1. **Introduction to Arachnology:**
2. **What is arachnology?**

Arachnology is the study of arachnids. Although mites and tick are arachnids, for a number of reasons they have their own science, called Acarology, devoted to them. Arachnology is the study of spider and related animals such as scorpions, pseudo scorpions and harvestmen

1. **Arachnologists**

The person who study the arachnids called as arachnologists. Arachnologists are served by a number of scientific societies both national and international in scope

1. **What are arachnids?**

animals collectively called as arachnids such as

* Scorpions
* Pseudo scorpions
* Harvestmen
* spider

1. **Body parts of Arachnids**

Arachnids have two body parts

* prosoma (cephalothorax)
* Abdomen (opisthosoma)

Mites and harvestmen bodies are less obviously divided, having the prosoma and opisthosoma fused together

1. **Prosoma**

Prosoma carries six pairs of appendages: the four pairs of legs

Arachnids have pairs of jaws (the chelicerae)

1. **The diverse group of arachnids**

The diverse group of arachnids include

* Spiders
* Scorpions
* False-scorpions
* Daddy
* Long legs
* Whip spiders
* Palpigrades
* Whip scorpions
* Ricinuleids
* Sun and wind spiders
* Mites

1. **Habitat**

All the arachnid area terrestrial however some spiders and mites are in fresh water industrial on the seashore in shallow salt water

1. **Specialties**

Arachnology can be broken down into several specialties these topics include

* **Acarology – the study of ticks and mites**
* **Araneology –the study of spiders**
* **Scorpiology – the study of scorpions**

1. **Reproductive system**

Arachnids have developed indirect sperm transfer as a way of minimizing the risk of beng eaten .with this form of mating there is no intimae coupling so males have a better chance of survival.males transfer sperm in packets to pick up for females

1. **SYSTEMATIC CLASSIFICATION OF CLASS ARACHNIDS**

The Arachnida is a class of arthropods containing about 100,000 named species. Arachnids are nested within the arthropod subphylum Chelicerata and share with other chelicerates the morphological features of chelate mouth parts and complete lack of lack of antennae. Arachnids have two body regions cephalothorax or prosoma and abdomen or opisthosoma. They have eight legs. Respiration is via trachea or book lungs. Arachnids evolve with the evolution of spiders about 400 million years ago from crab-like Chelicerata ancestors. Major developments in spider evolution include the development of spinnerets and silk secretion.

There are 12 extant orders of arachnids.

A close up of an animal

Description automatically generated

**Classification of arachnids**

**Kingdom**  Animalia

**Phylum**  Arthropoda

**Subphylum** Chelicerata Mandibulata

(crustaceans/insects/millipedes/centipedes)

**Class**  Merostomata (Horseshoe crabs) Pycnogonida(Sea spiders) Arachnida(Arachnida)

**Subclass**  Acari

**Suborder** Parasitiformes Acariforms

(mites and ticks) (mites)

**Order** Amblypygi

Araneae

Uropygi

Opiliones

Palpigradi

Pseudo scorpions

Ricinulie

Schizomida

Scorpions

Solifugae

1. **Order Araneae(spiders)**

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Chelicerae two jointed, with ducts for poison.

Abdomen non segmented, bearing spinnerets for silk production.

They are air breathing and have eight legs.

1. **Order Opiliones (daddy longlegs)**

Some regions of the abdomen fused with carapace.

Single pair of eyes on a central prominence.

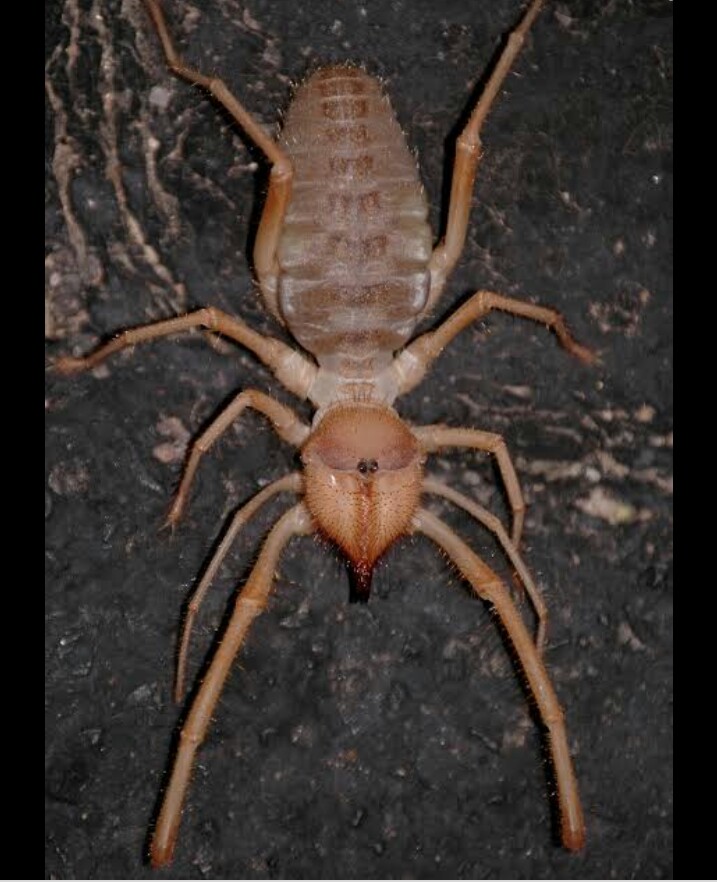
They don’t have silk glands.

1. **Order ricinulei (hooded tick spiders)**

They are not true spiders.

Abdomen is of nine segments last three forming taillike pygidium.

Living ricinuleids have no eyes.

1. **Order solifugae (camel spiders, wind scorpions)**

They are neither true scorpions nor true spiders.

Abdomen have 10 to 11 segments.

They don’t have poison gland but are ferocious predators.

1. **Order pseudo scorpions (false scorpion)**

They have flat pear-shaped body and pincers that resemble those of scorpions but not having stinger tail like true scorpions.

Abdomen often divided dorsally.

They are beneficial to humans since they prey on cloth moths’ larvae, carpet beetle.

1. **Order scorpions (true scorpions)**

They have segmented tail ending with venomous stringer.

Pair of grasping pedipalps.

Ovoviviparous rather than egg laying.

1. **Order amblypygid (whip spiders, tailless whip scorpions)**

Cephalothorax broader than longer.

Eight legs and body have solid carapace.

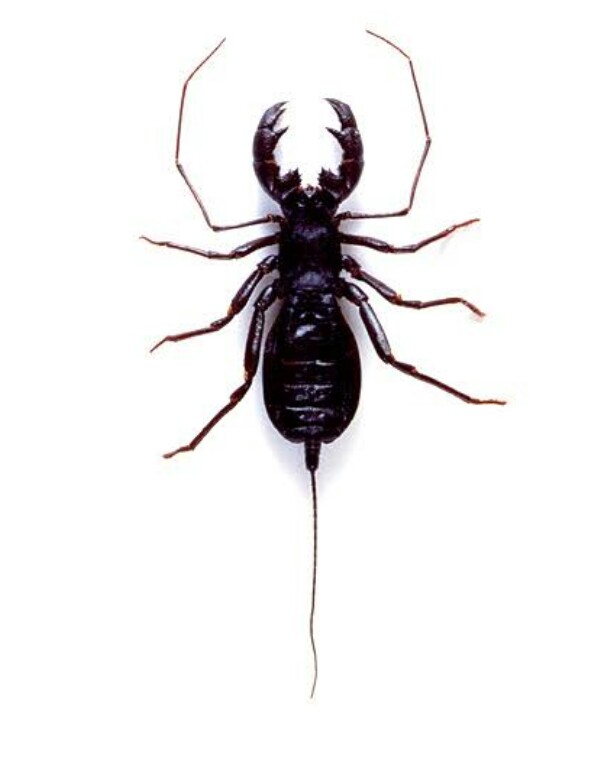
Pedipalps very strong and long.

1. **Order palpigrade (micro whip scorpions)**

Eyes absent, no book lungs.

Three jointed leglike pedipalps.

Long and thin multisegmented tail.

1. **Order uropygi (whip scorpions or vinegarrons)**

Long whip like tail.

Discharge offensive liquid when attacked, which contains acetic acid, producing a vinegar like smell.

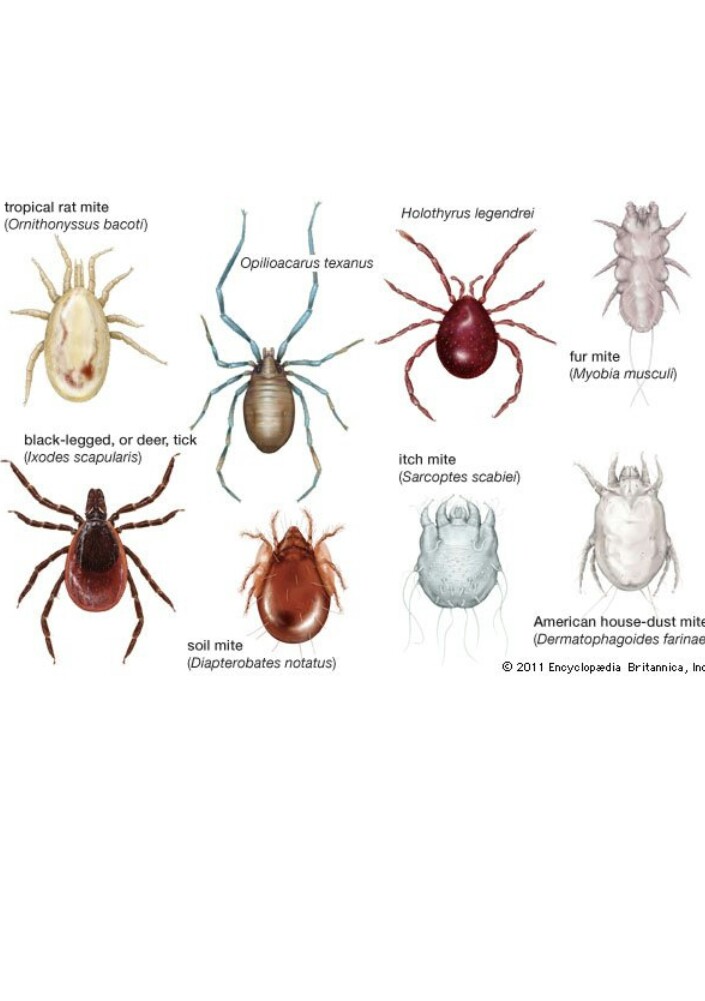
No venom glands are present.

1. **Order schizomida(schizomids)**

Two segmented chelicerae.

There are no eyes, but the first pair of leg is antenniform.

Its prosoma is divided into three regions, each dorsally covered by separate plate.

1. **Sub class Acari (ticks and mit**
2. **Super order Acarioforme(mites)**

Their setae have optically active chitin, Actinochitin.

Eyes may present or absent.

Habitat aquatic or terrestrial.

1. **Super order Parasitiforme (some mites and ticks)**

Body usually hardened.

First pair of legs have sensory organs.

They are usually heavily sclerotized.

1. **Characteristics of Arachnids**

Arachnids are classified in phylum Arthropoda which also consist of insects, centipedes and millipedes. The characteristics of arachnids are given bellow;

• They are terrestrial chelicerates

• Processes eight walking legs

• Arachnids are differ from insects in the presence of eight legs and absence of antennae and wings

• In spiders, each chelicera bears 2 sets of fang into which the poisonous glands are opens.

• Abdominal appendages are modified into book lungs. Respiration occurs by book lungs.

• In Arachnids, excretion occurs by coxal glands or by malpighian tubules.

• Scorpions are viviparous and show prolonged parental caring, arachnids usually show direct development Moreover, arachnids are unisexual animals

• They have four pairs of eyes.

• Arachnids has DNA of unspecified arachnid and extra limb can be hidden in his back.

• Arachnids consisting of one heart and an open circulatory system.

• The specific characteristics arachnids allow for effective movement, hunting and self defense techniques. Having jointed appendages means flexibility and quick escapes from predators.

• The exoskeleton acts like a shield of armor, but also provides rigidity for holding internal organs and maintaining pressure within the body.

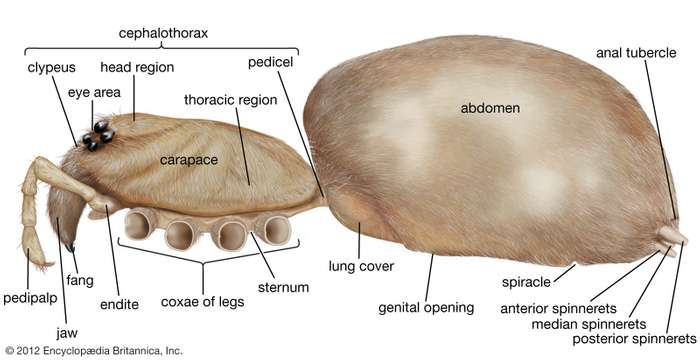


• Arthropods are sometimes nicknamed the “swiss army knives of living things”, for their dexterity and array of appendage functions.

• Arachnids’ specific class within phylum arthropoda is called class Arachnida.

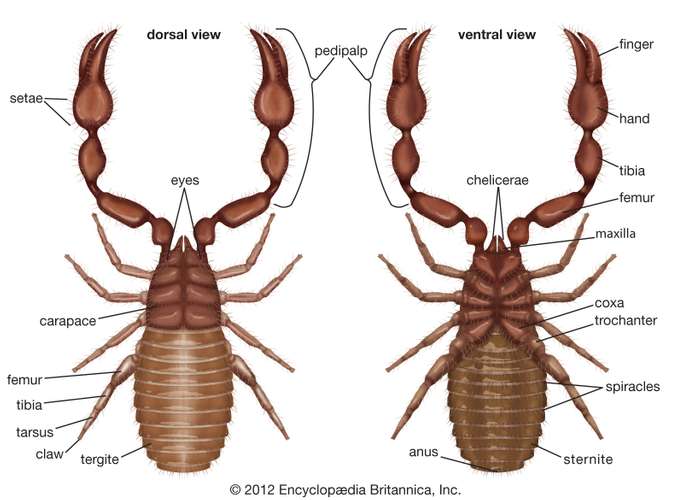
1. **External Anatomy of Arachnids**

There are many modifications of the cephalothorax and abdomen. Among the scorpions the abdomen is subdivided into the mesosoma, or preabdomen, and the metasoma, or postabdomen, which is mobile and more slender. Similar arrangements are found among whip scorpions, schizomids, and ricinuleids. Among the daddy longlegs the division between the two parts is indistinct, and among most of the mites and ticks the body is rounded and shows no segmentation. Spiders exhibit the greatest variation in body shape.

[](https://cdn.britannica.com/23/54723-050-5F763229/organization-spider.jpg)

1. **External organization of a spider:**

The form and function of the six pairs of appendages are variable. The first pair, the chelicerae, often have claws or fangs. They are used to capture prey (spiders), transport a spermatophore (sunspiders, some mites and ticks), produce sounds (sunspiders, some spiders), cut strands of silk (web-dwelling spiders), and produce silk (pseudoscorpions). The pedipalps, the second pair, likewise are often highly modified. Among the scorpions and pseudoscorpions the pedipalps are large, whereas among the tailless whip scorpions and some daddy longlegs they are elongated and equipped with many heavy spines. Among some arachnids they are prehensile and serve to both capture and hold prey. In male spiders they serve to transfer sperm, and for spiders, scorpions, pseudoscorpions, and tailless whip scorpions they play an important role during courtship displays.

[](https://cdn.britannica.com/07/147807-050-D8B05DD4/Anatomy-pseudoscorpion.jpg)

1. **Pseudo scorpion; false scorpion:**

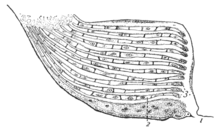
There are typically four pairs of walking legs, each of which usually has seven segments of variable lengths, with the last segment often bearing claws. The legs serve chiefly for locomotion but may be modified for serving as tactile organs (daddy longlegs), for capturing and immobilizing prey (running spiders), and for producing sound (daddy longlegs, spiders, sunspiders, and scorpions).

1. **Internal anatomy of Arachnids**
2. **Circulation:**

Spiders, like most [arthropods](https://en.wikipedia.org/wiki/Arthropod), have an [open circulatory system](https://en.wikipedia.org/wiki/Open_circulatory_system), i.e., they do not have true blood, or [veins](https://en.wikipedia.org/wiki/Vein) which transport it. Rather, their bodies are filled with [haemolymph](https://en.wikipedia.org/wiki/Haemolymph), which is pumped through arteries by a [heart](https://en.wikipedia.org/wiki/Heart) into spaces called [sinuses](https://en.wikipedia.org/wiki/Sinus_(anatomy)) surrounding their internal [organs](https://en.wikipedia.org/wiki/Organ_(anatomy)). The haemolymph contains [hemocyanin](https://en.wikipedia.org/wiki/Hemocyanin), a respiratory protein similar in function to [hemoglobin](https://en.wikipedia.org/wiki/Hemoglobin). Hemocyanin contains two copper atoms, tinting the haemolymph with a faint blue color.

The heart is located in the abdomen a short distance within the middle line of the dorsal body wall, and above the intestine. Unlike in insects, the heart is not divided into chambers, but consists of a simple tube. The aorta, which supplies haemolymph to the cephalothorax, extends from the anterior end of the heart. Smaller arteries extend from sides and posterior end of the heart. A thin-walled sac, known as the [pericardium](https://en.wikipedia.org/wiki/Pericardium), completely surrounds the heart.

1. **Breathing:**

[](https://en.wikipedia.org/wiki/File:Comstock-book-lungs.png)

Spider [book lungs](https://en.wikipedia.org/wiki/Book_lungs) (cross section)

Spiders have developed several different respiratory anatomies, based either on [book lungs](https://en.wikipedia.org/wiki/Book_lungs) or on [trach. eae](https://en.wikipedia.org/wiki/Trachea#Invertebrates)[Mesothele](https://en.wikipedia.org/wiki/Mesothelae) and [mygalomorph](https://en.wikipedia.org/wiki/Mygalomorphae) spiders have two pairs of book lungs filled with haemolymph, where openings on the [ventral](https://en.wikipedia.org/wiki/Ventral) surface of the abdomen allow air to enter and [oxygen](https://en.wikipedia.org/wiki/Oxygen) to diffuse in and [carbon dioxide](https://en.wikipedia.org/wiki/Carbon_dioxide) to diffuse out. This is also the case for some basal [araneomorph](https://en.wikipedia.org/wiki/Araneomorphae) spiders like the family [Hypochilidae](https://en.wikipedia.org/wiki/Hypochilidae), but the remaining members of this group have just the anterior pair of book lungs intact while the posterior pair of breathing organs are partly or fully modified into tracheae, through which oxygen is diffused into the haemolymph or directly to the tissue and organs. This system has most likely evolved in small ancestors to help resist [desiccation](https://en.wikipedia.org/wiki/Desiccation). The trachea were originally connected to the surroundings through a pair of spiracles, but in the majority of spiders this pair of spiracles has fused into a single one in the middle, and migrated posterior close to the spinnerets.

Among smaller araneomorph spiders there are species in which the anterior pair of book lungs have also evolved into tracheae, or are simply reduced or missing. In a very few species the book lungs have developed deep channels, apparently signs of evolution into tracheae. Some very small spiders in moist and sheltered habitats do not have any breathing organs at all, as gas exchange occurs directly through their body surface. In the tracheal system oxygen interchange is much more efficient, enabling [cursorial hunting](https://en.wikipedia.org/wiki/Cursorial_hunting) (hunting involving extended pursuit) and other advanced characteristics, such as having a smaller heart and the ability to live in drier habitats.

1. **Digestion:**

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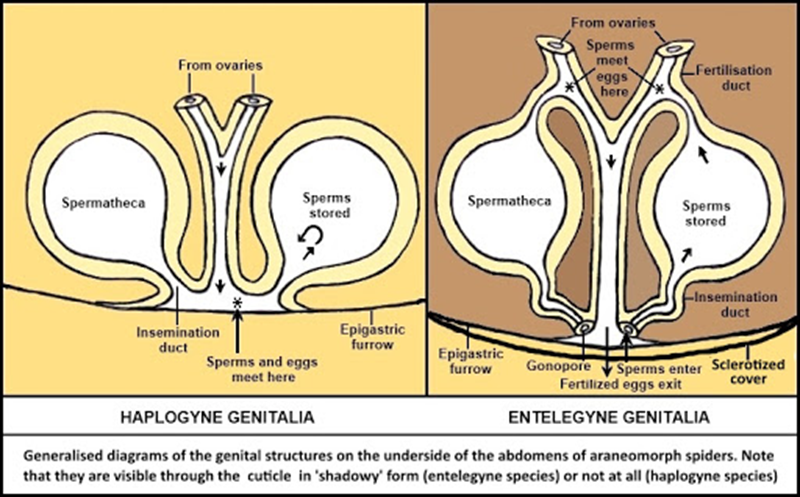
[*Argiope aurantia*](https://en.wikipedia.org/wiki/Argiope_aurantia) feeding on silk-wrapped [grasshopper](https://en.wikipedia.org/wiki/Grasshopper)

[Digestion](https://en.wikipedia.org/wiki/Digestion) is carried out internally and externally. Spiders do not have powerful chelicerae, but secrete digestive fluids into their prey from a series of ducts perforating their chelicerae. The coxal glands are excretory organs that lie in the prosoma, and open to the outside at the coxae of the walking legs.In primitive spiders, such as the [Mesothelae](https://en.wikipedia.org/wiki/Mesothelae) and the [Mygalomorphae](https://en.wikipedia.org/wiki/Mygalomorphae), two pairs of coxal glands open onto the posterior side of the first and third coxae.

They release a fluid only during feeding and play an important role in ion and water balance. Digestive fluids dissolve the prey's internal tissues. Then the spider feeds by sucking the partially digested fluids out. Other spiders with more powerfully built chelicerae masticate the entire body of their prey and leave behind only a relatively small amount of indigestible materials. Spiders consume only liquid foods. Many spiders will store prey temporarily. Web weaving spiders that have made a shroud of silk to quiet their envenomed prey's death struggles will generally leave them in these shrouds and then consume them at their leisure.

1. **Reproductive system:**

Almost all spiders [reproduce](https://en.wikipedia.org/wiki/Spider#Reproduction) sexually. They are unusual in that they do not transfer sperm directly, for example via a [penis](https://en.wikipedia.org/wiki/Penis). Instead the males transfer it to specialized structures ([palpal bulbs](https://en.wikipedia.org/wiki/Palpal_bulb)) on the [pedipalps](https://en.wikipedia.org/wiki/Pedipalp) and then meander about to search for a mate. These palps are then introduced into the female's [epigyne](https://en.wikipedia.org/wiki/Epigyne). This was first described in 1678 by [Martin Lister](https://en.wikipedia.org/wiki/Martin_Lister).In 1843 it was revealed that males build a nuptial web into which they deposit a drop of semen, which is then taken up by the copulatory apparatus (the palpal bulb) in the pedipalp. The structure of the copulatory apparatus varies significantly between males of different species. While the widened palpal tarsus of the [southern house spider](https://en.wikipedia.org/wiki/Southern_house_spider), *Kukulcania hibernalis* ([Filistatidae](https://en.wikipedia.org/wiki/Filistatidae)), only forms a simple bulb containing the coiled blind duct, members of the genus [*Argiope*](https://en.wikipedia.org/wiki/Argiope_(spider)) have a highly complex structure.



1. **Prey capturing in Arachnids**
2. **Spiders and Prey:**

Spiders have an amazing array of prey catching strategies ranging from simple ambushing to the use of complex silk snares.

1. **Hunters using webs:**

The Spider has many different methods of capturing prey. The most common one that occurs with the majority of species has to do with them creating a web. It is silky and it is sticky so anything that gets into it will be trapped there. Sometimes they will chase prey into their webs too.They will chase the prey the direction of their webs in order to get them cornered. The prey can often run much faster than a Spider. Yet the feet will quickly become entangled in the sticky mess of the web. This is a great advantage for the Spider and then they will bite which injects the venom into the prey. This will immobilize them and then will meet their ultimate fate.

Spiders won’t stick to their own webs though due to the oil on their limbs. They will build webs in different directions too. This will get those that crawl or those that fly. They are able to complete tasks based upon vibrations that they feel in the body. They don’t have great vision but they are able to use their senses to be able to create the Spider webs. Many people don’t realize that the Spider can have more than one web. In fact, when they enter a location with several of them they think they have a huge infestation of Spiders. However, they actually are very intelligent creatures. They are able to have multiple webs around so that they can increase their chances of successfully getting enough to eat.

1. **Hunters without webs:**

Not all Spiders use this method of being able to get their prey though. The Wolf Spider is one species that is very fast in movement. It is successfully able to chase its prey and to capture it. There is also the Door trap spider who has a very original tactic. They do create a web but it is in a hole in the ground. They line the hole with silk and that covers it up so that prey can’t see it. They create a tunnel and the prey is caught. When prey comes by they will fall into this trap and not be able to get back out. This method is effective and they are able to capture plenty of food this way in no time at all. The Grass Spider creates a type of funnel with the silk webbing along the blades of grass. The prey can get into the funnel but then not back out.

The Garden Spider is able to leave a dangling trap line out there. When they feel it vibrate they will run down it and capture the prey. This is a very similar concept to how humans use line to tell them when they may have a fish on the end of the hook. Each species of Spider can have a variation too of how they are able to successfully capture prey. This allows them to be able to survive in their own habitat. There has been plenty of change that has occurred for them to continue being successful. For example, some stretch webs and then release them as prey approaches.

1. **Scorpions and prey:**

Scorpions are active night hunters with developed abilities to achieve their goal. The natural environment in which they inhabit allows them to have a broad range of prey that provides them with the necessary nutrients to survive. Some in the comprehensive list of alternatives that mostly small or medium sized scorpions have to feed on are several types of insects and spiders, such as worms, centipedes, woodchucks, termites, crickets, flies, beetles, and snails. The big species can capture greater prey such as rodents, frogs, lizards and even some types of snakes.

An interesting fact about scorpions is that they can withstand several months without consuming food. Some scorpions which inhabit arid regions have survived without food for up to 12 months, as long as they have access to water sources. They do not feed daily like us, but usually, they look for food every two or three weeks. Although they have the same resources, not all hunt in the same way. Sometimes the size and strength of adults are enough to kill their prey without having to sting them; they only tear the body parts with the help of their pincers. Young ones on the other hand, do rely on injecting the poison to knock down their opponent. As an example, the adults and young of the emperor scorpion perform these two different procedures to catch their prey.

If the victim is an insect with delicate body parts easy to detach, the scorpion is responsible for tearing it with its pincers. The rest of the body is impossible to digest in a solid state, so the scorpion begins to fill it with digestive juices formed by enzymes that dissolve all the tissues until they become a semiliquid substance. After that, the food is ready to be sucked through their small mouth. This whole process can take about an hour. The scorpion abandons the hard parts, and it does not invest more energy trying to soften them.

Some species hunt by ambushes; they stay motionless beneath stones, wood, bark, and other objects on the ground that allow them to conceal or camouflage until the prey is close enough to catch it in an instantaneous movement that takes fractions of a second. They can also chase down briefly a detected victim and attack at the right moment. Scorpions do not go out looking for food; their success depends on waiting. They do not have excellent vision, but through their sensory hairs, they can know what kind of animal is approaching and how far is it from them

**Cannibalism:**

Cannibalism is common among scorpions. The battles between individuals many times end up with the death of one of the contenders, and the triumphant prepares to eat it, leaving only the tail. Researchers have observed that in confrontations of the European Yellow-tailed Scorpion the largest competitor always wins, while the small which always loses, dies eaten. Although not frequently, this also happens after mating. In this case, the female is the one that kills and eat the male. Cannibal behavior of mothers to their offspring is also possible when they do not have anything else to eat.

1. **LIFE CYCLE OF ARACHINDS**

Arachnids have nearly as much species diversity as their distant cousins, the insects.Spiders and ticks make up the vast majority of arachnids, although the class also contains the scorpions, vinegaroons, whip scorpions, and haevestman and camel spiders. Level of parental care varies between species and orders, but all arachnids have incomplete metamorphosis, meaning the babies look very much like miniature replica of adults.

1. **Mating:**

Courtship among arachnids often is a spectacle, including various gestures, touches, dances and some time sound. Spiders use their pedipalps to transfer sperm into female genital opening. A male scorpion guides his mate over to a sperm packet he’s deposited. Ticks mate while the female attached to her host. It is not uncommon for male to become dinner to his mated partner, particular in spider and scorpion.

1. **Egg and birth:**

Some species give birth to live young, although the egg laying is the most common form of birth among arachnids. Female ticks release from their host after mating and feeding, and then lay egg just before dying. Scorpion gives birth to live young. Wind scorpion, also known as camel spider or sun spider, bury their egg, as do harvestmen. Different levels of maternal care are shown among arachnids, as well. Baby scorpion climb onto their their mother‘s back until their first molt; some spiderling do this as well.

1. **Molting:**

During the larval and nymph stage, the young arachnids look like their parents, although they are much smaller in size, and sometimes have different coloration patterns. Molting is a process in which the larval and nymphs grow and shed their exoskeleton when their babies become too big for them. Spiders molt between 4 to 12 times during their lives, while scorpion molt five or six times before they mature.

1. **Life span:**

The life span of arachnids varies greatly between species and type. Some scorpions live 10 to 15 years. Spiders may live to only one year old, but some tarantulas are known to live decades. Many harvestmen only live for a year, while ticks may require two years for their life cycle to complete.

1. **The reproductive system of spider:**

The male spider’s primary objective in life is to impregnate one or more female spiders before other male can. As it turns out, this is no easy task in most species.

The first obstacle is actually finding a female spider. Most spiders are completely solitary animals, meaning they live and feed on their own, and they are generally spread out over a wide area, making an available female relative scarce. The male spider has the daunting task for tracking down a sexually mature, receptive female in the area before other males can get there. In most species the female makes it easier on the males by advertising herself with **pheromones**. Many female ground spiders will secrete a pheromone on their dragline, the silk thread they leave trailing behind them. When males of same species come across the dragline the smell the pheromone with chemical sensor on their front leg and follow the dragline. Once the male locates a female it has to contend with any other males in the area. If other male are present the spider in most species will fight it out for right copulate with female.

1. **Courtship:**

After taking care of any other male contenders the spider’s next task is to deal with female spider itself. Male spider are generally much smaller than female in their species, making them easy prey. The male has signal to the female that is a spider of the same species not food or potential predator, and that it intend to copulate. This is called courtship.

Courtship varies among different species. Many web building spider will use vibration as a means of courtship communication. Many spiders with better eyesight, such as wolf spider and jumping spider will dance to court female. Once female recognizes the male’s courtship behavior she will position herself for sex, signaling to male that she is receptive or she make it that she is not receptive. If male is desperate to mate, because all the females in area will soon lay their egg, he proceed anyway, with full understanding that female might kill him.

1. **Mating in spiders:**

Both the male and female reproductive organ s are at the rear of abdomen, but spider don’t mate by coupling these organ, instead the male deposited some sperm onto a small web and picks it up on the end of his paedipalp. When the female is in position the male deposits the sperms into the genital opening. The female stores the sperm in receptacles near the ovaries. When she is ready to lay her egg months down the road in some species she uses the sperm to fertilize them. Some spiders may lay hundreds even thousands of egg in one shot.

1. **The life cycle of a spider:**

The spiders from the tiniest jumping spiders to largest tarantula the same general life cycle. They mature in three stages: egg, spiderling, and adult.



1. **Egg and embryonic stage:**

after mating female spiders store sperm until they are ready to produce eggs. The mother spider first construct an egg sac from strong silk that is tough enough to protect her developing offspring from the element. She Then deposits her eggs inside it fertilizing them as they emerge. A single egg sac may contain just a few egg or several hundred depending on species.

Spiders take a few weeks to hatch. Some spiders in temperate regions will overwinter in the egg sac and emerge in spring.im many species mother guards the egg sac from predators. Other place sac in secure location.

1. **Spiderling, the immature stage:**

Immature spiders called spiderling resemble their parents but are considerably smaller when they first hatch from egg sac. They immediately disperse some by walking and other by a behavior called ballooning. Spiderlings that disperse by ballooning will climb onto a twig or other projecting object and raise their abdomens. They release threads of silks from their spinnerets letting the silk catch the wind and carry them away.

The spiderlings will molt repeatedly as they grow larger and they are very vulnerable until the new exoskeleton forms completely. Most species reach adulthood after five to 10 molts.

1. **Adult, the sexually mature stage:**

When the spiders reaches adulthood it is ready to mate and began the life cycle all over again. In general, female often die after mating. Spiders usually live just one to two years though this does vary by species. Tarantulas have usually long life spans. Some female tarantulas live 20 years or more. Tarantulas also continue molting after reaching adulthood. If the female tarantula molts after mating, she will need to mate again because she shed sperm structure along with exoskeleton.

1. **Defense mechanism of Arachnids:**
2. **Defense methods of Spiders:**

Spiders have many predators in their natural habitat. As a result, they have many methods of being able to defend themselves. They aren’t very fast when you consider most species so they have to compensate for it. They are able to blend well with their environment as a form of camouflage that is why they offer so many spectacular colorations.

There can be multiple colors found on any particular type of Spider. This makes it hard for any predator to recognize what species it may belong to. As a result, the predator isn’t going to take the chance that it may be one that could be potentially fatal to them. The predator is more likely to venture off than to take such a risk. Some spiders actually taste really terrible! They won’t be eaten by predators because they simply don’t taste good. Many experts believe that this is a type of defense that they are able to use in order to survive The downside to this thought is that they may be severely injured before the predator realizes that fact.

There are many fine hairs on the body of the Spider. They may use their abilities to flick hairs at their enemies. That can be very irritating and even alarming to a predator. This often causes them to run off and to leave them alone. Since Spiders don’t have muscles in their legs they use hydraulic power to be able to move. Many species are able to jump many times their body size. This can help them to get out of their predicament in no time at all. That jumping distance can make up for them not being able to run fast.

The webs of Spiders offer a natural type of defense for them. Many times their predators will get caught up in them as well as their prey. This can help them to stay safe from harm. They have a hub in their webs too that can offer them a safe place to retreat if they get the impression that danger is lurking around them. Of course the top defense that most of us think of with the Spider is the venom. They have sharp teeth that are able to quickly penetrate into the predators that are bothering them. That venom will immediately kick in and make them ill, immobile, or kill them. This is the most powerful type defense mechanism that the Spider has.

There are species that have a spiked type of armor on them. This will prevent some predators such as birds from being able to kill them. It is believed that many of these defense mechanisms for them are the result of evolution. That could be why some types of Spiders are able to so well in the wild and others struggle. Size isn’t always important either when it comes to the defenses of a Spider species. Some of the smaller ones definitely know how to hold their own successfully. If you are interested in learning more you can study specific species of Spiders. By identifying where they live and what they do to depend themselves you can get a good idea of what life is like for them on a daily basis.

1. **Defense methods of Scorpions:**

With their large pincers and venomous, stinging tails, scorpions can be intimidating creatures. While these arachnids generally keep to themselves in the wild, they won't hesitate to fight off attackers and hunt food using one of their natural defenses. Scorpions have a few weaknesses that may leave them vulnerable, but they generally compensate with these self-protecting mechanisms.

1. **Pincer Strength**

At the scorpion's front end, he's equipped with two large pincers, also known as pedipalps. Unlike snapping jaws, these pincers are actually sensitive, and can even be used to hold onto a partner during mating. As a defense mechanism, however, these pincers are invaluably strong. In fact, a scorpion's pincers are sometimes so strong that he doesn't even need to use his stinging tail to subdue a foe -- he simply crushes him. If his pincers aren't strong enough to finish the job, he uses them to hold his opponent in place while he brings down his tail.

1. **Venomous Sting**

Scorpions are easily recognizable by their large, articulated tails with the stingers on the end. A scorpion sometimes uses his tail to sting his prey, injecting it with toxic venom. Because their venom requires a lot of energy to replenish, they generally only resort to using the stinger when they know that they have to -- venom can be strong enough to protect a scorpion from predators as big as owls and coyotes. Some scorpions actually produce two types of venom -- one that's lethal, and one that only stuns prey. In those cases, lethal venom is usually reserved for prey, while stunning venom is used for self-defense.

1. **Arachnid Families**

Arachnid is a class of joint-legged arthropods, in subphylum Chelicerata. There are 15 orders of arachnids such as scorpiones (true scorpions), Solifugida (sun spiders), Araneae (spiders), Acari (ticks) etc. These orders have large number of families. Some families are discussed below:

1. **Family Buthidae(Scorpions):**

The Buthidae is the largest family of scorpions, containing about 80 genera & 800 species. Its members are known as for example fat tailed scorpions and bark scorpions.

1. **Scientific classification:**

**Kingdom: Animalia**

Phylum: Arthropodes

Subphylum: Chelicerata

Class: Arachnida

Order: Scorpiones

Family: Buthidae

1. **Size:**

Adult is about 2 to 4 inches.

1. **Identification:**

Scary-looking creature having upturned and very dangerous tails with powerful stingers on the end. Most of them have 2-5 pairs of eyes. The pedipalps are week and tweezer like. The Buthidae are cryptically colored but some are black or vividly colored.

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1. **Biology and Life Cycle:**

Scorpions are not insects. They are arachnids. All species are nocturnal usually hide out during day. They have ability of metamorphosis.

1. **Habitat:**

They occur in the warmer parts of the world except New Zealand. They also occur in dry climates. Some species are present in tropical and sub-tropical regions.

1. **Feeding Habits:**

They use their stingers to immobilize the pray while being held by pinchers. They feed on insects like crickets and roaches.

1. **Economic Importance:**

They have painful stings but they are useful because they are predaceous and eat roaches.

1. **Natural Control:**

Snakes eat crickets and roaches in this way they destroy the food source of scorpions.

1. **Ticks:**

Ticks are arachnids. Ticks are external parasites. They are evolved during cretaceous period. Almost all the ticks belong to 2 families’ hard ticks (Ixodidae), and soft ticks (Argasidae).

**Family Ixodidae:**

This is family of hard ticks o scale ticks. It is one of the two big families of ticks containing 700 species. They are known as hard ticks because they have hard scutum or hard shield which the other family of soft ticks lack.

1. **Scientific Classification:**

**Kingdom: Animalia**

Phylum: Arthropoda

Class: Archnida

Order: Ixodida

Family: Ixodidae

1. **Size:**

They are 3-5mm long.

1. **Description:**

They are distinguished from the soft ticks on the bases of scutum. Both adults and nymph has prominent gnathosoma (feeding parts).

1. **Habitat:**

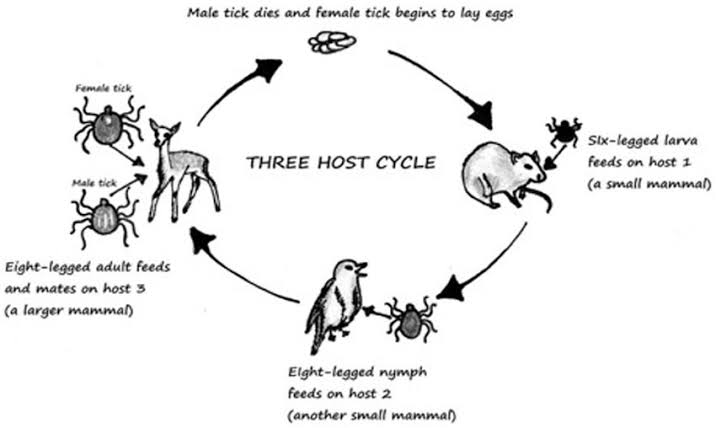
Ticks are widely distributed around the world especially in warm and humid climate.

1. **Feeding Habit:**

They are ectoparasites and living by feeding on the blood of mammals, birds and sometimes reptiles and amphibians.

1. **Life Cycle:**

The ticks need a new host at each stage of their life. The life cycle of ticks usually lasts for 3 years. During this time they go through four life stages: egg, larva, nymph, and adult. After the eggs hatch, the ticks must have a blood meal at every stage to survive. Ticks have 3 hosts.Beacuse of their habit of ingesting blood ticks are vector of many diseases that affect humans and other animals.



1. **Medical Importance:**

Hard ticks are of great medical importance acting as vector of diseases caused by bacteria, protozoa and viruses. The saliva of female ticks is toxic causing ascending paralysis in animals and people, known as tick paralysis.

1. **Jumping Spider (Family Salticidae):**
2. **Scientific classification:**

**Kingdom Animalia**

Phylum Arthropoda

Subphylum Chelicerata

Class Arachnida

Order Araneae

Family Salticidae

1. **Description:**

The jumping spiders have some of the best vision among arthropods and use it in courtship, hunting and navigation. Their front four legs are generally larger than hind four legs. They are also distinguished also by prominent spines on the back four legs. Jumping spiders are generally recognized by their eye pattern. All jumping spiders have four pairs of eyes, with the anterior median pair being particularly large. The body length of jumping spiders generally ranges from 1 to 25 mm. Both their book lungs and tracheal system are well developed, and they use both the system for breathing.

1. **Habitat:**

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 and mountainous regions

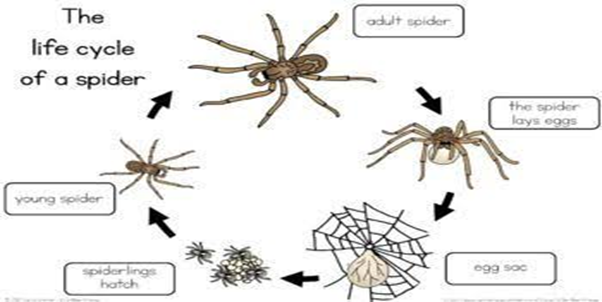
1. **Feeding:**

Although jumping spiders are generally carnivorous, many species have been known to include nectar and plant matter in their diet.

1. **Mating Behavior:**

Jumping spiders conduct complex, visual courtship displays using body movements. Unlike females, male possess plumose hairs, colored or iridescent hairs.

1. **Life Cycle of Jumping Spider:**



1. **Red Velvet Mite (Family Trombidiidea)**
2. **Scientific classification**

**Kingdom Animalia**

Phylum Arthropoda

Sub phylum Chelicerata

Class Arachnida

Order Trombidiformes

Family Trombidiidea

1. **Description:**

The red velvet mite is a small predatory arachnid belonging to the Trombidiidae family. They come in a wide range of sizes, from about the size of a pinhead to around two centimeters in length. The velvet mites are predators and they feed on other invertebrates like small arthropods and their eggs, for example termites. The adult velvet mites look for food and feed on them for only a few hours every year. Depending on the species, the amount of food they eat per day varies

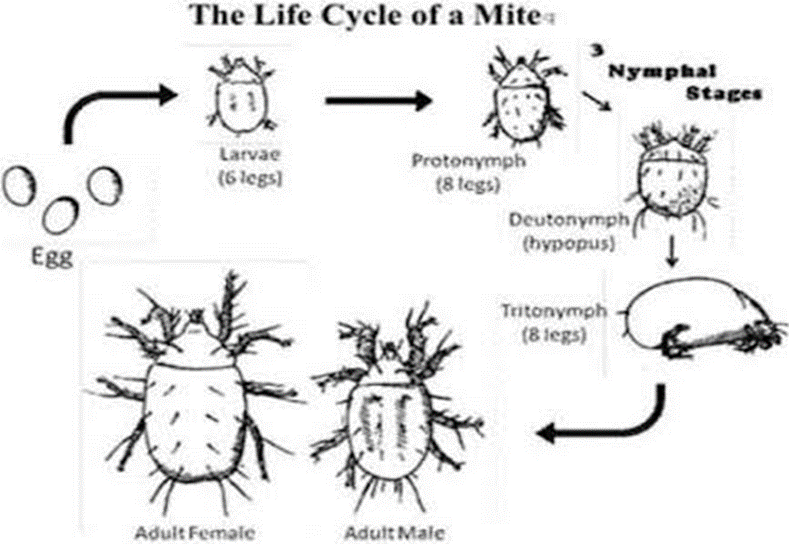
1. **Habitat:**

Red velvet mites live in colonies under plant leaves. Mites are often overlooked by humans and they can live as decomposers in the soil, in plants and also in water

1. **Life Cycle:**

The life cycle of mites may vary from species to species but it generally involves four stages of development into adult life and it happens from ten days to three weeks.

Initially, the female mite lays eggs, usually in host. The eggs hatch into larvae that feeds on skin cells of its host. This can last between 3 to 4 days. The larvae then moults into nymphs and undergoes two different stages between the next 3 to 4 days before they finally moult into adult mites



1. **Economic importance:**

The oil from the red velvet mite Trombidium grandissimum is used in traditional Indian medicine to treat paralysis.

Certain species are important pests of agricultural value. These are mostly known as plant mites.