These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and Technical Learning College (TLC) assume no liability resulting from the use of these recommendations.

Most pyrethroid metabolites are promptly excreted, at least in part, by the kidney. In response to dermal exposure, some persons may experience a skin sensitivity called paresthesia. The symptoms are similar to sunburn sensation of the face and especially the eyelids.

Sweating, exposure to sun or heat, and application of water aggravate the disagreeable sensations. This is a temporary effect that dissipates within 24 hours. For first aid, wash with soap and water to remove as much residue as possible, and then apply a vitamin E oil preparation or cream to the affected area. Paresthesia is caused more by pyrethroids whose chemical makeup includes cyano- groups: fenvalerate, cypermethrin, and fluvalinate. In addition to protecting themselves from future exposure, persons who have experienced paresthesia should choose a pyrethroid with a different active ingredient, as well as a wettable powder or microencapsulated formulation.

About These Pesticides
Pyrethrins and pyrethroids are insecticides included in over 3,500 registered products, many of which are used widely in and around households, including on pets, in mosquito control, and in agriculture. The use of pyrethrins and pyrethroids has increased during the past decade with the declining use of organophosphate pesticides, which are more acutely toxic to birds and mammals than the pyrethroids. This change to less acutely toxic pesticides, while generally beneficial, has introduced certain new issues. For example, residential uses of pyrethrins and pyrethroids may result in urban runoff, potentially exposing aquatic life to harmful levels in water and sediment.

Pyrethrins are botanical insecticides derived from chrysanthemum flowers most commonly found in Australia and Africa. They work by altering nerve function, which causes paralysis in target insect pests, eventually resulting in death. Pyrethroids are synthetic chemical insecticides whose chemical structures are adapted from the chemical structures of the pyrethrins and act in a similar manner to pyrethrins. Pyrethroids are modified to increase their stability in sunlight. Most pyrethrins and some pyrethroid products are formulated with synergists, such as piperonyl butoxide and MGK-264, to enhance the pesticidal properties of the product. These synergists have no pesticidal effects of their own but enhance the effectiveness of other chemicals.

Pyrethrins, a single pesticide active ingredient, contain six components that have insecticidal activity: **pyrethrin 1, pyrethrin 2, cinerin 1, cinerin 2, jasmolin 1, and jasmolin 2**

Pyrethroids include:
Allethrin stereoisomers, Bifenthrin, Beta-Cyfluthrin, Cyfluthrin, Cypermethrin, Cyphenothrin, Deltamethrin, Esfenvalerate, Fenpropathrin, Tau-Fluvalinate, Lambda-Cyhalothrin, Gamma Cyhalothrin, Imiprothrin, 1RS cis-Permethrin, Permethrin, Prallethrin, Resmethrin, Sumithrin (d-phenothrin), Tefluthrin, Tetramethrin, Tralomethrin, and Zeta-Cypermethrin

Synergists include:
MGK-264 and Piperonyl butoxide

Permethrin
General Information
Permethrin is a broad-spectrum pyrethroid insecticide. It is available in dusts, emusifiable concentrates, smokes, ULV concentrates, and wettable-powder formulations. The historical development of the synthetic pesticides called pyrethroids is based on the pyrethrins, which are derived from chrysanthemums. Pyrethrins are a "natural" environmental product that is of low toxicity to mammals. They are highly photolabile and degrade quickly in sunlight, and the cost of reapplying them has limited their widespread agricultural use. Pyrethroids have been synthesized to be similar to pyrethrins yet more stable in the environment.

Evidence suggests that they have a very large margin of safety when used as directed by the label (Aldridge, 1990; Chen et al., 1991; Snodgrass, 1992). Commercial pyrethroid products commonly use petroleum distillates as carriers. Some commercial products also contain OP or carbamate insecticides because the rapid paralytic effect of pyrethrins on insects ("quick knockdown") is not always lethal (Cheremisinoff and King, 1994). Pyrethroids are formulated as emusifiable concentrates, wettable powders, granules, and concentrates for ULV application.

Borates
“Borate” is a generic term for compounds containing the elements boron and oxygen. Boron never occurs alone naturally but as calcium and sodium borate ores in several places in the world. Borax and other sodium borates are used in numerous products such as laundry additives, eye drops, fertilizers, and insecticides. Though the mechanisms of toxicity are not fully understood, boron is very toxic to insects and decay fungi that commonly damage wood in structures.

At low levels, however, boron is only minimally toxic, and perhaps beneficial, to humans, other mammals, and growing plants. Use of borate-treated wood for construction of homes and their wood-based contents appears to offer many advantages to today’s environmentally sensitive world.

Unlike most other wood preservatives and organic insecticides that penetrate best in dry wood, borates are diffusible chemicals—they penetrate unseasoned wood by diffusion, a natural process. Wood moisture content and method and length of storage are the primary factors affecting penetration by diffusion. Properly done, diffusion treatments permit deep penetration of large timbers and refractory (difficult-to-treat) wood species that cannot be treated well by pressure.

Insecticide Safety Sub-Section

Insecticides

An insecticide is a pesticide used against insects. They include ovicides and larvicides used against the eggs and larvae of insects respectively. The use of insecticides is believed to be one of the major factors behind the increase in agricultural productivity in the 20th century. Nearly all insecticides have the potential to significantly alter ecosystems; many are toxic to humans; and others are concentrated in the food chain. This course contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and Technical Learning College (TLC) assume no liability resulting from the use of these recommendations.

Evaluating Pesticides EPA

All pesticides sold or distributed in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment.

Because of advances in scientific knowledge, the law requires that pesticides which were first registered before November 1, 1984, be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. The Agency develops any mitigation measures or regulatory controls needed to effectively reduce each pesticide's risks. EPA then reregisters pesticides that can be used without posing unreasonable risks to human health or the environment. When a pesticide is eligible for reregistration, EPA explains the basis for its decision in a Reregistration Eligibility Decision (RED) document.

Occupational Exposure to Pesticides

A pesticide poisoning occurs when chemicals intended to control a pest affect non-target organisms such as humans, wildlife, or bees. Pesticide poisoning is an important occupational health issue because pesticides are used in a large number of industries, which puts many different categories of workers at risk. Extensive use puts agricultural workers in particular at increased risk for pesticide illnesses. Workers in other industries are at risk for exposure as well. For example, commercial availability of pesticides in stores puts retail workers at risk for exposure and illness when they handle pesticide products. The ubiquity of pesticides puts emergency responders such as fire-fighters and police officers at risk, because they are often the first responders to emergency events and may be unaware of the presence of a poisoning hazard. The process of aircraft disinsection, in which pesticides are used on inbound international flights for insect and disease control, can also make flight attendants sick.

Different job functions can lead to different levels of exposure. Most occupational exposures are caused by absorption through exposed skin such as the face, hands, forearms, neck, and chest.

This exposure is sometimes enhanced by inhalation in settings including spraying operations in greenhouses and other closed environments, tractor cabs, and the operation of rotary fan mist sprayers. When used properly, pesticides offer a variety of benefits to society. They increase crop production, preserve produce, combat insect infestations, and control exotic species. However, pesticides also have the potential for causing harm.

Approximately 1.1 billion pounds of pesticide active ingredient are used annually in the U.S., and over 20,000 pesticide products are being marketed in the U.S.

The Environmental Protection Agency estimates that 10,000-20,000 physician-diagnosed pesticide poisonings occur each year among the approximately 2 million U.S. agricultural workers. Agricultural workers, groundskeepers, pet groomers, fumigators, and a variety of other occupations are at risk for exposure to pesticides including fungicides, herbicides, insecticides, rodenticides, and sanitizers.

Surveillance for occupational pesticide-related illness and injury is designed to protect workers by determining the magnitude and underlying causes of over-exposure to pesticides in the workplace. Surveillance also serves as an early warning system of any harmful effects not detected by manufacturer testing of pesticides.

Toxicity
Toxicity is the degree to which a substance can damage an organism. Toxicity can refer to the effect on a whole organism, such as an animal, bacterium, or plant, as well as the effect on a substructure of the organism, such as a cell (cytotoxicity) or an organ (organotoxicity), such as the liver (hepatotoxicity). By extension, the word may be metaphorically used to describe toxic effects on larger and more complex groups, such as the family unit or society at large. A central concept of toxicology is that effects are dose-dependent; even water can lead to water intoxication when taken in large enough doses, whereas for even a very toxic substance such as snake venom there is a dose below which there is no detectable toxic effect.

There are generally three types of toxic entities; chemical, biological, and physical:

- Chemical toxicants include inorganic substances such as lead, mercury, asbestos, hydrofluoric acid, and chlorine gas, organic compounds such as methyl alcohol, most medications, and poisons from living things.
- Biological toxicants include bacteria and viruses that can induce disease in living organisms. Biological toxicity can be difficult to measure because the "threshold dose" may be a single organism. Theoretically one virus, bacterium or worm can reproduce to cause a serious infection. However, in a host with an intact immune system the inherent toxicity of the organism is balanced by the host's ability to fight back; the effective toxicity is then a combination of both parts of the relationship. A similar situation is also present with other types of toxic agents.
- Physical toxicants are substances that, due to their physical nature, interfere with biological processes. Examples include coal dust and asbestos fibers, both of which can ultimately be fatal if inhaled.

Teratogenic Agents
A wide range of different chemicals and environmental factors are suspected or are known to be teratogenic in humans and in animals. A selected few include:

- **Drugs and medications:** tobacco, caffeine, drinking alcohol (ethanol) (see fetal alcohol spectrum disorder), isotretinoin (13-cis-retinoic acid, Roaccutane), temazepam (Restoril; Normisson), nitrazepam (Mogadon), nimetazepam (Ermin), aminopterin or methotrexate, androgenic hormones, busulfan, captopril, enalapril, coumarin, cyclophosphamide, diethylstilbestrol, phenytoin (diphenylhydantoin, Dilantin, Epanutin), etretinate, lithium, methimazole, penicillamine, tetracyclines, thalidomide, trimethadione, methoxyethyl ethers, Flusilazole, valproic acid, and many more.
- **Environmental chemicals:** polycyclic aromatic hydrocarbons (polynuclear aromatic hydrocarbons), polychlorinated biphenyls (PCBs), polychlorinated dibenzodioxins a.k.a dioxin, polychlorinated dibenzofurans (PCDFs), hexachlorobenzene hexachlorophene, organic mercury, ethidium bromide, etc.
- **Ionizing radiation:** atomic weapons fallout (Iodine-131, uranium), background radiation, diagnostic x-rays, radiation therapy.
- **Infections:** cytomegalovirus, herpes virus, parvovirus B19, rubella virus (German measles), syphilis, toxoplasmosis, Venezuelan equine encephalitis virus. (An easy way to remember maternal infections is TORCH: Toxoplasmosis, Other agents, Rubella, CMV and HSV.
- **Metabolic imbalance**: alcoholism, endemic cretinism, diabetes, folic acid deficiency, iodine deficiency, hyperthermia, phenylketonuria, rheumatic disease and congenital heart block, virilizing tumors

The status of some of the above substances (e.g. diphenylhydantoin) is subject to debate, and many other compounds are under varying degrees of suspicion. These include Agent Orange, nicotine, aspirin and other NSAIDs. Other compounds are known as severe teratogens based on veterinary work and animal studies, but aren't listed above because they have not been studied in humans, e.g. cyclopamine.

Teratogenic effects also help to determine the pregnancy category assigned by regulatory authorities; in the United States, a pregnancy category of X, D, or C may be assigned if teratogenic effects (or other risks in pregnancy) are documented or cannot be excluded.

Isotretinoin (13-cis-retinoic-acid; brand name Roaccutane), which is often used to treat severe acne, is such a strong teratogen that just a single dose taken by a pregnant woman may result in serious birth defects. Because of this effect, most countries have systems in place to ensure that it is not given to pregnant women, and that the patient is aware of how important it is to prevent pregnancy during and at least one month after treatment. Medical guidelines also suggest that pregnant women should limit vitamin A intake to about 700 µg/day, as it has teratogenic potential when consumed in excess.

Teratogenic outcomes
Exposure to teratogens can result in a wide range of structural abnormalities such as cleft lip, cleft palate, dysmelia, anencephaly, ventricular septal defect. Exposure to a single agent can produce various abnormalities depending on the stage of development it occurs. Specific birth defects are not characteristic of any single agent.

Plantae
In botany, teratology investigates the theoretical implications of abnormal specimens. For example, the discovery of abnormal flowers—for example, flowers with leaves instead of petals, or flowers with staminoid pistils—furnished important evidence for the "foliar theory", the theory that all flower parts are highly specialized leaves.

Carcinogen
When assessing possible cancer risk posed by a pesticide, EPA considers how strongly carcinogenic the chemical is (its potency) and the potential for human exposure. The pesticides are evaluated not only to determine if they cause cancer in laboratory animals, but also as to their potential to cause human cancer. For any pesticide classified as a potential carcinogen, the risk would depend on the extent to which a person might be exposed (how much time and to what quantity of the pesticide). The factors considered include short-term studies, long-term cancer studies, mutagenicity studies, and structure activity concerns. (The term “weight-of-the-evidence” is used in referring to such a review. This means that the recommendation is not based on the results of one study, but on the results of all studies that are available.)

Teratogen
Teratology is the study of abnormalities of physiological development. It is often thought of as the study of human birth defects, but it is much broader than that, taking in other non-birth developmental stages, including puberty; and other non-human life forms, including plants.

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Pathophysiology

Organochlorines

DDT is an organochlorine. The organochlorine pesticides, like DDT, aldrin, and dieldrin are extremely persistent and accumulate in fatty tissue. Through the process of bioaccumulation (lower amounts in the environment get magnified sequentially up the food chain), large amounts of organochlorines can accumulate in top species like humans. There is substantial evidence to suggest that DDT, and its metabolite DDE, act as endocrine disruptors, interfering with hormonal function of estrogen, testosterone, and other steroid hormones.

Anticholinesterase compounds

Malathion is an organophosphate anticholinesterase. Certain organophosphates have long been known to cause a delayed-onset toxicity to nerve cells, which is often irreversible. Several studies have shown persistent deficits in cognitive function in workers chronically exposed to pesticides. Newer evidence suggests that these pesticides may cause developmental neurotoxicity at much lower doses and without depression of plasma cholinesterase levels.

Diagnosis

Most pesticide-related illnesses have signs and symptoms that are similar to common medical conditions, so a complete and detailed environmental and occupational history is essential for correctly diagnosing a pesticide poisoning. A few additional screening questions about the patient's work and home environment, in addition to a typical health questionnaire, can indicate whether there was a potential pesticide poisoning.

If one is regularly using carbamate and organophosphate pesticides, it is important to obtain a baseline cholinesterase test. Cholinesterase is an important enzyme of the nervous system, and these chemical groups kill pests and potentially injure or kill humans by inhibiting cholinesterase. If one has had a baseline test and later suspects a poisoning, one can identify the extent of the problem by comparison of the current cholinesterase level with the baseline level.

Prevention

Accidental poisonings can be avoided by proper labeling and storage of containers. When handling or applying pesticides, exposure can be significantly reduced by protecting certain parts of the body where the skin shows increased absorption, such as the scrotal region, underarms, face, scalp, and hands. Using chemical-resistant gloves has been shown to reduce contamination by 33-86%.

Treatment

Specific treatments for acute pesticide poisoning are often dependent on the pesticide or class of pesticide responsible for the poisoning. However, there are basic management techniques that are applicable to most acute poisonings, including skin decontamination, airway protection, gastrointestinal decontamination, and seizure treatment.

Decontamination of the skin is performed while other life-saving measures are taking place. Clothing is removed, the patient is showered with soap and water, and the hair is shampooed to remove chemicals from the skin and hair. The eyes are flushed with water for 10–15 minutes.
The patient is intubated and oxygen administered, if necessary. In more severe cases, pulmonary ventilation must sometimes be supported mechanically. Seizures are typically managed with lorazepam, phenytoin and phenobarbitol, or diazepam (particularly for organochlorine poisonings).

Gastric lavage is not recommended to be used routinely in pesticide poisoning management, as clinical benefit has not been confirmed in controlled studies; it is indicated only when the patient has ingested a potentially life-threatening amount of poison and presents within 60 minutes of ingestion. An orogastric tube is inserted and the stomach is flushed with saline to try to remove the poison. If the patient is neurologically impaired, a cuffed endotracheal tube inserted beforehand for airway protection. Studies of poison recovery at 60 minutes have shown recovery of 8%-32%.

However, there is also evidence that lavage may flush the material into the small intestine, increasing absorption. Lavage is contra-indicated in cases of hydrocarbon ingestion.

Activated Charcoal
Activated charcoal is sometimes administered as it has been shown to be successful with some pesticides. Studies have shown that it can reduce the amount absorbed if given within 60 minutes, though there is not enough data to determine if it is effective if time from ingestion is prolonged. Syrup of ipecac is no longer recommended for most pesticide poisonings. Urinary alkalinization has been used in acute poisonings from chlorophenoxy herbicides (such as 2,4-D, MCPA, 2,4,5-T and mecoprop) however evidence to support its use is poor.

Epidemiology
Acute pesticide poisoning is a large-scale problem, especially in developing countries. "Most estimates concerning the extent of acute pesticide poisoning have been based on data from hospital admissions which would include only the more serious cases. The latest estimate by a WHO task group indicates that there may be 1 million serious unintentional poisonings each year and in addition 2 million people hospitalized for suicide attempts with pesticides. This necessarily reflects only a fraction of the real problem. On the basis of a survey of self-reported minor poisoning carried out in the Asian region, it is estimated that there could be as many as 25 million agricultural workers in the developing world suffering an episode of poisoning each year." Estimating the numbers of chronic poisonings worldwide is more difficult.

All agricultural employers whose workers perform hand labor operations in fields, forests, nurseries, and greenhouses treated with pesticides, and handle pesticides in these locations are covered by the U.S. Environmental Protection Agency's worker protection standard revised 2005.

Agricultural employers must be in full compliance with this regulation before April 15, 1994. Additionally, owners, operators, and their immediate family members must comply with some of the provisions of this standard. This supplement to *“A Summary of Federal Laws and Regulations Affecting Agricultural Employers,”* summarizes this regulation.

Agricultural employers must be in full compliance with the U.S. Environmental Protection Agency's (EPA) 2005 worker protection standard. This standard, which became effective on October 20, 1992, revises EPA's 1974 worker protection standard. Precise estimates of the number of workers and handlers who will be covered by the WPS are unknown, but the EPA estimates that nearly 4 million owners, operators, family members, hired workers and handlers could be affected.

The WPS covers every agricultural employer, including livestock producers, who have employees that perform hand labor operations in fields, forests, nurseries, and greenhouses treated with pesticides.

Unlike other laws and regulations affecting agricultural labor, the WPS does not exempt any employment in commercial agriculture involving hand labor in fields, but owners or operators and immediate family members are specifically exempt from some provisions. The WPS expands coverage to include more employees and expands employers' requirements for training employees who handle pesticides, protecting employees from pesticide exposure, and providing emergency assistance to exposed employees. Although many laws affecting agricultural employment exempt farming enterprises that employ small numbers of hired farmworkers, the new standard has no exemptions based on the number of employees.

Employers covered by the WPS must:
Reduce overall exposure to pesticides by prohibiting handlers from exposing workers during pesticide application, excluding workers from areas being treated and areas under a restricted entry interval, and notifying workers about treated areas. Some activities are allowed during restricted entry intervals if workers are properly trained and protected.

Mitigate exposures by requiring decontamination supplies be present and emergency assistance be available.

Inform workers about pesticide hazards by requiring safety training (workers and handlers), safety posters, access to labeling information, and access to specific information (listing of treated areas on the establishment).

WPS provisions are very complicated and are likely to affect a large number of employers and their workers. States may also issue worker protection standards that are stricter than the WPS.

Therefore, employers should contact their State agency that regulates the Federal Insecticide, Fungicide, and Rodenticide Act in cooperation with the EPA to determine whether they must comply with the WPS and local regulations. Nothing in this report replaces technical and professional legal advice.

Background
The Federal Insecticide, Fungicide, and Rodenticide Act (**FIFRA**) of 1947, as amended, sets an overall risk/benefit standard for pesticide registration, requiring that all pesticides perform their intended function, when used according to labeling directions, without imposing unreasonable risks of adverse effects on human health or the environment (Runyan, 1992).

During the congressional discussion of FIFRA amendments in 1972, the Senate Committee on Agriculture and Forestry (Committee) "*found protection of man and the environment to be a broad term encompassing farmers, farmworkers, and others who come into contact with pesticides...*" (57 FR 38102).

The Committee further found "that the bill [The Federal Environmental Pesticide Control Act of 1972 (FEPCA)] requires the Administrator to require that the labeling and classification of pesticides be such as to protect farmers, farmworkers, and others coming in contact with pesticides or pesticide residues" (57 FR 38102).

Given the above mandate, the EPA issued regulations in 1974 dealing with pesticide-related occupational safety and health of workers performing hand labor operations in fields during and after application of pesticides (40 CFR).

Four Basic Requirements
These regulations contained four basic requirements:
(1) workers are not to be sprayed with pesticides;
(2) there are specific restricted entry intervals (REI) for 12 pesticides, interim restrictive entry levels for certain pesticides, and a general re-entry interval for all other agricultural pesticides prohibiting re-entry into treated areas until sprays have dried, dusts have settled, and vapors have dispersed;
(3) protective clothing is required for any worker entering a treated area before the specific re-entry period has expired; and
(4) "appropriate and timely" warnings are required for re-entry. These warnings may be given orally in appropriate language, placed on the pesticide notice board, or posted in the field.

1974 Regulations
The EPA determined that the 1974 regulations did not adequately protect agricultural workers and pesticide handlers who were occupationally exposed to pesticides. In order to correct these inadequacies, the EPA issued new regulations designed to reduce exposure to pesticides, mitigate exposure, and inform workers about pesticides. Reducing overall exposure to pesticides will be accomplished by prohibiting handlers from exposing workers during application, excluding workers from areas being treated and areas under a REI (some activities are allowed during a REI if workers are properly trained and protected), and notifying workers about treated areas.

Mitigating Exposures
Mitigating exposures will be accomplished by requiring decontamination supplies and emergency assistance. Workers will be informed about pesticide hazards through required safety training (workers and handlers), safety posters, access to labeling information, and access to specific information (listing of treated areas on the establishment).

Worker Protection Standard for Agricultural Pesticides
Provisions of the WPS apply to:

Owners or managers of farms, forests, nurseries, or greenhouses where pesticides are used in the production of agricultural plants.

Those who hire or contract for services of agricultural workers to do tasks related to the production of agricultural plants on a farm, forest, nursery, or greenhouse.

The general duties of the WPS require an agricultural employer or a pesticide handler-employer to:

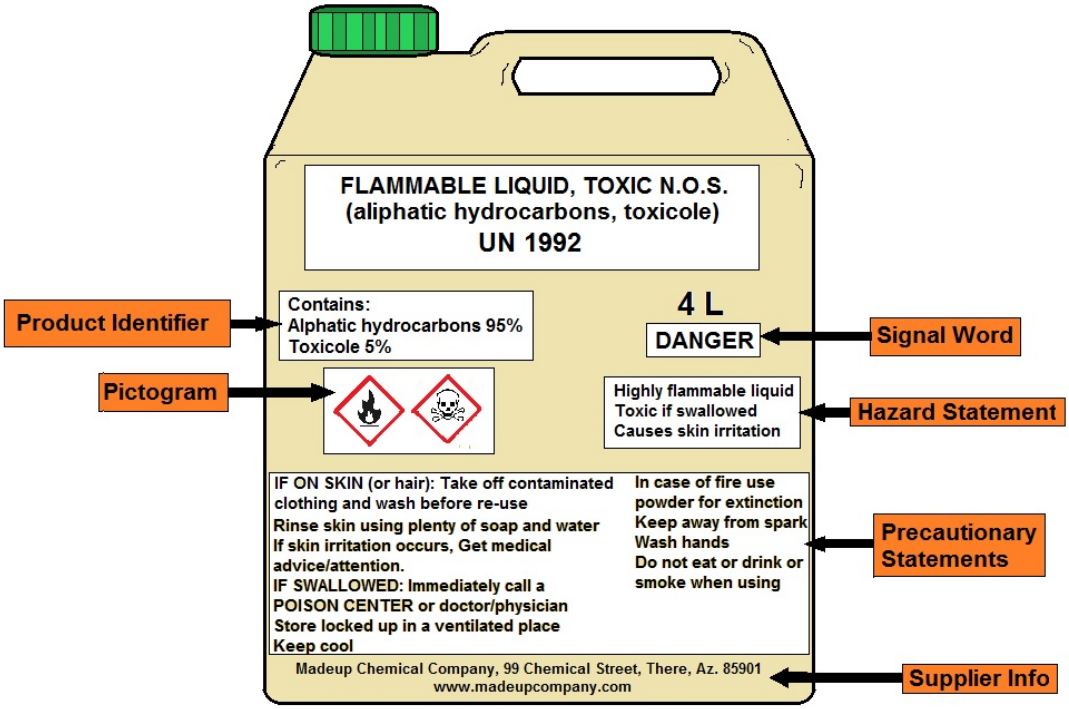
- Assure that each worker and handler subject to the standard receives the required protections.

- Assure that any pesticide subject to the standard is used in a manner consistent with the labeling of the pesticide, including the requirements in the standard.

- Provide sufficient information and directions to each person who supervises any worker or handler to assure that each worker or handler receives the required protection. The information and directions must specify which persons are responsible for actions required to comply with the standard.

- Require each person who supervises any worker or handler to assure compliance by the worker or handler with the provisions of this standard and to assure that the worker or handler receives the required protection (40 CFR).

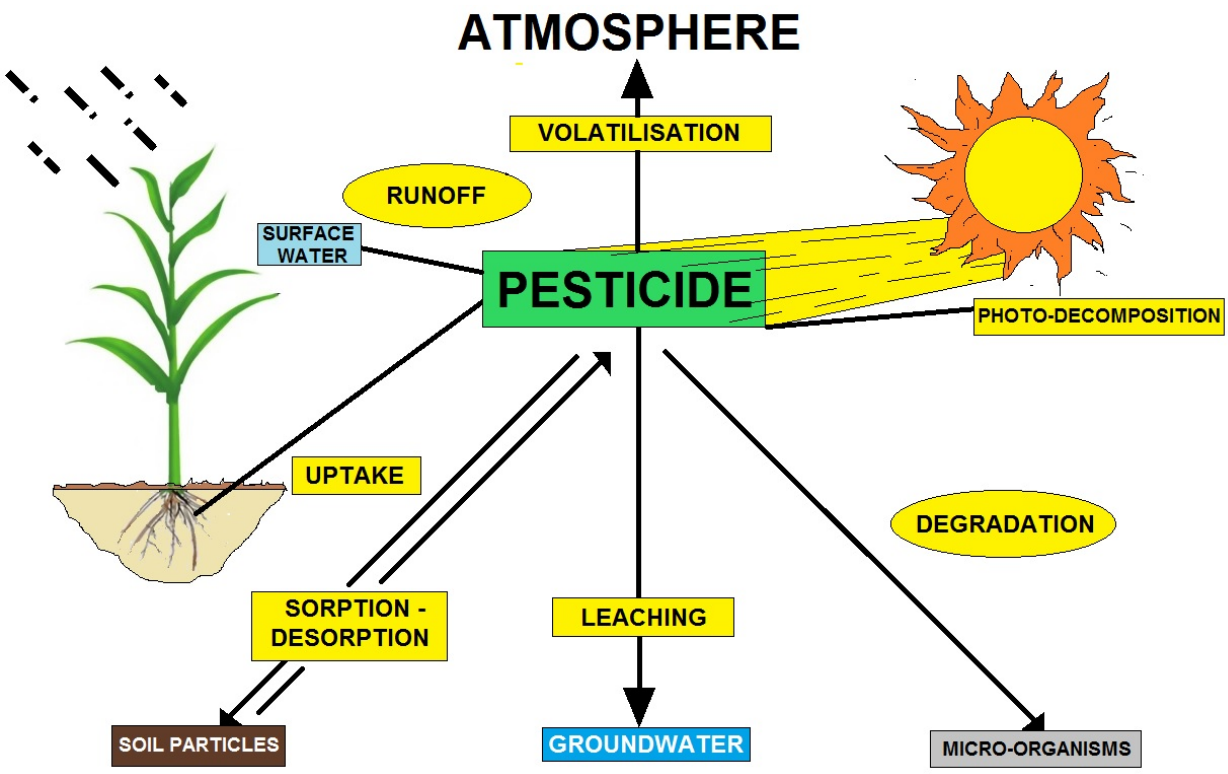
- The general duties also prohibit agricultural and handler employers from taking any retaliatory actions against workers attempting to comply with this standard, or from taking any action that prevents or discourages any worker or handler from complying or attempting to comply with the WPS.



PESTICIDE LABEL DIAGRAM

Labeling
Requires everyone applying pesticides to obey instructions printed on the pesticide container's label.

This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and Technical Learning College (TLC) assume no liability resulting from the use of these recommendations.



PESTICIDE FATE DIAGRAM

2017 Changes to EPA's Farm Worker Protection Standard

In late 2015 the Environmental Protection Agency issued the long awaited revision to the Worker Protection Standard (WPS). Although it is now technically active it will not be enforced until 2017 but the original WPS will still be enforced until the end of 2016. Please keep in mind that the WPS covers both restricted use AND general use pesticides. This section will deal with the highlights to the revision but also some areas of the current WPS that need emphasized.

The Environmental Protection Agency has revised the 1992 Agricultural Worker Protection Standard regulation to increase protection from pesticide exposure for the nation's two million agricultural workers and their families. These changes will afford farmworkers similar health protections that are already afforded to workers in other industries while taking into account the unique working environment of many agricultural jobs.

The regulation seeks to protect and reduce the risks of injury or illness resulting from ***agricultural workers'*** (those who perform hand-labor tasks in pesticide-treated crops, such as harvesting, thinning, pruning) and ***pesticide handlers'*** (those who mix, load and apply pesticides) use and contact with pesticides on farms, forests, nurseries and greenhouses. The regulation does not cover persons working with livestock.

• Annual mandatory training to inform farmworkers on the required protections. This increases the likelihood that protections will be followed.
• Expanded training includes instructions to reduce take-home exposure from pesticides on work clothing and other safety topics.
• First-time ever minimum age requirement: Children under 18 are prohibited from handling pesticides.
• Expanded mandatory posting of no-entry signs for the most hazardous pesticides. The signs prohibit entry into pesticide-treated fields until residues decline to a safe level.
• New no-entry application-exclusion zones up to 100 feet surrounding pesticide application equipment will protect workers and others from exposure to pesticide overspray.
• Requirement to provide more than one way for farmworkers and their representatives to gain access to pesticide application information and safety data sheets – centrally-posted, or by requesting records.
• Mandatory record-keeping to improve states' ability to follow up on pesticide violations and enforce compliance. Records of application-specific pesticide information, as well as farmworker training, must be kept for two years.
• Anti-retaliation provisions are comparable to Department of Labor's (DOL's).
• Changes in personal protective equipment will be consistent with the DOL's Occupational Safety & Health Administration standards for ensuring respirators are effective, including fit test, medical evaluation and training.
• Specific amounts of water to be used for routine washing, emergency eye flushing and other decontamination, including eye wash systems for handlers at pesticide mixing/loading sites.
• Continue the exemption for farm owners and their immediate family with an expanded definition of immediate family.

What Will These Changes Achieve?
There is a clear need for better protection for farmworkers. Each year, between 1,800 and 3,000 occupational incidents involving pesticide exposure are reported from the farms, forests, nurseries and greenhouses covered by the Worker Protection Standard. There is widespread underreporting.

By better protecting our agricultural workers, the agency anticipates fewer pesticide exposure incidents among farmworkers and their family members. Fewer incidents mean a healthier workforce and avoiding lost wages, medical bills, and absences from work and school. In addition, EPA is concerned about low level, repeated exposure to pesticides that may contribute to chronic illness.

What Types of Activities Are Covered?
The regulation seeks to protect and reduce the risks of injury or illness resulting from agricultural workers' (those who perform hand-labor tasks in pesticide-treated crops, such as harvesting, thinning, pruning) and

pesticide handlers' (those who mix, load and apply pesticides) use and contact with pesticides on farms, forests, nurseries and greenhouses. The regulation does not cover persons working with livestock.

Family Exemption
There is an "immediate family" exemption to the WPS that exempts family members from MOST of the WPS protections. However, family members must still use label required PPE (personal protection equipment) and still must obey the REIs (Restricted Entry Intervals) and the other label requirements.

So who falls under the Family Exemption?
The regulation revision has expanded the family exemption to now include first cousins, nephews, nieces, aunts, uncles, grandchildren, grandparents and in-laws. The original exemptions are still valid and they include children, step children, foster children, parents, step parents, foster parents, siblings and spouses and of course the owner. In spite of this exemption why not give your family the benefit of these WPS protections?

Training Changes
This is the area with the most changes. Under the revision growers subject to the WPS must now train their employees every year and they must be trained on Day 1 before they do any work in the crop areas if it has been less than 30 days since the last restricted entry interval expired. Make sure the employees sign off on their training and keep those on file. If the employee requests a copy of the sign off employers are now responsible to give them one copy.

Central Location
The big change here is the need to keep SDS sheets (Safety Data Sheets). Many of you are unfamiliar with SDS sheets but they are the old MSDS sheets in a standardized format. You will need to "display" them at the central location for 30 days following their use. Keeping them in a loose leaf notebook at the central location is acceptable. You need to keep these SDS sheets for two years after they were last used. You can get the SDS sheets from your pesticide supplier or download them off the Internet.

Of course you will still need to keep pesticide application information for 30 days at the central location and the pesticide safety information (poster). The central location must be easily accessible to your employees.

Decontamination Supplies
Pesticide handlers still need three gallons of water, soap and paper towels at the mix and load site, within a quarter mile of the application area and where PPE is taken off. If they are working with a product requiring eye protection they must have "immediate "access to at least a pint of eye wash or fresh water.

Handlers need an eye wash system at the mix and load site capable of delivering .4 gallons of water for 15 minutes or 6 gallons of water able to flow gently for 15 minutes. This does **Not** have to be a fancy system; it can be a hose attached to a faucet. A change of clothes for handlers is also required.

Although handlers and workers need to have access to the required decontamination supplies they can in emergency situations make use of natural waters that are close by in addition to the required decontamination supplies. Workers need to have access to at least a gallon of wash water, soap and paper towels within a quarter of a mile of the crop area that they are working in.

Application Exclusion Zone (AEZ)
The AEZ is an exclusion zone that surrounds the application equipment in a 360-degree radius. High drift applications such as air blast sprayers, aerial applications, fumigants, mist and fogging will need a 100 foot "bubble" where everyone is excluded except for handlers that have the proper PPE and training to work inside that bubble. Low drift applications will need a 25-foot bubble. If someone is in that AEZ the handler must suspend application in that area until they leave that area.

QUICK REFERENCE GUIDE TO THE WORKER PROTECTION STANDARD (WPS) AS REVISED IN 2015

The WPS is a federal regulation designed to protect agricultural workers (people employed in the production of agricultural plants) and pesticide handlers (people mixing, loading, or applying pesticides or doing certain tasks involving direct contact with pesticides). Each section links to the Code of Federal Regulations (40 CFR Part 170) for more information on the revised WPS. (www.ecfr.gov)

The section summarizes the maximum requirements under the revised WPS. It does not include exemptions and exceptions that may allow you to do less.

See the referenced sections below.
Exemptions (general) 170.303 (b) and170.601
Exceptions for **workers** 170.401 (b) and 170.409 (a)(2)
Exceptions for early-entry **workers** during a restricted-entry interval 170.603
Exceptions for **handlers** 170.501 (b)
Exceptions to PPE required on pesticide labels 170.607

Employer Responsibilities for Supervisors and Labor Contractors
Employers must provide sufficient information to supervisors and/or labor contractors to ensure compliance with the revised WPS.

Specify:
- ✓ The tasks supervisors / labor contractors must do, and
- ✓ The information they must provide to workers/handlers.

Employers are liable for a penalty under FIFRA if a supervisor or labor contractor acting for them fails to comply with the revised WPS requirements. 170.309 (d), 170.313 (d), 170.317 (c)

Duties of All Employees
These requirements apply to agricultural employers and commercial pesticide handler employers except the pesticide safety, application and hazard information requirements apply only to agricultural employers.

Anti-Retaliation
Employers must not retaliate against a worker or handler who attempts to comply with the WPS, files a complaint, or provides information in an investigation of alleged WPS noncompliance. 170.315

Minimum Age Requirements
1. Ensure that early-entry workers and all handlers are at least 18 years old. 170.309 (c) and 170.313 (c)

Pesticide Safety, Application and Hazard Information
An agricultural employer must display or make certain information available on the establishment. Commercial pesticide handler employers do not have to comply with information display requirements.
1. Display or make available all of the information listed in #2 together in an easily accessible (“central”) location on the agricultural establishment. 170.311 (a)(5) and 170.311 (b)(2)
2. The information includes:
- EPA WPS safety poster or equivalent information, which must include some additional information by January 2, 2018, and must be kept current. 170.311 (a)
- Application information that includes:

Product name, EPA registration number, and active ingredient
Crop or site treated, location and description of the treated area
Date, start and end times of the application, and duration of restricted-entry interval (REI). 170.311 (b)(1)
- A copy of the safety data sheet (SDS) for the formulated product for each WPS-labeled pesticide applied. 170.309 and 170.311

3. In addition, display the EPA WPS safety poster (or equivalent) where decontamination supplies are located at permanent sites and where decontamination supplies are provided for 11 or more workers. 170.311 (a)(5)
4. Allow workers and handlers unrestricted access to all of the information and keep all of the displayed information current and legible. 170.311 (a)(6)-(7) and 170.311 (b)(3)-(4)
5. Display the EPA WPS safety poster or equivalent information before an application takes place and for 30 days after the REI expires. 170.309 (h)
6. Display the SDS and application information within 24 hours of the application and before workers enter treated areas. This information must be displayed for 30 days after the REI expires and kept in records on the agricultural establishment until 2 years after the REI expires. 170.309 (h)&(l) and 170.311 (b)(5)-(6)
7. Provide the SDS and application information upon request of a worker, handler, designated representative or medical personnel, within 15 days. 170.311 (b)(7)-(9)

Pesticide Safety Training

Ensure that **workers** are trained before performing tasks in a pesticide treated area (REI in effect within the last 30 days). 170.401 (a) Ensure that **handlers** are trained before performing any handler activity. 170.501 (a) There is no grace period for worker or handler training.
1. Train workers and handlers annually. 170.401 (a) and 170.501 (a)
2. Present training using EPA-approved materials either orally from written materials or audio-visually. After January 2, 2018, the training must cover additional topics. 170.401 (c) and 170.501 (c)
3. Trainers must be certified applicators or have completed an EPA-approved train-the-trainer program or be designated by the State or Tribal pesticide enforcement agency. 170.401 (c)(4) and 170.501 (c)(4)
4. Training must be delivered in a manner the employees can understand, and the trainer must be present and respond to questions. 170.401 (c)(1) and 170.501 (c)(1)
5. Maintain training records on the establishment for two years from the training date for each worker and handler required to be trained on the agricultural establishment. 170.401 (d) and 170.501 (d)
Separate from the pesticide safety training, employers must tell workers and handlers where to find the following on the worksite: EPA WPS safety poster (or equivalent), application information, SDSs and decontamination supplies. 170.403 and 170.503 (b)

Decontamination Supplies

1. Establish accessible decontamination supplies located together within 1/4 mile of all **workers** (when required 170.411 (c)) and **handlers**. 170.411 and 170.509
- 1 gallon of water per worker and 3 gallons of water per handler at the beginning of each work period for routine and emergency decontamination,
- Plenty of soap and single-use towels, Note: hand sanitizers and wet towelettes are insufficient. 170.411 (b)(2) and 170.509 (b)(2)
- A clean coverall (or other clean change of clothes) for handlers

2. Provide water that is safe and cool enough for washing, eye-flushing, and drinking. Do not use water that is also used for mixing pesticides unless steps are taken to ensure safety. 170.411 (b)(1)
3. Provide **handlers** with decontamination supplies where personal protective equipment (PPE) is removed at the end of a task. 170.509 (a)
4. Provide **handlers** with decontamination supplies at each mixing and loading site. 170.509 (c)(1)
5. When a product requires protective eyewear for **handlers**, and/or when using a closed system under pressure, provide the following in mixing and loading areas: a system that can deliver gently running water at 0.4 gallons per minute for at least 15 minutes or 6 gallons of water in containers suitable for providing a gentle eye-flush for about 15 minutes. 170.509 (d)(1)
6. When applying a product that requires protective eyewear, provide 1 pint of water per **handler** in portable containers that are immediately available to each handler. 170.509 (d)(2)
7. Do not put **worker** decontamination supplies in areas being treated or under an REI. 170.411 (d)
8. For **handlers**, decontamination supplies must be kept outside the treated area, or any area under an REI, unless they are protected from contamination in closed containers. 170.509 (c)(1)&(3)

Employer Information Exchange

1. Before any application, commercial pesticide handler employers must make sure the owner/ operator of an agricultural establishment where a pesticide will be applied, is aware of:
- Location and description of area to be treated,
- Date of application, estimated start time and estimated end time of the application,
- Product name, EPA registration number, active ingredient(s), and REI,
- Whether the product label requires both oral warnings and treated area posting,
- All other safety requirements on labeling for workers or other people. 170.313 (i)

2. Owners/operators of agricultural establishments must make sure any commercial pesticide
- handler employer they hire is aware of: Specific location and description of any treated areas where an REI is in effect that the commercial handler may be in or walk within 1/4 mile of, and,
- Restrictions on entering those areas. 170.309 (k)
- The commercial pesticide employer must pass this information along to the handler doing the work. 170.313 (h)

Emergency Assistance

If there is reason to believe a worker or handler has been exposed to pesticides, during or within 72 hours of employment, and needs emergency medical treatment, employers must do the following:
1. Promptly make transportation available to an appropriate emergency medical facility.
2. Promptly provide to the treating medical personnel, information related to each pesticide product to which the person may have been exposed:
- Safety Data Sheet
- Product name, EPA registration number, and active ingredient(s).
- Description of how the pesticide was used on the agricultural establishment.
- Circumstances that could have resulted in exposure to the pesticide. 170.309 (f)

Additional Duties for Worker Employees

These requirements apply to agricultural employers who employ workers.

Restrictions During Applications 170.405 (a)-(b)

During pesticide applications, keep workers and everyone other than appropriately trained and equipped handlers out of the treated area (for all types of applications) and out of:
- The application exclusion zone (AEZ) for outdoor production, or
- A specified area that varies by the type of application until the ventilation criteria are met for enclosed space production.

Restricted-Entry Intervals (REIs) 170.309 (l) and 170.407

Do not direct or allow any worker to enter or remain in the treated area until the REI has expired and all posted warning signs are removed or covered. Read the exceptions in 170.603.

Notice About Applications 170.409 (a)

1. Orally warn workers **and** post treated areas if required by the pesticide labeling.
2. If not, post warning signs if the REI is **greater than**:
- 48 hours for outdoor production or
- 4 hours for enclosed space production.

3. For all other applications, **either** orally warn workers or post warning signs.

Posted Warning Signs 170.409 (b)

1. Post legible 14” x 16” WPS-design warning signs no more than 24 hours prior to an application; keep posted during REI; remove or cover before workers enter and within 3 days after the end of the REI. 170.409 (b)(1)-(3)
2. Post signs so they can be seen at all reasonably expected entrances to treated areas. 170.409 (b)(3)(ii)

3. Warning signs can be smaller than 14” x 16” under certain conditions. All warning signs must meet specific requirements. 170.409 (b)

Oral Warnings 170.409 (c)

1. Before each application, tell workers who are on the establishment (in a manner they can understand):
- Location and description of treated area,
- Date and times entry is restricted
- AEZ, REI, and not to enter during REI.

2. Workers who enter the establishment after application starts must receive the same warning at the start of their work period.

Additional Duties for Agricultural Employers Duties

Before allowing persons not directly employed by the establishment to clean, repair, or adjust pesticide application equipment, provide the following information:
- The equipment may be contaminated with pesticides.
- The potentially harmful effects of pesticide exposure.
- How to handle equipment to limit exposure to pesticides.
- How to wash themselves and/or their clothes to remove and prevent exposure to pesticide residues.

170.309 (g) and 170.313 (l)

Application Restrictions and Monitoring 170.505

1. Do not allow handlers to apply a pesticide so that it contacts, directly or through drift, anyone other than appropriately trained and equipped handlers.
2. Handlers must suspend applications when anyone other than appropriately trained and equipped handlers enter the application exclusion zone (AEZ). This goes into effect on January 2, 2018. 170.505 (b)
3. When anyone is handling a highly toxic pesticide with a skull and crossbones, maintain sight or voice contact every two hours.
4. Make sure a trained handler equipped with labeling-specific PPE maintains constant voice or visual contact with any handler in an enclosed-space production site (e.g., greenhouses, high tunnels, indoor grow houses) while applying a fumigant.

Specific Instructions for Handlers

1. Before handlers do any handling task, inform them, in a manner they can understand, of all pesticide labeling instructions for safe use. 170.503 (a)(1)
2. Ensure that the handler has access to product labeling during the entire handling task. 170.503 (a)(2)

Equipment Safety

1. Inspect pesticide handling equipment before each day of use, and repair or replace as needed. 170.309 (j) and 170.313 (g)
2. Allow only appropriately trained and equipped handlers to repair, clean, or adjust pesticide equipment that contains pesticides or residues, unless they are not employed on the establishment. 170.309 (g) and 170.507 (a) See Additional Agricultural Employer

Personal Protective Equipment (PPE) Handlers

Must Use

1. Provide handlers with the PPE required by the pesticide labeling, and be sure it is: 170.507 (b)
- Clean and in operating condition, 170.507 (b)
- Worn and used according to the manufacturer’s instructions,170.507 (c)
- Inspected before each day of use, 170.507 (c)(2)
- Repaired or replaced as needed. 170.507 (c)(2)

2. When a respirator is required by product labeling, provide handlers with:
- A medical evaluation to ensure the handler is physically able to safely wear the respirator,
- Training in respirator use, and
- A fit test to ensure the respirator fits correctly.

- Keep records on the establishment of these items for two years. 170.507 (b)(10)

3. Take steps to avoid heat-related illness when labeling requires the use of PPE for a handler activity. 170.507 (e)
4. Provide handlers a pesticide-free area for:
- Storing personal clothing not in use,
- Putting on PPE at start of task,
- Taking off PPE at end of task. 170.507 (d)(9)

5. Do not allow used PPE to be taken home. 170.507 (d)(10)

Care of PPE

1. Store and wash used PPE separately from other clothing and laundry. 170.507 (d)(3)
2. If PPE will be reused, clean it before each day of reuse, according to the instructions from the PPE manufacturer unless the pesticide labeling specifies other requirements. If there are no other instructions, wash in detergent and hot water. 170.507 (d)(1)
3. Dry the clean PPE before storing. 170.507 (d)(4)
4. Store clean PPE away from personal clothing and apart from pesticide-contaminated areas. 170.507 (d)(5)

Replacing Respirator Purifying Elements

1. Replace particulate filters or filtering facepiece respirators when any following condition is met:
- When breathing becomes difficult,
- When the filter is damaged or torn,
- When the respirator label or pesticide label requires it,
- After 8 total hours of use, in the absence of any other instructions or indications of service life. 170.507 (d)(6)

2. Replace vapor-removing cartridges/canisters when any following condition is met:
- When odor/taste/irritation is noticed,
- When the respirator label or pesticide label requires it (whichever is shorter),
- When breathing resistance becomes excessive,
- After 8 total hours of use, in the absence of any other instructions or indications of service life. 170.507 (d)(7)

Disposal of PPE

1. Discard, do not clean, coveralls and other absorbent materials that are heavily contaminated with pesticide having a signal word
"DANGER" or "WARNING." When discarding PPE, ensure that it is unusable as apparel or made unavailable for further use.
2. Follow federal, state, and local laws when disposing of PPE that cannot be cleaned correctly. 170.507 (d)(2)

Instructions for People Who Clean PPE 170.507 (d)(8)

The handler employer must inform people who clean or launder PPE:
- That PPE may be contaminated with pesticides,
- Of the potential for harmful effects of exposure to pesticides,
- How to protect themselves when handling PPE,
- How to clean PPE correctly, and
- Decontamination procedures to follow after handling contaminated PPE.

Requirement	2017 Provision	Prior 2017 Provision
Training		
Frequency of full training for workers and handlers	Annual training.	Every 5 years.
Training grace period for worker training	No grace period. Workers must be trained before they work in an area where a pesticide has been used or a restricted-entry interval has been in effect in the past 30 days.	5-day grace period with abbreviated training.
Qualifications for trainers of workers	Certified applicators, State/Tribal/Federal approved trainers, and persons who have completed an EPA- approved train-the-trainer course.	Handlers, certified applicators, State/Tribal/Federal approved trainers, and persons completing an approved train-the-trainer course.
Expand training content for workers and handlers	Keep existing and expand content. Final worker training topics expanded to 23 items, and handler training expanded to 36 items. Training on new content not required until 2 years from effective date of final rule.	11 basic training items for workers and 13 items for handlers. Minimal training on reducing take-home exposure, reporting use violations, and prohibition from employer retaliation.
Recordkeeping of training	Keep records for 2 years. Give copy of record of training to workers and handlers upon their request.	No recordkeeping of training. Voluntary verification card system.
Hazard Communication		
Content and availability of hazard communications materials	Employer must display application information and safety data sheets (SDSs) at central location within 24 hours of end of application and before workers enter that treated area. Display both for 30 days after REI expires. Keep application information and SDS for 2 years from end of REI and make available to workers, handlers, designated representatives (identified in writing) or treating medical personnel upon request.	Employer must display application-specific information at a central location before application occurs, or, if no workers or handlers are on the establishment, before next period workers/handlers are on establishment. Keep posted for 30 days after REI expires. No recordkeeping.

Requirement	2017 Provision	Prior 2017 Provision
Notification of Treated Areas		
Notification of treated areas under an REI	Post warning sign if REI is greater than 48 hours (outdoor applications) or 4 hours (enclosed space applications (e.g., greenhouses)), otherwise option for posting or oral notification unless label requires both.	Farms, forests and nurseries: Post warning sign or give oral notification for any REI, unless label requires both. Greenhouses: all applications require signs to be posted.
Warning sign	Same as current sign.	Red circle containing stern-faced man with upraised hand. At the top: “DANGER” and “PELIGRO”, “PESTICIDES”, “PESTICIDAS”. At the bottom: “KEEP OUT”, “NO ENTRE.”

Information exchange between handler employer and agricultural employer	Agricultural employer must provide application information on treated areas the handler may be in (or walk within ¼ mile of). Handler employer must notify before the application begins for certain changes and within 2 hours of end of application for most other changes, unless only change was less than 1 hour difference in application time.	Agricultural employer must provide application information on treated areas the handler may be in (or walk within ¼ mile of). Handler employer must notify of changes to application plans before application begins.

Minimum Age		
Minimum age for handlers and early-entry workers	Handlers and early-entry workers must be at least 18 years old. (Members of owner's immediate family are exempt from this and most other requirements of the WPS.)	No minimum age.
Entry Restrictions During Application for Outdoor Production		
Ag employers must prohibit entry in areas during application for outdoor production. (Restrictions for greenhouses/enclosed space production are different.)	All outdoor production: No entry into treated area or the application exclusion zone, which is an area up to 100 feet area around the application equipment during pesticide application on farms, forests and nurseries. Size of the application exclusion zone depends on type of application. Revised descriptions of application methods.	Farms and forests: No entry into treated area. Nurseries: No entry into treated area or an area up to 100 feet around the treated area, where the size of the additional area depends on type of application.
Handler Suspend Application		
Handler (applicator) must suspend application in certain circumstances	Handler must apply pesticides so as not to contact workers or other persons. Handler must suspend application if a worker or other person is in the application exclusion zone, an area up to 100 feet around the application equipment.	Handler must apply pesticides so as not to contact workers or other persons. No specific requirement to suspend applications.
Exemptions and Exceptions		
Exemption for certified crop advisors and their employees	Only certified crop advisors are exempt from labeling PPE and WPS requirements as specified in exemption. Certified crop advisor employees must use label-required PPE while working in a field during an REI, and employer must provide all required WPS protections, or rely on the PPE substitutions allowed under the crop advisors.	Certified crop advisor chooses PPE for themselves and their employees working under their direct supervision in a field during an REI. Also exempted from providing decontamination supplies and emergency assistance for themselves and employees.
Exceptions to REIs for early entry workers – notification requirements	Notify early-entry workers of application specifics, tasks to be performed, conditions of the early-entry exception, and hazard information from the pesticide label.	Inform early-entry workers of hazard information from the pesticide label.

Requirement	2017 Provision	Prior 2017 Provision
Basic Pesticide Safety Information		
Display of pesticide safety information	Display pesticide safety information at a central location and at sites where decontamination supplies are located, if the decontamination supplies are at a permanent site or at a location with 11 or more workers or handlers.	Display a safety poster at central location.
Content of pesticide safety information	Information can be displayed in any format (doesn't have to be a poster); keep the 7 concepts about preventing pesticides from entering your body; delete the point that there are federal rules to protect workers and handlers; add instructions for employees to seek medical attention as soon as possible if they have been poisoned, injured or made ill by pesticides; add name, address and telephone number of state or tribal pesticide regulatory authority; revise "emergency medical facility" to "*a nearby* operating medical care facility." New content for safety information display not required until 2 years from effective date of final rule.	The safety poster must include 7 concepts about preventing pesticides from entering your body; the point that there are federal rules to protect workers and handlers; and the name, address and phone number of the nearest emergency medical care facility.
Personal Protective Equipment		
Respirators	Employer must provide respirator and fit testing, training, and medical evaluation that conforms to OSHA standards for any handler required to wear any respirator by the labeling. Require recordkeeping of completion of fit test, training, and medical evaluation.	Employer must provide respirator listed on label and ensure it fits. No recordkeeping required.
Definition of chemical-resistant	Same as current definition.	Made of a material that allows no measurable movement of the pesticide through the material during use.
PPE exception for closed systems	Exceptions to the labeling-specified PPE allowed for handlers when using closed systems. A closed system must meet a broad performance-based standard and basic operating standards (written operating instructions and training of handlers in use of the system) must be provided.	Exceptions to the labeling-specified PPE allowed for handlers when using closed systems. No specific criteria for closed systems.
PPE exception for crop advisors and their employees	Crop advisors and their employees entering treated areas while a REI is in effect to conduct crop-advisor tasks may wear a standard set of PPE (coveralls, shoes plus socks and chemical-resistant gloves made of any waterproof material, and eye protection if the labeling of the pesticide product applied requires protective eyewear for handlers, as outlined in rule), *OR* the PPE specified on the pesticide labeling for early-entry activities instead of the PPE specified on the pesticide labeling for handling activities, provided certain conditions are met. (See exemption for certified crop advisor.)	Crop advisors and their employees entering treated areas while a REI is in effect to conduct crop-advisor tasks may wear the PPE specified on the pesticide labeling for early-entry activities instead of the PPE specified on the pesticide labeling for handling activities, provided certain conditions are met. (See exemption for certified crop advisor.)
PPE exception from eyewear for pilots in open cockpits	If product label requires eye protection, pilots in open cockpits may wear a helmet with lowered face shield instead of label-required eye protection.	If product label requires eye protection, pilots in open cockpits may wear visor instead of label-required eye protection.

Requirement	2017 Provision	Prior 2017 Provision
Personal Protective Equipment		
PPE exception from gloves for pilots in enclosed cockpits	Same as current requirement.	Gloves are optional when entering and leaving aircraft unless required by product label.
PPE exception for enclosed cabs	Maintain exception for dermal PPE as in existing rule with same conditions, but handlers in enclosed cabs must wear the labeling-specified respiratory protection except when the only labeling-specified respiratory protection is a particulate filtering facepiece respirator (NIOSH approval number prefix TC-84A), previously called a dust/mist filtering respirator.	Exceptions to the labeling-specified PPE are allowed when handling tasks are performed from inside an enclosed cab that meets the specifications defined in the rule and certain conditions are met. Exceptions to the labeling-required respiratory protection are allowed only if the cab has been certified by the manufacturer to provide respiratory protection equivalent to the respiratory protection required by the pesticide labeling for handling.
Decontamination Supplies		
Quantity of water	Provide 1 gallon for each worker and 3 gallons for each handler and each early entry worker as measured at beginning of workers' or handlers' work period.	Provide enough water for routine washing and emergency eye flushing for workers and handlers. For handlers, also provide enough to wash entire body in emergency.
Use of natural waters	Must provide water for decontamination. There is no reference to, or prohibition from, using natural waters in addition to decontamination water provided. Workers and handlers are trained to use any nearest clean water source in case of emergency.	Must provide water for decontamination. May use natural waters in addition to water provided for decontamination.
Eye wash for handlers	Provide a system capable of delivering 0.4 gallons/minute for 15 minutes, or 6 gallons of water able to flow gently for about 15 minutes at a mix/load site if handlers use products requiring eye protection or use a pressurized closed system. One pint of water in a portable container must be available to each handler applying pesticides if eye protection is required.	Provide enough water for emergency eye flushing. One pint of water in a portable container must be available to each handler if eye protection is required.
Emergency Assistance		
Emergency Assistance	Provide prompt transportation to medical facility. Promptly provide the SDS, product information (name, EPA Reg. No and active ingredient) and circumstances of exposure to treating medical personnel	Provide prompt transportation to medical facility and provide any obtainable information about the product, antidote, first aid, and circumstances of exposure to the worker/handler or treating medical

General Pesticide First Aid Sub-Section

It is still important to recognize signs and symptoms of pesticide/herbicide poisoning. When in doubt, seek medical attention and be sure to bring the fumigants label and MSDS (SDS) to the physician.

Poisoning Recognition
Certain pesticide/herbicide may cause an allergic reaction in a sensitive person. It is important to know the signs and symptoms most likely to be caused by the products you use. Symptoms such as nausea or headache are noticeable only to the affected person. Other people can see signs, such as vomiting, sweating, sluggishness, staggering, swelling, or rash development. Know what your own symptoms might mean and what signs of poisoning to look for in your coworkers. Chemical products that are chemically similar to one another often cause the same type of symptoms. They may be mild or severe, depending on the specific chemical or product involved and the level of exposure. If you have been working with pesticide/herbicides and some signs or symptoms begin to develop, let your co-workers know, and get medical attention quickly. The pesticide/herbicide's label or MSDS (SDS) will have a telephone number to contact in case of a medical incident.

Procedures
- Get medical attention quickly if you or any of your fellow workers experience unusual or unexplained symptoms that start during work hours or later the same day.
- Do not allow yourself or anyone else to become extremely sick before calling a physician or going to a hospital.
- Read the first aid instructions on the product label or the Material Safety Data Sheet (MSDS) for each product.
- Follow the instructions, and avoid becoming exposed while trying to help another person.
- Give the label and MSDS to the physician or emergency personnel. Most labels have a telephone number to contact in case of medical emergencies involving the product. You should provide this number to medical personnel.
- Most of the following recommendations are useful for most types of pesticide exposure. Always read the label for more specific instructions.

Pesticide/herbicides on Skin
Wash the chemical product from skin with soap and water. This should be adequate in most instances of skin exposure. You should have a ready supply of soap and clean water on the spray equipment to wash your hands or protective equipment after working on the sprayer or coming in contact with the spray solution. Seek medical treatment if there are skin burns or an irritation persists.

Pesticide/herbicides in Eye
Eye exposure to pesticide/herbicides can be serious. Always pour, measure, or mix pesticide/herbicides with the containers held below eye level to avoid splashing the product into your eyes. Wettable powders and granules are abrasive and may damage your eyes. Always wear eye protection when mixing.

If Pesticide/herbicides contact your eye(s)

- Remove any protective equipment and wash the eyes quickly but gently.
- Hold the eyelid open and wash with a gentle stream of clean running water.
- Wash for 15 minutes or more.
- Do not use chemicals or eye wash solutions in the wash water because they may increase the extent of the injury.
- Seek medical attention if irritation or burning in the eyes persists.

Pesticide/herbicides in the Lungs

Because these chemical treatments and products are used outdoors, inhalation is not a common route of exposure. However, there are situations with potential inhalation exposure, such as while mixing wettable powders and handling chemical in a storage room or rail car.

- Stand where the wind blows across your body so the wind will carry any chemical dust away from you.
- Cutting the bags, rather than tearing them, avoids stirring up any dust from the product.

Pesticide/herbicides in Mouth or Swallowed

Rinse the mouth with plenty of water. If chemical is swallowed read and carefully follow all instructions on the product label regarding treatment. Induce vomiting only if instructed to do so if on the label. Get medical attention.

Supplies

- A standard first aid kit is important for treating cuts and scrapes associated with working around equipment.
- A supply of clean water for emergency eye flushing should be readily available at the storage facility, on the application equipment, and at the job site. This water should NOT be contaminated in any way. Special eye washing kits that contain water and eye cups can be purchased from safety supply stores.
- Soap and water for routine hand washing should be kept with each piece of equipment, especially if crews eat on location. When using waterless hand cleaners for routine cleanup, you should rinse the cleaner off with water when available.
- Also consider a Tyvek suit that can be worn in the event of an applicator's clothing becoming contaminated.

"Spill kits" are available commercially and include absorbent materials that will help contain a minor jobsite spill until you can properly dispose of the material

Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 1-800-222-1222. If you wish to report a pesticide problem, please call 1-800-858-7378.

NOTE: When pesticides are used, it is the applicator's legal responsibility to read and follow directions on the product label. Not following label directions, even if they conflict with information provided herein, is a violation of federal law.

Pesticide Applicator Observations

Right photograph, a hand compress spray applicator. Known in the industry as a B&G sprayer. This sprayer will apply most liquid products. A necessary tool for any applicator.

Top left photograph, hose reel spray set-up.

Most applicators have gone to a backpack style product applicator; this is your primary moneymaking tool if properly utilized. I said “product” and not “chemical” or “pesticide”. For some reason, customers prefer the word product, especially when you are applying pesticides. Here is my commentary; for some unknown reason, a majority of the younger applicators are doing a horrible job at applying product and conducting customer service. The larger firms are going through several new hires and only keeping a few of their trainees. This process is costing companies thousands of dollars and losing customers and I can’t figure it out.

The item on the right is often referred to as a “Centrobulb” or duster. This is a brand name, and many variations are found. It is a simple tool to apply powder, dust, or granular baits. An insecticide duster delivers a fine application of your favorite insecticidal dust. Get one that is non-conductive to electrical lines and switches. I have noticed that applicators will utilize this tool and proper product in areas that are wet or receive rain. This is a good use of product and good idea to boot.

Always follow the pesticide or product’s label and not my suggestions or comments.

The photograph above is a Crusader Duster or dust applicator and is great for voids in walls or cracks and crevices. Just pour your product in the top and squeeze the product into the cracks or inside switchplates. You have to get in to the pest's home to kill them! Notice the plastic tip so that you don't get an electric shock. This moneymaking tool is great to kill cockroaches, bees, or termites. I've heard enough complaints from applicators that they are unable to kill the pests. If you can't kill spiders or know someone that complains about not being able to kill spiders, then you know who I am talking about. Know your pest, its habitat, and know your product! Always follow the pesticide or product's label and not my suggestions or comments.

Right photograph: I like to call this my coffee pot type of dispenser. It is a hand-held compressed-air spot applicator for indoor use. I like to use Phantom products in it and it works like dynamite on ants and termites alike. Notice the two red backpacks on this truck. Always have a backup backpack. Now go out there and pour a little coffee for the pest of the week.

Bottom photograph: Drax Gel (i.e. - Orthoboric acid 5%): Indoor ant bait in gel form. The "double barrel" syringe delivers both sugar and protein baits in one easy application. Bait can be placed in small amounts to cracks, crevices and other areas where conventional bait stations cannot be used. We have found excellent control of household ants by combining Drax Gel with FluorGuard bait stations. This ant bait combo gives you quick control of indoor ant populations.

Utilizing the same application gun, I hate to endorse any product, but here is an example of a bait that is the ideal means of targeted elimination of infestations. Baits are used to kill the entire colony, not just foraging workers. If the ants bite, such as fire ants, or if they are carpenter ants, this is the product you need. The granules are unobtrusive, ready-to-use, and take less time to apply than conventional insecticides. Always follow the pesticide or product's label and not my suggestions or comments.

Termidor (Great on Ants too)

Termidor is applied at very low rates. Typically, the active ingredient (fipronil) is just 0.06% of the solution, a concentration much lower than that of older liquids and less than most insecticides. For an average home treatment, only about 8 ounces of the active ingredient are actually used. Keep in mind, too, that since 1995, fipronil has been used around the world for flea and tick control on household pets and on agricultural crops to protect food supplies. And Termidor has virtually no odor, which means you and your family won't notice a thing. Termidor is made from a revolutionary new non-repellent or "undetectable" chemical technology treatment. That means termites cannot see, smell, taste or avoid Termidor. Instead they contact, ingest, and share it with their nestmates. This is in sharp contrast to older liquid termite controls, which rely on repellent barriers that termites can finds breaks in or avoid completely. Mix this in your backpack and never mix with a contact killer. Always follow the pesticide or product's label and not my suggestions or comments.

Cockroaches have been here since before Adam and Eve, maybe by a couple of hours. As an applicator, you will see things that will set you off. Because of your route, you may never eat again at a certain restaurant. I hate seeing German cockroaches because I've seen such large infestations in homes and restaurants. But this product has shown success in killing those little critters. Place Avert cockroach bait into cracks and crevices; holes; pipe chases; undersides of furniture; under drain plates; in or under trash containers; hidden surfaces around sinks and storage areas; behind baseboards; around doors and windows; inside, behind and under cabinets, drawers and shelving; under and behind appliances such as stoves and refrigerators; and in attics and crawl spaces. Also apply in points between different elements of construction, between equipment and floors, openings leading to voids and hollow spaces in walls, equipment legs and bases and crawl spaces where roaches hide. During follow-up applications, inspect bait placements and re-apply when necessary. Care should be taken to avoid depositing cockroach bait onto exposed surfaces. If gel contacts an exposed surface, remove gel and wash exposed surface. This product may also be used in food/ feed areas of food/ feed handling establishments. Believe it or not, this little tube is good for several applications. Let's get it right and make some money.

Roach baits are formulations that are attractive to roaches and (when eaten by the insect) are lethal to roaches. There are different types of baits that can be used, depending on roach species and area to be baited. The basic baits covered in this article are bait stations, bait gels, and granular baits. Roach bait stations can be used indoors or outdoors; indoor use is usually recommended. Roach bait gels can be used indoors and can also be used on the exterior surfaces of buildings. Granular baits are usually used outdoors (in mulched areas where larger roaches breed or hide) but can also be used in attics or wall voids. Always follow the pesticide or product's label and not my suggestions or comments.

For best results, do not combine contact insecticides with baits. (A contact insecticide is a granule, liquid spray, or aerosol that is used to directly kill targeted pests.)

Two bad things happen when you use a contact insecticide in the same area where baiting programs are implemented: your bait is contaminated and any domino effect will be neutralized. If you contaminate your roach bait with another insecticide, the bait will no longer be attractive to the targeted roach population. If you kill a roach with an insecticide spray, it will die before it passes the bait on to the rest of the roach population, thus killing your domino effect. The same is true when baiting for ants. You want the foraging worker ants to carry your bait back to the nest, where all ants will consume the bait.

Many people are concerned when they see the amount of active ingredients in an insect bait. These people think that they are not getting their money's worth, because the amount of active ingredients (insecticide or killing agent) seems to be very low. When baiting roaches, ants, silverfish or crickets, you do not want to see large amounts of active ingredients in the formulation. If insecticide levels are too high (in an insect bait), the targeted pest will be repelled instead of being attracted to the bait. The low amount of active ingredients in a roach bait (or other insect baits) is an attractive property to many people who wish to use as little insecticide as possible.

While I am on the subject, here is a super insect growth regulator. An insect growth regulator is by definition a juvenile hormone mimic, a material that inhibits the growth or maturity of certain insect pests. An insect growth regulator (IGR) is an important pest management tool because it helps to reduce, eliminate, or prevent infestations of targeted pests without the use of conventional contact insecticides, thus reducing or eliminating the need for pesticides in homes, hospitals, restaurants, warehouses or any area where certain pests are not welcome.

Hydroprene is an IGR that was first introduced to the pest control industry under the brand name Gencor IGR. Gencor was used to help prevent or control populations of indoor roaches, most commonly used against German cockroaches. Always follow the pesticide or product's label and not my suggestions or comments.

Although the name has changed from Gencor to Gentrol, the active ingredient is still Hydroprene. The label for this product has been broadened to include not only roaches (cockroaches) but also many pantry pests, also known as stored product pests. The only stored product pest that does not react well to hydroprene is the cigarette beetle.

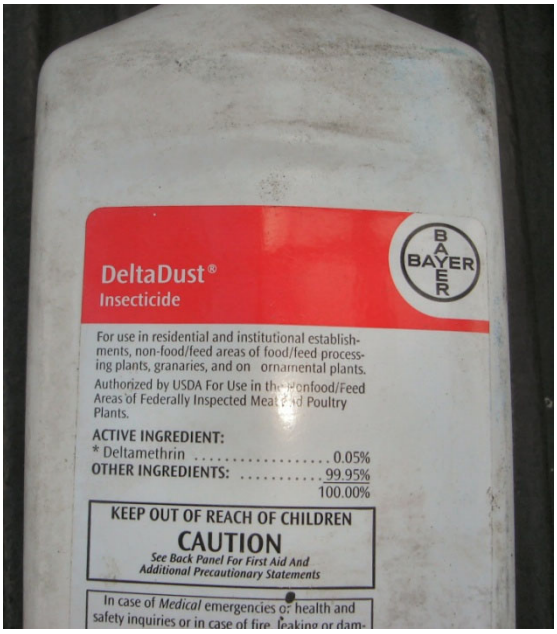
This particular beetle is affected by Methoprene, another IGR that is widely used in indoor flea control programs. The Methoprene products used by professional pest control operators are sold under the brand name of Precor. Always follow the pesticide or product's label and not my suggestions or comments.

When cockroaches are exposed to Gentrol (any form or type), people usually report seeing crippled, deformed, or otherwise odd looking roaches. These deformities are to be expected. Young roaches (also called cockroach nymphs) have an exoskeleton or outer shell. (Mammals have an internal skeleton or bone structure.) As roaches in their nymphal stage grow, their exoskeleton, or outer shell becomes too small to contain the insect. As they reach the limits of their exoskeleton a new, flexible exoskeleton forms beneath the old one, and the old "shell" splits open to allow the nymphs to molt. This transition denotes what is called a different instar or stage of development.

Beautiful and skillful female Black Widow, yes there is a Brown Widow Spider, primarily in Southern California. It is a beautiful orb spider; I believe it is from Africa. You will make lots of money as soon as housewives figure that there is a new spider in town. Most pesticide applicators will think the Brown Widow is a Brown recluse but they look nothing alike. The worse part of about Brown and Black widows is the nightmares some applicators have after crawling under houses. I had many of these spiders and their webs all over me and have been bitten once. They are very sly. I recommend wearing your bee suit if you are working around a large widow nest. I have seen birds go after the eggs. I will be catching and raising Brown Widows to convince the naysayers about this incredible spider.

Delta Dust

Delta Dust (i.e., Deltamethrin .05%). I am not here to endorse this product, but I have found great success inside wall voids. It will kill cockroaches, ants, and that is good enough for me. This odorless, non-staining product is the world's only water-proof insecticide dust!



Besides indoor and outdoor applications, it can also be used on ornamental plants. When left undisturbed, Delta Dust kills crawling insects up to eight months. Because it is water-proof, this insecticide dust will not absorb moisture (which destroys other dusts) and it will not clump. It provides quick control of ants, bees (especially carpenter bees), cockroaches, fleas, silverfish, ticks, and numerous stored product pests.

It's also an invaluable tool for controlling boxelder bugs, ladybugs, white footed ants and pavement ants. Deltamethrin is a synthetic pyrethroid insecticide. Always follow the pesticide or product's label and not my suggestions or comments.

I hate to endorse any product, but ExciteR is one of my cricket killers of all time. Once you spray this product, you'll see every type of critter run for its life. This is a 6% concentrate of liquid pyrethrin used for fogging and spraying.

Using 1 to 4 ounces per gallon, Exciter can be used alone (in a fogger, mister or pump sprayer) and can also be used as an additive to other insecticides (Malathion, Permethrin, Cypermethrin) for the quick knock-down of insect pests. When used alone, Exciter does not have a long residual.

No, I do not own stock in Delta or Bayer. Nor did they pay me, either. If you have a good product, let me know. Always follow the pesticide or product's label and not my suggestions or comments.

Prescription Treatment Brand Cy-Kick CS is a flowable, concentrated controlled, release Cyfluthrin. Simply mix 1-3 oz. per gallon of water and spray liberally along baseboards, into cracks and crevices, etc. Cy-Kick is also used as an outdoor perimeter or lawn treatment. Virtually odorless and is very long lasting. Cy-Kick is the choice of many professional pest companies; it is good but not cheap. It will kill scorpions.

NiBan - FG

Another commonly found pesticide product is NiBan - FG. Niban FG (e.g., Orthoboric acid 5.0 %): weather resistant bait for the control of ants, carpenter ants, cockroaches, crickets, mole crickets, and silverfish for both interior and exterior use, for use in and around homes, apartments, garages, public and private institutions, schools, hotels, hospitals, warehouses, supermarkets, restaurants, and food processing plants. Apply at a rate of 4 pounds per 1000 square feet (6 ounces per 100 square feet) of surface area. Spread evenly in crawl spaces, attics, drop ceilings, cellars with dirt or gravel floors. In warehouses, garages and basements, concentrate application along walls and baseboards. Apply in inaccessible areas such as cracks and crevices where insects may hide. Reapply as necessary.

When baiting for roaches, crickets or silverfish in cracks and crevices, Niban FG is easy to apply with a Crusader Duster. This professional duster enables you to penetrate deep into the hiding places of insect pests. When baiting outdoors only, Niban G is the best. Niban G is a larger granule, capable of withstanding outdoor conditions for longer periods. When treating for carpenter ants outdoors, consider using the larger granule size. Always follow the pesticide or product's label and not my suggestions or comments.

Talstar One

Talstar One is the new label name for Talstar concentrate. In the past, there were several different labels for general categories of pest control in lawns, shrubs, ornamentals, indoor pest control in homes, and other areas of pest management concerns. Talstar One has the label you need for controlling the many different pests that fipronil is known to effectively eliminate or control.

Lawn pests are listed with three different application rates allowed by the pesticide label: Low Rate (0.18 to 0.25 fluid ounces per 1,000 square feet), Medium Rate (0.25 to 0.50 fluid ounces per 1,000 square feet), and High Rate (0.50 to 1.00 fluid ounces per thousand square feet.)

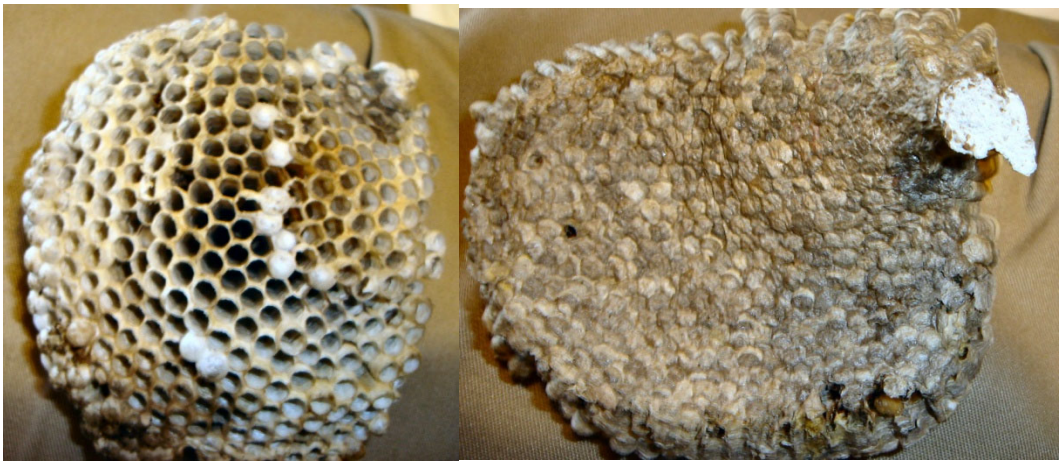
Special comments provided for armyworms, cutworms, sod webworms, adult annual bluegrass weevil, banks grass mite, adult billbugs, adult black turfgrass ataenius, chinch bugs, mites, flea larvae, imported fire ants, adult mole cricket, mole cricket nymphs and ticks. Always follow the pesticide or product's label and not my suggestions or comments.

Wasp Freeze

Here is one of my favorite products-- I am not trying to promote the brand name, but anyone who mixes a freezing agent with a pesticide is either crazy or a genius; either way, the two are very close, and this is a wonderful product. I wish I would have thought of it first.

By the way, 40 giant wasps can destroy a honey bee hive and kill the entire hive in less than four hours. Wasps are nasty by nature. They can bite or sting. They were designed by God as the perfect winged attack insect. Think about the wasp that will attach tarantulas. This professional outdoor aerosol projects a long stream of quick knock-down insecticide, for killing wasps or hornets. Use this product for a quick kill of visible stinging insects as they rest on their nests.

For best results, use Wasp Freeze at dusk when stinging insects are at rest. If necessary, re-apply your wasp spray the following day. The nests of paper wasps are usually located under eaves or other high places where wasp killing aerosols are needed. Wasp Freeze is designed for quick kill of stinging wasps and hornets, but does not leave a long term residual. If longer residual is desired, use a double-strength solution of Demon WP after using Wasp Freeze insecticide aerosols. If dealing with ground hornets, yellowjackets, or other in-ground nests, you will have poor results using any aerosol or wasp freeze. Always follow the pesticide or product's label and not my suggestions or comments.



Front and rear sides of a paper wasp's nest.

Spider Control Section Summary

Ridding your home of insects will help discourage spiders from sharing your habitat, as will removal of webbing. Eventually, if no other food source happens into your house, control is inevitable. This takes time, immaculate cleanliness, and rigid pest control. Sometimes, spiders have to be chemically treated.

A consistent presence of spiders in structures may be a sign of an insect infestation, because spiders cannot survive long without food. Reducing insect infestations will also decrease spiders.

Most applicators have discovered that wettable powders and dusts work better than standard liquid pesticides for spider control. In unfinished basements, fan spray with a wettable powder on sill plates, and cracks and crevices throughout the rest of the house to provide excellent control. If the spider population is severe throughout the house, foggers may be in order in combination with the spraying for more immediate results.

For accidentally invading spiders (these are most frequent spider situations), we recommend that efforts be made to seal cracks and crevices as the most permanent solution.

Treat the perimeter of the building with Ficam W or equivalent, paying particular attention to corners and entry points. Ficam W is effective against all spiders, including the brown recluse, black widow, house, wolf, and garden spiders. Ficam W is odorless, has a low mammalian toxicity, and is especially effective against ants, millipedes, spiders, big roaches, carpenter bees, clothes moths, and scorpions.

- For continuous spider control, repeat this outside spraying each month.
- On the inside, an aerosol can be used to kill spiders quickly, and then use **Ficam W** or equivalent at maximum strength and low volume to keep the spiders from rebuilding their webs. It is very important to use a wettable powder pesticide formulation such as **Ficam W**. Using a garden-type spray will give you almost no residual because the spiders will rebuild their webs in the sprayed areas within just a few days after spraying with one of these emusifiable water based sprays. For heavy infestations, you may also want to spray the attic and crawlspace.

In areas where insecticides should not be used (for example, boat docks and boat houses or in areas where access is difficult, for example, high rise buildings), then the use of Cobweb Eliminator or equivalent is recommended. This is a non-toxic spray that discourages spiders from building their webs on the areas sprayed.

Cobweb Eliminator
A product that eliminates cobwebs both indoors, outdoors, or anywhere cobwebs are noticed with 100% natural ingredients. Cobweb Eliminator will not stain and has no long lasting odor. The mildly acidic odor noticed after application indicates the product is effectively working.

This odor disappears usually in 24 hrs. Cobweb Eliminator deteriorates the webs' attachment points making for easy removal and maintains a neat, clean appearance. It also discourages the reformation of cobwebs. It is 100% natural, nontoxic, biodegradable, nonflammable, non-corrosive and safe around humans, pets, and crops, when used as directed.

Crack and Crevice (C/C)
When spiders began to build resistance to chemicals and manufacturers designed their products with less volatility, new packaging and treatment techniques became necessary. These new trends became known as "*crack and crevice*".

Basically, Crack and Crevice (C/C) means applying the chemical into the cracks and crevices suspected of harboring spiders. There are two types of products commonly used for this purpose: dust and aerosol. In fact, a good pest control technician should be able to get spider control with nothing more if he or she knows where to do the application. With the use of *Drione Dust* or equivalent, applicators have solved many problems. Apply it in cracks and crevices, behind cabinets and major appliances, in wall voids, and electric outlets.

This requires a lot of work and this product can be messy to work with, but provides the fastest results possible when used properly. Use a *Crusader Hand Duster* for the application. Since dust can be messy to work with, aerosol products became popular throughout the 1980s.

Although not as popular as when they first came out, aerosols offer a clean, ready-to-use formulation that is effective. PT-280 uses Orthene as an active ingredient, which is still the least resistant chemical available for pest control. On a special note, don't think you can substitute boric acid or a can of "*Raid*" for either of the products mentioned above.

Residual Sprays
These formulations are oil-based or water-based emulsions and water-based suspensions (wettable powders). They are available in ready-to-use pressurized containers or non-pressurized containers with built-in spray pumps. Residual sprays also can be purchased as concentrates to mix with water before applying with a compressed-air sprayer, plunger-type sprayer, or paint brush.

Be careful when using oil-based insecticides; they may stain, dull, or damage certain floor tiles, linoleum, painted surfaces, plaster, plastics, houseplants, carpets, and carpet backing. Oil-based sprays can create a fire hazard when used near an open flame (pilot lights, gas stoves, furnaces). Water emulsions may stain wallpaper, light-colored carpets, draperies, or other materials.

Water-based sprays can short out electrical circuits, and are inferior to oil-based sprays on impervious surfaces such as glass or metal. Wettable powders must be frequently agitated in the spray tank, but they leave the most active residues, especially on porous surfaces such as unpainted wood, mortar, or concrete block.

Residual sprays are generally easy and fast to apply. The spray should wet or dampen the treated surface; do not allow spray to puddle or run off. When treating for pests, pay particular attention to cracks and crevices. Exposed surfaces, especially those used to prepare foods, should usually not be treated with sprays.

Habit Modification
Habit modification is the most important tactic for good spider control. Whether indoors or outdoors, most spiders have a preference for undisturbed areas. Outdoors, remove debris near the building to disturb their natural habitat. Also, remove webs in outdoor areas, especially porches, under eaves, and other likely breeding places around the home. Inside, clutter in garages, basements, closets, and other storage areas should be removed. Be sure to dust and vacuum frequently around windows, corners of rooms, shelves, under furniture, and behind mirrors and pictures. If you see sac spider capsules, remove them. It is a good idea to wear gloves when cleaning.

Because most spiders enter houses through small cracks and crevices, sealing entry points with caulk will be the most permanent solution to spiders wandering inside in the late summer and early fall.

Glue Boards
If you are concerned about spiders inside your home, place sticky glue boards in the rooms where you are seeing spiders, especially on outside walls and in closets or secluded areas. Take captured spiders to someone who can identify them. Check with your local extension office or land-grant university. If you have an infestation of brown recluse spiders, you may want to work with a licensed pest control company—one who has experience treating structures for brown recluse infestations. These nontoxic sticky boards are very useful to keep under your sinks and appliances at all times. They let you know if any ants, roaches, spiders, scorpions, lady bugs, box elder bugs, etc., have invaded your home.

Non-Chemical Spider Control

- Eliminate or shield outdoor lights or bright indoor lights that attract flying insects.
- Trim weeds around the building foundation and remove debris to discourage insects and spiders from living next to a structure.
- Seal openings, and install screens and door sweeps to prevent spiders from moving indoors.
- Use a vacuum to remove webs, spiders, and egg sacs.

Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 1-800-222-1222. If you wish to report a pesticide problem, please call 1-800-858-7378.

NOTE: When pesticides are used, it is the applicator’s legal responsibility to read and follow directions on the product label. Not following label directions, even if they conflict with information provided herein, is a violation of federal law.

This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them.

If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and Technical Learning College (TLC) assume no liability resulting from the use of these recommendations.

Topic 4 - Spider Control Section

Post Quiz
Answers are found at rear of Glossary

Fill-in-the blank

1. From a biological standpoint, it is rarely necessary to control spiders. However, if it is desirable to get rid of spiders in the home, _____.should be effective. Pesticides alone, without some effort to remove or modify favorable spider habitats, will not be effective.

2. Remove rocks, wood piles, compost piles, old boards, and other sheltering sites adjacent to the home. Eliminate migration of spiders into homes by _____around the foundation.

3. ._____, used to control cockroaches and rodents, can capture spiders when placed along baseboards or other migration areas.

4. _____, containing pyrethrins, probably will have little effect on spiders.

Spider Harborages

5. Spiders hide in cracks in trim, flooring, behind outlets, countertops – any dark secluded space. Of course it would be difficult, if not impossible, to seal all such areas inside the home. Focus your energies where you've seen the most spider activity and where your _____have killed the most spiders.

Mechanical control: Spider traps and manual spider removal

6. Use glue boards for spider control and monitoring. While sticky traps won't work for_____, they are outstanding for the many ground-dwelling, hunting spider species, including funnel-web, wolf, and brown recluse spiders.

Biological Control: Natural Spider Control
Diatomaceous Earth (DE)

7. Diatomaceous earth is made of the fossilized remains of ancient algae called diatoms. It is a food-grade, pet and _____that can be used in the same fashion as other insecticidal dusts. When spiders (or any creature blessed with an exoskeleton) walk over a thin layer of DE, they leak fluids, dehydrate, and die.

Natural spider repellents

8. _____and eucalyptus are other popular spider repellents that are used in the same manner.

For outdoor spider control

9. Barrier treatments, in conjunction with pest proofing, can effectively protect your home from spiders. Before sealing off cracks and crevices in siding and foundation, apply something like Delta Dust Insecticide (deltamethrin) or_____.

Pyrethroids

10. To mimic the insecticidal activity of the natural compound pyrethrum another class of pesticides, pyrethroid pesticides, has been developed. These are non-persistent, which is a sodium channel modulators, and are _____than organophosphates and carbamates.

Spider Glossary

Abdomen: The posterior (rear) of the two major divisions of a spider.

Accessory claws: Serrated, thickened hairs near the true claws in some spiders.

Alveolus: A ventral depression in the male palp which receives the basal and middle divisions of the genital bulb. Although usually described as a cup-like depression, the alveolus is actually a ringed depression, the inner margin of which is joined to the basal haematodocha.

Anal tubercle: A small projection, dorsal to the spinners, carrying the anal opening.

Annulations: Rings of pigmentation around leg segments.

Anterior: Nearer the front or head.

Apex: Distal tip.

Apomorphy: Derived character.

Apical male palp: The conductor and the embolic subdivision comprise the apical division of the bulb.

Apophysis: An excrescence or appendage changing the general cylindrical or globular shape of a sclerite; most often used in description of male palp.

Atrium (pl. atria): Internal chamber at the entrance of copulation tract in female haplogyne spiders.

Ballooning: Aeronautical dispersing by means of air currents acting on strands of silk.

Booklung: An air-filled cavity, containing sacks of blood-filled leaves, opening on the underside of the abdomen.

Bronchial opperculum: A sclerotized, hairless plate overlying the book lung.

Bulbus: The genital bulb is the terminal segment of the palpus. It's an hollow organ with external elaborations. The bulbus is divided into three divisions: (1) Basal division, (2) Middle division and (3) Apical division.

Calamistrum: A comb-like series of hairs on metatarsus IV of cribbelate spiders.

Caput (pl. capita): Another name for the cephalic region of the cephalothorax.

Carapace: The exoskeleton covering, or shell, over the dorsal (upper) surface of the cephalothorax.

Cardiac mark: An elongate midline mark on the anterior, dorsal surface of the abdomen, overlies the heart.

Cephalothorax: The anterior (front) of the two major divisions of the body of a spider.

Chelicerae: The jaws, each one comprising a large basal part and a fang.

Chelate: Said of chelicerae in which the fang closes down on a tooth-like process.

Chilum (pl. Chila): Small sclerite at the base of chelicerae, just under the clypeus.

Chitin: A linear homopolysacheride found as the characteristic molecule in the cuticle of arthropods. The molecules are layered in chains and cross-linked to form a strong, lightweight basis of the cuticle.

Claw tuft: A bunch of hairs at the tip of the leg tarsus in spiders with only two claws.

Clypeus: The area between the anterior row of eyes and the anterior edge of the carapace.

Colulus: A small midline appendage or tubercle arising just in front of the anterior spinners in some spiders.

Conductor: A semi-membranous structure in the male palp, which supports and guides the embolus in insemination.

Condyle: A smooth, rounded protuberance sometimes present on the outer side of the chelicera, near its base.

Coxa (plural: Coxae): The segment of legs nearest the body, modified in the palp to form the maxilla.

Cribellum: A spinning organ just in front of the spinners, which appears as a transverse plate. Only present in cribellate spiders, which also have a calamistrum.

Cryptozoic: Living a concealed life.

Cymbium: The broadened, hollowed-out tarsus of the male palp within which the palpal organs are attached.

Diaxial: Said of chelicerae extending downwards with fangs closing towards midline.

Dionychous: Possessing two claws on tarsus.

Distal: Pertaining to the outer end, furthest away from the body or point of attachment.

Dorsal: Pertaining to the upper surface.

Dorsum: The upper surface.

Ecdysis: Molting; the periodic casting off the cuticle.

Ecribellate: Without a cribellum and calamistrum.

Edentate: Without teeth.

Embolus: The structure, in the male palp, containing the terminal part of the ejaculatory duct and its opening. It may be very small, or long, whip-like, or coiled; and is sometimes divided into several structures.

Endite: Basal segment of palp, also called the maxilla or gnathocoxa.

Entelegyne: The group of spiders in which the females have an epigyne.

Epigastric fold: A fold and groove separating the anterior part of the ventral abdomen (with epigyne and book lungs) from the posterior part.

Epigyne: A more or less sclerotized and modified external structure associated with the reproductive openings of adult females of most spiders.

Exoskeleton: The hard, external supportive covering found in all arthropods.

Exuviae: The parts of the cuticle cast off during molting.

Fang: The claw-like part of each chelicera; the poison duct opens near its tip.

Femur (pl. femora, adj. femoral): The third segment of the leg, counting from the body.

Fissidentate: Teeth having more than one point.

Folium: Any pattern of pigment on the dorsum of the abdomen that is fairly broad and leaf-shaped.

Fovea: A short median groove on the thoracic part of the carapace that marks the internal attachment of the gastric muscle.

Gnathocoxa (pl. gnathocoxae): Basal segment of palp, also called maxilla or endite.

Gossamer: A light film of silk threads, or groups of these floating through the air.

Haematodocha: A balloon of elastic connective tissue between groups of sclerites in the male palp that distends with blood during insemination, causing the sclerites to separate and rotate.

Haplogyne: The group of spiders in which the females have no epigyne.

Head: The part of the carapace carrying the eyes, which is separated from the thorax by a shallow groove.

Labium: The lip, under the mouth opening and between the maxillae, attached to the front of the sternum.

Lateral: Pertaining to the side.

Lanceolata: Tapering to a point.

Lyriform organ: A sensory organ near the distal end of limb segments formed of a group of parallel slit organs.

Maxilla: The mouthparts on each side of the labium, which are the modified coxae of the palps.

Median: In the midline or in the middle.

Median apophysis: A sclerite arising from the middle division of the male palpal organs.

Median septum: Longitudinal sclerite on floor of epigynal atrium.

Metatarsus (pl. Metatarsi): The sixth segment of the leg, counting from the body.

Onychium (pl. Onychia): Ventral extension of tip of tarsus bearing the claws.

Orb web: A two-dimensional web, roughly circular in design (and strictly speaking, a misnomer). Silk threads radiate like spokes from a central hub. These are then overlaid with a spiral of silk, running from the periphery almost to the hub.

Palp *short for the pedipalp*: The appendage arising just in front of the legs, the coxa of which also forms the maxilla. It has no metatarsal segment, and in adult males, is greatly modified for the transfer of semen.

Palpal organs: The more or less complex structures found in the terminal part of the adult male palp. They comprise groups of sclerites separated from each other and the cymbium by up to three haematodochae, and contain the semen reservoir which opens via ducts through the tip of the embolus.

Paracymbium: A structure in the male palp branching from, or loosely attached to, the cymbium.

Paraxial: Said of chelicera extending forwards, with fangs closing towards abdomen.

Patella (pl. Patellae): The fourth segment of the leg or palp, counting from the body.

Paturon: Basal segment of chelicera.

Pedicel: The narrow stalk connecting the cephalothorax and the abdomen.

Pheromone: A chemical secreted by an animal in minute amounts which brings about a behavioral response in another, often of the opposite sex.

Phylogenetic: Pertaining to evolutionary relationships between and within groups.

Pluridentate: Having more than one tooth.

Porrect: Said of chelicera directed forwards.

Posterior: Near the rear end.

Process: A projection from the main structure.

Procurved: Curved, as an arc, having its ends ahead of its center.

Prolateral: Projecting from, or on, the side facing forwards.

Proximal: Pertaining to the inner end; closest to the body or point of attachment.

Punctate: Covered with tiny depressions.

Rastellum (pl. rastella): Rake-like structure at extremity of chelicerae in Mygalomorpha, often reduced to a few strong spines; use for burrowing.

Receptaculum (pl. receptacula): See: spermathecea.

Recurved: Curved, as an arc, having its ends behind its center.

Reticulated: Like network.

Retrolateral: Projecting from, or on, the side facing backwards.

Rugose: Rough, wrinkled.

Scape (Scapus): A finger-, tongue-, or lip-like projection from the midline of the female epigyne.

Sclerite: Any separate sclerotized structure connected to the other structures by membranes.

Sclerotized: Hardened or horny; not flexible or membranous.

Scopula (pl. Scopulae): A brush of hairs on the underside of the tarsus and metatarsus in some spiders.

Scutum: A hard, often shiny, sclerotized plate on the abdomen of some spiders.

Septum: A partition separating two cavities or parts.

Serrated: Saw-toothed.

Seta (pl. setae): Hair-like, tapered, and flexible structures on legs and body (cf. spine and trichobothrium).

Sigillum (pl. Sigila): An impressed, sclerotized spot, often reddish-brown. Often present on the dorsal surface of the abdomen and marking points of internal muscle attachments.

Slit organ: A stress receptor in the exoskeleton.

Spermathecae: The sacs or cavities in female spiders that receive and store semen.

Spiderling: The nymphal or immature spider, generally resembling the adult, but smaller; fully mobile and no longer dependant on yolk.

Spine: A thick, stiff hair or bristle.

Spinners: Paired appendages at the rear end of the abdomen, below the anal tubercle, from the spigots of which silk strands are extruded.

Spiracle: The opening of the tracheae on the underside of the abdomen.

Sternum: The heart-shaped or oval exoskeletal shield covering the undersurface of the cephalothorax.

Stria (pl. striae): Paired depressions; usually three pairs of darkened stripes radiating from fovea.

Stridulating organ: A file-and-scraper for sound production; may be variously located on chelicerae, palps, legs, abdomen, and carapace.

Subadult: Almost adult; the last instar before maturity.

Synonym: Each of two or more scientific names of the same rank used to denote the same taxon. The senior synonym is the name first established.

Tapetum (pl. tapeta): A light-reflecting layer in secondary eyes; eyes appear pale in color; assumed to be used for nocturnal vision.

Tarsus (pl. Tarsi): The most distal (or end) segment of a leg or palp.

Taxon: Any taxonomic unit (e.g., family, genus, species).

Taxonomy: The theory and practice of classifying organisms; part of systematics, the study of the kinds and diversity of organisms.

Tegulum: Part of the male palp: a discoidal sclerite.

Tegument: External cuticular skin.

Thorax: That part of the cephalothorax behind the head region and separated from it by a shallow groove.

Tibia (pl. Tibiae): The fifth segment of the leg or palp counting from the body.

Tracheae: Tubes through which air is carried around the body and which open at the spiracles.

Trichobothrium (pl. Trichobotria): A long, fine hair rising almost vertically from a socket on the leg. Trichobothria detect air vibrations and currents.

Trochanter: The second segment of the leg or palp, counting from the body.

Unidentate: Having one tooth.

Ventral: Pertaining to the underside.

Vulva: Internal structure of female copulatory organs, including entrance ducts, spermathecae, and fertilization ducts (in entelegyne spiders); internal genitalia including ducts and spermathecae (in haplogyne spiders).

Post Quiz Answers

Topic 1 Arachnid Introduction Post Quiz Answers
1. Coleoptera, 2. Prosoma or cephalothorax, 3. Its large palps, 4. Circular orb web, 5. Initial three center spiral threads, 6. Non-sticky threads, 7. Signal line, 8. Generally not harmful, 9. Vacuuming spiders, 10. Screening

Topic 2 Spider Identification Section Post Quiz Answers
1. Web-building spiders, 2. Iridescent mouthparts, 3. Mygalomorphs, 4. Rarely leaves, 5. Dyad, 6. 24-36 days, 7. Ample venom glands, 8. World's biggest spiders, 9. 25 years, 10. No venom glands

Topic 3 Web Spiders Post Quiz Answers
1. Seldom bite,2. Low risk (non-toxic), 3. Horizontal sheet web, 4. Snakebite venom, 5. "Target" or "bull's-eye", 6. 24-72 hours, 7. Kissing bugs, 8. 2 to 8 hours, 9. Two and 4 weeks, 10. 1-4 days

Topic 4 Spider Control Section Post Quiz Answers
1. A combination of sanitation and pesticides, 2. Caulking cracks and crevices, 3. Sticky traps 4. Total release foggers, 5. Spider traps, 6. Web- building spiders, 7. Child friendly dust, 8. Horse chestnuts, 9. Drione Dust (pyrethrins, pipernyl butoxide, and silica gel), 10. Much less acutely toxic

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READ THE LABEL!

Camel Spider/Wind Scorpion

Yes these creatures run rampant through the US, but we are instructed not to tell homeowners. No, not really, but it sounded good. Here is the skinny: the camel spider isn't really a spider, because it is also called a wind scorpion. But it is ***NOT*** a scorpion either. It is related to both the spiders and the scorpions, and it belongs to its own group of animals. This large arachnid looks like a huge hairy spider and is unique to the desert. It can be as long as 6 inches across! Camel spiders like to live in barren parts of the desert far away from humans. They don't like oases either, and they feel most at home in the open, uninhabited places of the desert. Most of the time camel spiders hide in their burrows, coming out only when they're hungry. So when they do come out at night to feed, they are very ferocious and dangerous.

A hunting camel spider runs across the desert floor almost at lightning speed, and it is so fast that it is impossible for the human eye to follow. When it senses its prey, the camel spider chases after it until it is caught. The greedy camel spiders have a big appetite, they will eat and eat and eat and eat until their bodies are so swollen with food and they can hardly move an inch!

Then, with great difficulty I imagine, it crawls back to its safe, cozy burrow. The reason why camel spiders have managed to live so successfully in the desert is probably because they spend as little time as they can on the dangerous surface where there are lots of predators.

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