WINNER
OALA AWARD
FOR SERVICE TO THE ENVIRONMENT

SPIDERS OF TORONTO

A GUIDE TO THEIR REMARKABLE WORLD

• City of Toronto Biodiversity Series •

TORONTO ROM Livegreen Toronto

Imagine a Toronto with flourishing natural habitats and an urban environment made safe for a great diversity of wildlife. Envision a city whose residents treasure their daily encounters with the remarkable and inspiring world of nature, and the variety of plants and animals who share this world. Take pride in a Toronto that aspires to be a world leader in the development of urban initiatives that will be critical to the preservation of our flora and fauna.

Cover photo: Ken Jones, © MCB Andrade 2008

A female jumping spider, *Phidippus clarus*, lands on the edge of a milkweed leaf while stalking a cricket. A line of silk, which she uses as a safety line, can be seen extending from her body. *Phidippus clarus* has an explosive breeding season that lasts a little over three months (June to August), but during these months large numbers can be found hunting, fighting and mating on native vegetation in parks around Toronto. Females build refuges of silk sandwiched between plant leaves. Using a combination of visual and vibratory signals, males defend females from rival males, and these interactions occasionally escalate into direct combat. Fights between females over refuges are even more intense than fights between males, with females often injuring or killing their rivals.

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Araneus marmoreus orbweb, early morning
© John Sloan

"Indeed, in its need for variety and acceptance of randomness, a flourishing natural ecosystem is more like a city than like a plantation. Perhaps it will be the city that reawakens our understanding and appreciation of nature, in all

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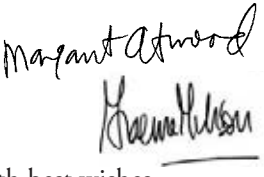
Winner of the 2012 Ontario Association of Landscape Architects Award for Service to the Environment

Welcome!

To encourage the celebration of all life on earth, the United Nations declared 2010 to be the Year of Biodiversity. We congratulate the City of Toronto for honouring this special year with this Biodiversity Series celebrating the flora and fauna of our city. Each booklet within the series – written by dedicated volunteers, both amateurs and professionals – offers Torontonians a comprehensive look at a major group of flora and fauna within our city.

We hope that this Biodiversity Series will achieve its main goal: to cultivate a sense of stewardship in Toronto area residents. If each of us becomes aware of the rich variety of life forms, their beauty and their critical roles within the varied ecosystems of Toronto, we will surely be inspired to protect this natural heritage. After all, our own health and ultimately our very survival is linked to the species and natural spaces that share the planet with us. Without plants, there would be no oxygen; without the life of the soil, there would be no plants; without unpolluted fresh water, we would die.

While there are many organizations actively engaged in protecting our city's flora and fauna, the support of ordinary citizens is critical to the conservation of our natural habitats. We hope you'll take a walk in one of our parks and open spaces, lower your blood pressure, look around you, and enjoy the diversity of trees, animals, fishes, birds, flowers, and even fungi that flourish among us.



With best wishes,
Margaret Atwood and
Graeme Gibson
January 2011

An Introduction to the Spiders of Toronto

Spiders!

The very name makes some people shudder. Instead, these oft-maligned but fascinating creatures deserve our respect and are an important part of the biodiversity of our area. Spiders are predatory arachnids (invertebrate animals with jointed legs) that feed mainly on insects. Many of their prey cause considerable damage to our crops, our forests and our gardens. Without spiders, we would be over-run!

If you take a moment to look at spiders in their natural habitat, you may marvel at their ability to spin silk. Silk is used for a variety of purposes, including capturing prey, creating shelters, wrapping eggs and making parachutes – yes, young spiders use them to catch the wind and sail to a new home! If you rise early in the new dawn you may be fortunate to see dew-laden webs shimmering in the morning light. Wander out with a small light at dusk and you can see spiders spinning their intricate creations in preparation of catching their evening meal, or search at night to find spiders by the shine of reflected light from their eyes.

I hope that as you read through this book, you will begin to appreciate the beauty of these misunderstood, refined predators. The next time someone yells, "Spider!" rather than recoil, you can imagine the magnificent top predator stealthily stalking its wary prey, leaping on its victim, or trapping it in a deadly, magical web woven of the finest silk. Instead of hurrying over to squish the invertebrate *T. rex,* - look at it in a new light.

Yours truly,

Dr. Mark D. Engstrom
Deputy Director, Collections and Research, Royal Ontario Museum

City of Toronto Biodiversity Series

Spiders of Toronto is part of the Biodiversity Series developed by the City of Toronto in honour of the Year of Biodiversity 2010. A number of the non-human residents of Toronto will be profiled in the Series. It is hoped that, despite the severe biodiversity loss due to massive urbanization, pollution, invasive species, habitat loss and climate change, the Biodiversity Series will help to re-connect people with the natural world, and raise awareness of the seriousness that biodiversity loss represents and how it affects them directly. The Series will inform residents and visitors of opportunities to appreciate the variety of species inhabiting Toronto and how to help reduce biodiversity loss by making informed individual decisions.

Introduction to Spiders

Spiders are among the most diverse groups of organisms on earth. There are over 42,000 known species and scientists estimate there may be another 40,000 to 100,000 species that have not yet been identified. Spiders are adapted to a wide range of habitats and lifestyles. They can be found thriving in parks, blanketing bushes along city streets, hanging in people's basements, lounging on docks on Lake Ontario, populating green roofs, and even hanging outside the windows of Toronto's tallest buildings. Despite their presence in just about every habitat, relatively little is known about most spider species. What we do know is that spiders are a fascinating and critical part of all terrestrial ecosystems, with abilities and behaviours that make them unique. This is just as true in a city like Toronto as it is in an unspoiled wilderness.

Spiders are estimated to eat about 200 kg of insects per hectare per year. In a city the size of Toronto, this amounts to an astonishing 12 million kg of insects per year – equivalent to the body weight of over 150,000 average-sized people every year! Research shows that just two of the spider species living at Highland Creek in Scarborough eat 2 of every 100 insects that develop in the creek. This includes large numbers of mosquitoes. Multiply this estimate by the 40 or so other spider species likely to live around the creek, and suddenly the impact of spiders is clear. Spiders have a similar effect in gardens, where they eat biting insects and pests, such as the aphids that frustrate city gardeners. If spiders were to suddenly disappear, we would soon be overwhelmed by insects.

Arachnophobia and Misconceptions About Spiders

The fear of spiders, "Arachnophobia", frequently ranks in the top two or three most common phobias.

Many people who have a fear of spiders express it in a mild manner, quickly brushing away spiders or webs when there is contact. But there are individuals who suffer from arachnophobia in a much more pronounced manner. Severe arachnophobes (individuals who are afraid of spiders) will often try to avoid situations where spiders or spider webs may be encountered, suffer panic attacks if they encounter them and, in extreme cases, even an image of a spider may trigger an irrational response from them.

Current treatment of arachnophobia involves behavioural therapy and education. This involves teaching arachnophobes that the vast majority of spiders are not harmful to humans and exposing them to spiders in controlled settings. This helps to desensitize them and ultimately overcome their fear. Therapists stress that it is important not to make fun of or embarrass someone who suffers from arachnophobia – that moral support is essential for these individuals to overcome their fear.

There have been a number of scientific studies that have tried to determine if the fear of spiders, snakes and other "threatening" types of organisms are rooted in evolutionary history. These studies suggest that early mammals, including the earliest humans, found it advantageous to be aware and fearful of anything that could cause them harm, and therefore to avoid them. However, research has not been conclusive about the origin of arachnophobia.

Myth: Spider bites are responsible for the vast majority of bites a person receives.

Fact: Spiders are not aggressive by nature and will only bite when defending themselves; for example, if you pick one up and try to crush it.

Myth: The Brown recluse, *Loxosceles reclusa*, lives in Ontario.

Fact: There has never been a verified record of this species having been found in Ontario. This species lives in the southern midwest states of the United States south to the Gulf of Mexico.

Greco-Roman Mythology

According to Greco-Roman mythology, Arachne was a mortal human being with incredible weaving skills. Arachne was so confident of her skills that she became conceited and believed that she could weave even better than Athena, the goddess of wisdom, war and the weaving arts.

Arachne's attitude offended Athena, who decided she must warn Arachne not to offend any of the other gods. She assumed human form as an old woman and approached Arachne. But Arachne did not heed Athena's warning – instead demanding a contest whereby she could demonstrate her skills. Athena, now angered by Arachne, dropped her disguise and revealed her true identity, and granted Arachne's wish. The contest began. Athena wove a spectacular tapestry – one of humans being punished by the gods for their arrogance. Once again, Arachne was undeterred and wove an even more amazing tapestry. Although her tapestry was without flaw, Arachne had chosen to depict the failings of the gods. This so enraged Athena that she lashed out at Arachne. Rather than bow down to the goddess, Arachne instead hung herself by a rope. Athena took pity upon Arachne and, while loosening her rope, turned it into a silk line.

In the process, Arachne changed, losing her nose, her ears and her hair. Athena is believed to have told Arachne that she would now live out the rest of her life weaving silk, but as a spider.

In Greek, Arachne means "spider".

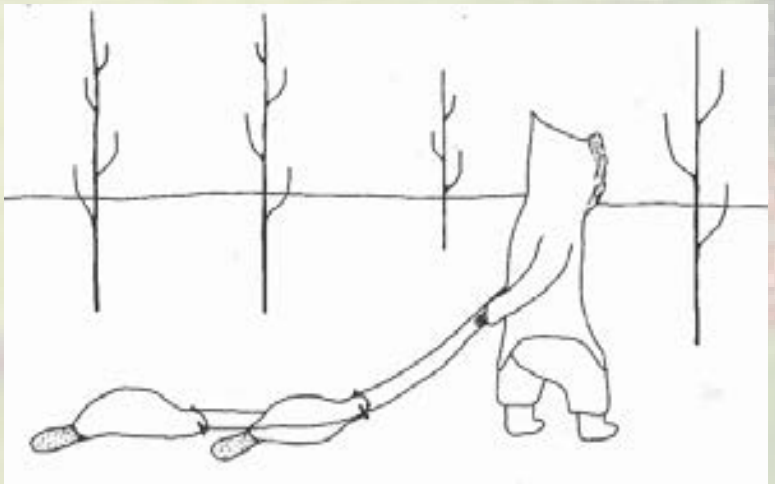
Ojibway Legend – "How Spiders Came to Be"

Reprinted with the permission of the Royal Ontario Museum, from *Tales the Elders Told – Ojibway Legends* by Basil Johnson.

In the midst of plenty, there was hunger. It seemed that no matter how much game men killed, or how much food women stored away, there was never enough for the next day. For some strange reason that people could not understand, all the food spoiled and turned green.

Hunters killed enough animals, fishes and birds to feed their families for days – even weeks. The hunters brought home enough food to allow them many days of rest. Yet they had only unending toil.

In vain, the people tried to understand this riddle. In vain, they tried to keep their food fresh and fit to eat. They hung the flesh of game high up in the trees. Still the flesh turned green and rotted. They buried the meat in the ground. Even in the ground there was no protection. The meat became mouldy and sour. They tried keeping the meat in water, both hot and cold. That worked no better than hanging the flesh or burying it. Nothing, it seemed, could be done to preserve the food, prevent waste and save labour.



Hunters had to kill many, many creatures to provide enough food. At last, the hunting and killing drove the animals from their grounds and greatly reduced their numbers. As food became scarcer, men, women and children began to grow very sick and to die.

At the same time, life was very hard for a small, six-legged, pot-bellied bug, the Manitoosh. He lived on the juices of the flesh of flies. But he was slow and awkward, and could not catch the nimble flies.

The Manitoosh tried every way he could think of to catch the flies. He hid in dark corners and darted out at them. The flies sneered and flew away. He hurled grains of sand at the cunning insects. The flies laughed and flitted out of the way. He tried letting himself down from above by means of a special thread that he made. Again the flies laughed and dodged out of reach.

Finally, the Manitoosh and his brothers (the Manitooshug) decided to ask the Great Spirit, Kitche Manitou, for help. They went to a high mountain to plead with Kitche Manitou to make them better hunters of flies or to make it possible for them to eat other foods.

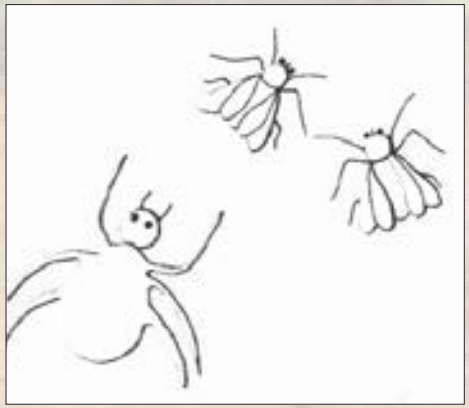
When the Manitooshug reached the peak, they cried out, "Kitche Manitou, we are hungry and helpless. We come to you for help. Hear us."

Kitche Manitou heard and replied. "What is it that you want?" The Manitooshug asked him for power to catch the flies.

In reply, the voice of Kitche Manitou echoed over the mountain top. "I have given you all the power you need. If you use it wisely, it will serve you well." And the voice faded away.

Discouraged, the Manitooshug left the mountain. They would have to go on trying to catch flies.

For a long time no one realized that the troubles of the people and the troubles of the Manitooshug were related. Then the hunters had a great council with a powerful spirit, Nanabush. They wanted to talk about the rotting meat and the vanishing game.



Just before the council, there was a great feast. During the meal swarms of flies crawled over the food and the feasters. Many Manitooshug ran and leaped and jumped, trying to catch the flies. But they were just too clumsy.

Nanabush felt sorry for the little creatures and forgot the purpose of the great council. "We must help the Manitooshug," he said to the chiefs and wise men present. "They cannot catch the flies and are very hungry."

Then Nanabush spoke to a Manitoosh. "Brother," he said, "I have watched you trying to catch the flies. I know that you can make a thread to let yourself down from above. Couldn't you use the thread to make a trap for catching flies?"

Although the Manitoosh was doubtful, he hurried home and that same afternoon began to weave the thread in a criss-cross fashion. All afternoon and all evening he worked. When night came, he was very tired and fell into a deep sleep.

It was nearly noon when the Manitoosh awoke the next day. As soon as he opened his eyes, he saw the net of thread he had woven the day before. To his joy and surprise there were two flies trapped in it.

After he had eaten his fill, the Manitoosh rushed off to find Nanabush to tell him about the flies he had trapped. Then he told the other Manitooshug about his discovery. And he taught them how to make nets.

From that day on, the Manitooshug made nets and caught flies, and ate well. From that day on, people were able to keep meat fresh a little longer. And from the Manitooshug, they learned how to make nets to catch fish.

Because the Manitooshug had helped the people, Kitche Manitou gave each bug an extra pair of legs. He also gave the bug a new name, Supp-Kay-Shee or Net-Maker.

All this happened before people knew how to preserve meat and other foods.

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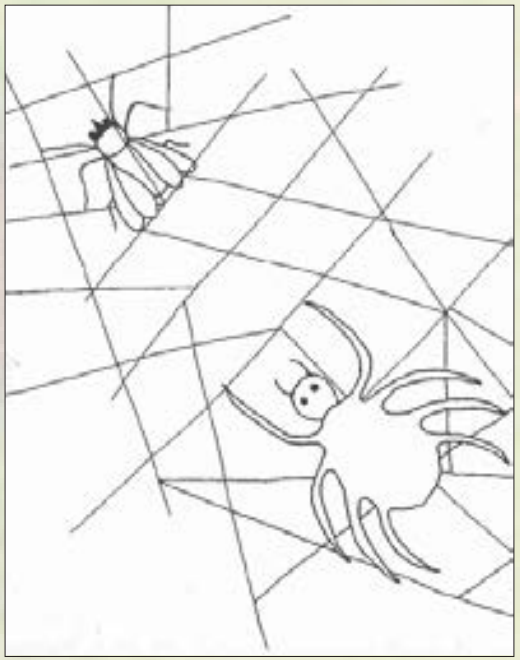


Evolutionary Timeline

Spiders are Chelicerates – a group of organisms that includes horseshoe crabs and sea 'spiders' – that evolved from marine invertebrates (animals without backbones). Chelicerates all have chelicerae, which are specialized structures near the mouth that function as pinchers and are used to grasp food. In spiders, these are modified into venom-injecting, hollow fangs. The Chelicerata diverged from the Trilobites and the group that includes insects (Hexapoda – six-legged invertebrates) at least 445 million years ago, during the Late Ordovician period. Animals we would recognize as ancestors of the true spiders first appeared about 300 million years ago during the Devonian Period. Much was changing on the early Earth during this time. The first tetrapods (four-legged animals) appeared on land, seed-bearing plants were spreading across the Earth's surface creating the first forests and, most critical for the evolution of spiders, land-dwelling insects were becoming more numerous and diversifying. The appearance of this ready source of food on land created a niche that was exploited by the first spiders – ground-dwelling predators able to survive outside the water where they could trap and eat the new six-legged prey.

Although the oldest fossil of a true spider is from the Permian period (about 290 million years ago), true spiders likely evolved earlier, in the late Devonian and Carboniferous periods. We can learn much about the lifestyle of early spiders by examining the behaviour of species that are 'living fossils' – those that exist today but have changed very little over millions of years. For example, spiders of the family Liphistiidae are active only at night, and live mainly in underground tunnels or burrows. Millions of years ago, these burrows allowed them to avoid much of the dangerous ultraviolet light that was common at that time in the Earth's history. Today, like all modern spiders, they produce silk from glands located in their abdomen, but the silk is used to line their burrows and acts as a protective layer to surround their eggs. These habits, along with their hardened external skeleton, likely allowed early spiders to moderate and maintain the relatively high humidity necessary for survival on land. Thus, spider silk was not originally used to create spider webs. In fact, spider webs did not evolve until much later, perhaps 260 million years ago, after the evolution of winged insects provided a ready food source for creatures that could 'fish' in the air. However, web building was and is restricted to only certain groups of spiders. Many large and successful spider families continue to use silk only for its original purpose.

Spiders have three key evolutionary innovations that have allowed their extraordinary success as a group. First, all spiders produce silk throughout their lives. Second, spiders produce offspring that can disperse to new habitats by ballooning on the wind using silk as a sail. Third, spiders are consummate hunters, with a range of different ways of capturing prey that may walk, run, hop or fly. In addition to the use of silk for detecting, entrapping and subduing prey, all spiders also have a chemical tool at their disposal – venom.

Evolutionary timeline

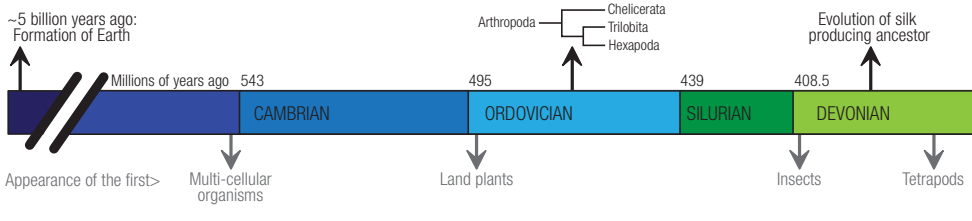


illustration: Janice Ting

Spider Fossils

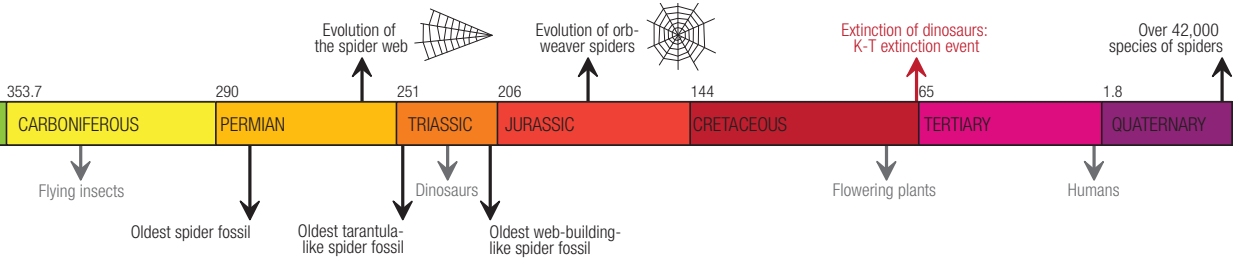
Spider fossils are relatively rare. This is not surprising, as fossilization is a rare event, requiring a narrow range of physical and ecological conditions for success. For a fossil to form, an organism must die in a way that leaves it relatively intact during the fossilization process, which involves the deposition of layers of minerals on top of the dead animal over time. Spiders may be more likely to be destroyed rather than fossilized by this process. Perhaps this is why, as is the case for insects, more spider fossils are found in amber rather than rock. Amber is created when tree sap hardens and fossilizes. On the ancient Earth, a spider that became stuck in sticky tree sap might later be engulfed and kept intact by the viscous liquid.

Fossil of *Palaeoperenethis thaleri*
Horsefly, British Columbia,
Middle Eocene
40 million years old
ROM 31304
Donated by M.V.H. Wilson
© Royal Ontario Museum

Spider fossils show the time of appearance of traits that define spiders and distinguish them from similar animals. The spinnerets (spigots that release silk), are located on the abdomen in spiders, and are one such trait. Another is the web that some species build to catch prey. In 2006, a 110-million-year-old piece of amber was found that holds a remarkable fossil: portions of an orbweb, along with the fossils of numerous flying insects caught in the web. This fossil shows that spiders have been using webs to catch flying insects for a very long time, and that they were important predators even in the distant past.

Unidentified spider in amber
Estonia, Middle Eocene
45 million years old
ROM 60749
Donated by M. Dehn
© Royal Ontario Museum

Liphistius malayanus
(giant armored trapdoor spider)
is a 'living fossil' found in Malaysia.



Threats to Spider Populations

As is common in other groups of animals, some spider species are habitat generalists, capable of living in a wide range of different habitats and conditions. The spiders found in largest numbers in urban areas are either these generalists or species that thrive in disturbed habitats, and are often introduced species. However, many spiders are habitat specialists – these prefer or even require specific habitats to survive. Some are wetland spiders, others require well-drained sandy soils, and still others thrive in old growth forests or rocky outcrops. Thus, even in the urban environment, a diversity of habitats provides for a diversity of spiders. When trees are cut and wetlands are filled in, the habitat becomes more uniform. This leads to a loss in habitat diversity and thus a loss in species diversity. So even if generalist spiders fill the new habitats created by clearing forests and filling wetlands, we do lose something.

Humans affect spiders in other ways. Pesticides can kill spiders directly but also indirectly by killing their prey. When pesticides are used inappropriately or at the wrong time, beneficial species, such as spiders, can be affected more than pest species. Pest populations tend to recover quickly while predators take more time. Thus, the misuse of pesticides can lead to an imbalance in predators and prey in an agricultural field, park or garden. This can start a vicious cycle. As the pest species numbers increase faster than the reduced predators can handle, there is the temptation to use stronger pesticides, and the result is an even more unbalanced ecosystem. This is why it is very important to avoid their use whenever possible, and leave pesticide use to experts if it is unavoidable.

Changes in weather patterns can have an impact on spider populations. Drought, flooding, and extremes in heat and cold can all affect spiders. If the wind does not blow, then spiderlings cannot disperse; if habitats remain damp too long, then fungal growth may trap small spiders; and if dew is scarce, then newly hatched spiderlings may dehydrate.

Spider wasp, *Anoplius carolinus*

Spiders also have a number of natural enemies. Birds, mice, frogs and even snakes find spiders a tasty morsel. There are also insects that can turn the tables on spiders and, of course, other spiders that are not above a little cannibalism. Perhaps their greatest enemies are wasps. Members of the family Pompilidae are known as spider wasps. Although adult wasps use nectar as their prime source of food, their offspring have a taste for spiders. The female wasp is extremely efficient and diligent in her search. When she finds a spider, they begin a deadly dance. The spider will attempt to defend itself but the wasp knows its weak spot – the underside of the body. Spiders are not killed, but are paralyzed with the sting and then transported, still living, to a mud chamber. Spiders are gathered until enough are caught to feed one larva. Once enough are collected, the wasp lays a single egg and seals the chamber. She will do nothing more for that larva, but will build another chamber, often attached to the first, and again stock it with paralyzed spiders. When the eggs hatch, the larvae will consume the paralyzed spiders. The size of the spiders does not matter, even the largest tarantulas are hunted by these wasps. Some of the largest wasps known are the tropical “tarantula hawks” of South America.

Spiders and Their Relatives

When identifying specimens, spider specialists, also known as arachnologists, examine a number of the spider's morphological characteristics, such as the arrangement of their eyes, the orientation of their chelicerae (fangs), the number of claws on their feet and, more recently, their DNA.

More than 42,000 different types, or species, of spiders have been studied worldwide and named. The assigning of a scientific name to a species of spider follows a rank-based system developed in 1735 by the botanist Carol von Linnaeus.

Spiders and their relatives
illustration: Janice Ting

Harvestman

- One main body part (the abdomen and cephalothorax are broadly joined to form one structure)
- 8 legs
- No antennae
- No wings

Spider

- Two main body parts (the abdomen and the cephalothorax)
- 8 legs
- No antennae
- No wings

Insect

- Three main body parts (head, thorax and abdomen)
- 6 legs
- Antennae
- May have wings

Illustrative DNA barcode of Harvestman *(Phalangium opilio)*

Illustrative DNA barcode of Boreal cobweb weaver *(Steatoda borealis)*

Illustrative DNA barcode of Familiar Bluet Damselfly *(Enallagma civile)*

Following this system of classifying organisms, the table below demonstrates the classification of a harvestman *(Phalangium opilio)*, a Boreal cobweb weaver (*Steatoda borealis*), and a Familiar Bluet Damselfly (*Enallagma civile*).

Scientific Rank	Harvestman	Boreal cobweb weaver	Familiar Bluet Damselfly
Kingdom:	Animalia	Animalia	Animalia
Phylum:	Arthropoda	Arthropoda	Arthropoda
Class:	Arachnida	Arachnida	Insecta
Order:	Opiliones	Araneae	Odonata
Family:	Phalangiidae	Theridiidae	Coenagrionidae
Genus:	*Phalangium*	*Steatoda*	*Enallagma*
Species:	*Phalangium opilio*	*Steatoda borealis*	*Enallagma civile*

Note: The scientific name is also called a Latin binomial and consists of the genus and specific epithet. The genus and scientific name always appear as *italicized* text and the first letter of the genus appears as a capital letter, for example, *Steatoda borealis*. The higher level names appear as normal text.

Spiders, harvestmen and insects all belong to the phylum Arthropoda. Arthropods are organisms that lack a spine (invertebrates), have an external skeleton (exoskeleton) that encases their internal organs, a segmented body, and jointed appendages.

If they all have this in common, how does one easily distinguish between harvestmen, spiders and insects? One simple method is to count the number of major body parts (see illustrations).

Spider Identification

Many of us have encountered our more common spiders, such as the Yellow garden spider and Daring jumping spider, on more than one occasion. We may not have known what they were the first time we met them but we may have become inspired to learn more. In the case of these two particular species, their scientific name can be quickly determined, since much is known about their method of capturing prey, their size and colour. However, these characteristics should not be relied upon when trying to identify the vast majority of spiders.

Spiders are perhaps the most difficult group of arthropods to identify to the level of species. In many groups, only mature spiders, typically males, show the characters that are required to accurately identify them to species. Even then, these characters can only be observed under magnification and this requires that the specimen be preserved in ethanol for detailed examination. The reason for this is that very similar-looking spiders may be different species, whereas others that look quite different may belong to the same species. This section will therefore outline characteristics that should not be relied upon when trying to identify spiders, and characteristics that can be used to identify spiders – but not necessarily to the level of species.

Daring jumping spider, *Phidippus audax*
Illustration: Tiffany Yau

Glossary of Terms:

Abdomen: the hindmost section of a spider's body

Arachnophobia: the fear of spiders and other arachnids, such as scorpions

Ballooning: a method by which young spiderlings disperse through the air by letting silk strands out into the wind

Cephalothorax: the foremost section of a spider's body consisting of a head and thorax that are fused together

Chelicerae: the pointed mouthparts (fangs) of a spider

Cribellum: plate-like silk spinning organs located on a spider's abdomen

Dragline: a type of silk used by spiders to keep them from falling, and to build the frame and radial threads of an orbweb

Egg sac: a silken bundle in which a female spider encloses her eggs

Exoskeleton: the hardened, external skeleton of an arthropod

Invertebrates: animals without backbones

Pedipalps: one pair of front leg-like appendages. In mature male spiders, modified organs used to transfer sperm to the female

Spiderling: a juvenile spider, usually just emerged from an egg

Spinnerets: cone-like silk spinning organs located on a spider's abdomen

Tetrapods: four-legged animals

Thorax: the middle portion of an insect's body to which legs and wings are attached

Characteristics not to rely upon when identifying spiders

Body size is not a reliable method to identify spiders, as it can vary considerably between the sexes in the same species. Males of the Yellow garden spider, *Argiope aurantia*, are often one third the size of the females. To the untrained eye looking at both a male and female in the same web, they may think they are looking at two different species.

As humans, one of our primary senses is colour vision. When we describe objects or places, we often refer to colour. However, colour cannot be relied upon when trying to identify spiders. There are some species of spiders that have different colour forms, such as the Goldenrod crab spider, *Misumena vatia*.

Misumena vatia – yellow phase

Misumena vatia – white phase

Characteristics that may assist in the identification of spiders

By observing a spider's behaviour and using a hand-held magnifying glass to look at the more obvious physical characters of the spider, it is possible to determine the family or, in the case of our better-known spiders, the species of the spider. A spider's prey catching behaviour can also be used to place the spider in one of three major groups: web builders, ambush predators or active predators. The shape of the web and the habitat in which the spider lives can also help you determine to which group the spider belongs. This, in turn, helps narrow down the list of possible spider families.

Then one can look at spider morphology – its physical characters – which includes the position in which the legs sit when the spider is at rest, the shape of the body, leg length, the number of claws on the feet, the shape and length of the spinnerets, the presence or absence of a cribellum, and the size and position of the eyes.

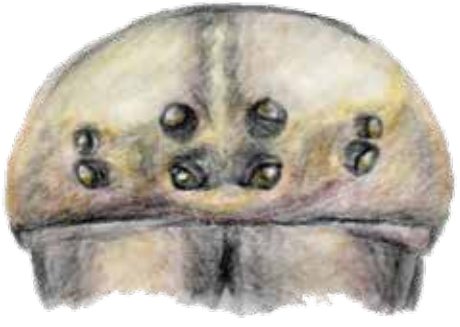
Jumping spiders (Salticidae)

Two large central eyes on a relatively flat surface, a smaller pair at the corners, a third pair of minute eyes behind those with a fourth pair, which may be similar to the front pair, about midway on the cephalothorax.

Wolf spiders (Lycosidae)

A row of four small eyes located beneath two large forward facing eyes, behind which are two similar-sized eyes located on the cephalothorax.

Yellow garden spider, *Argiope aurantia*
Illustration: Tiffany Yau



Yellow sac spider, *Cheiracanthium mildei*
Illustration: Tiffany Yau

Nursery web spider, *Dolomedes tenebrosus*
Illustration: Tiffany Yau

By using these characters, it is possible to identify the spider to the family level, maybe even to the level of genus. Other than for our most common species, positive identification of a spider to the level of genus or species can really only be done by a spider specialist. These scientists must use a microscope to carefully examine the complex reproductive organs, also known as pedipalps, of the male spider.

DNA barcoding is another method used by specialists to add to the knowledge of individual species. For this procedure to work, though, the identity of a species must first be confirmed by a specialist, after which the resulting DNA sequence can then be associated with that particular species. DNA sequences of additional specimens can be used to confirm the species present in a population. By using these methods, any age of spider can be used to identify the species in the region, thus giving us a more accurate determination of what lives in the area.

Wolf spider, *Hogna helluo*
Illustration: Tiffany Yau

Daring jumping spider, *Phidippus audax*
Illustration: Tiffany Yau

Slender crab spider, *Tibellus oblongus*
Illustration: Tiffany Yau

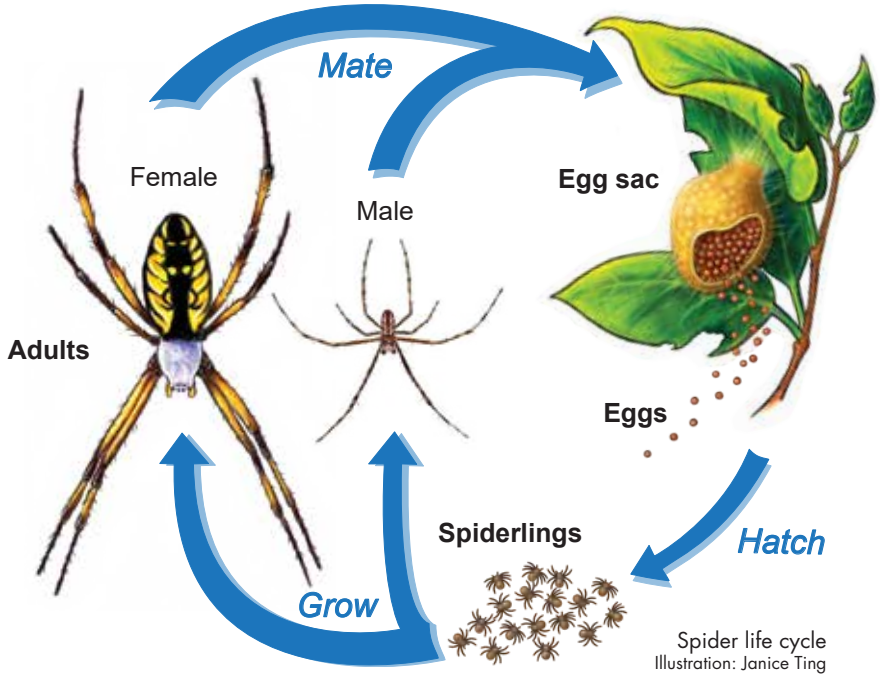
A Spider's Life Cycle

Spiders develop from eggs that are clustered inside a finely woven silk package called an egg sac. The number of eggs produced by females varies between species: female cobweavers often lay several hundred eggs in each sac, whereas some female jumping spiders may deposit only 10 to 20 eggs within an egg sac. The number of times in a year that eggs are produced also varies between species.

Eggs hatch within the egg sac and spiderlings go through one growth stage (instar) before leaving the sac (emergence). While inside the sac, spiderlings eat their yolk sac. Some that mature earlier than others may hunt and cannibalize their slower siblings. Once emerged, all spiderlings are capable of hunting and feeding by themselves.

Different spider species treat their eggs differently. At the simplest, a female deposits her egg sac in a hiding place, then leaves and never returns, whereas some orb-weaving females deposit their egg sacs in their webs and act as guards until the spiderlings have hatched and dispersed. Some carry their egg sac with them until the young emerge (nursery web, wolf and cobweb spiders). Canadian wolf spiders, for example, carry their egg sacs on their spinnerets. When spiderlings emerge, they climb onto the female's back and stay there until they disperse. Female Nursery web spiders hold their egg sacs in their chelicerae, and then spin

Nursery web female with spiderlings



Spider life cycle
Illustration: Janice Ting

Wolf spider and egg case

Nursery web spider with eggs

Yellow garden spider, *Argiope aurantia*, female (left), male (right)
© Bev Wigney

© Bev Wigney

Orbweaver spiderlings
© Bev Wigney

Pardosa ontariensis sub-adult male preparing to balloon
© John Sloan

a special nursery web on which the young live after emergence. The female guards her spiderlings until they disperse. In very rare cases (some tarantulas), a female spider will share her residence with young, collect food for them and live with them until the young are mature.

Some species of spiderlings disperse by "ballooning," where silk is extruded from the spinnerets while the spiderling stands with its abdomen tilted towards the sky. The wind catches the silk and drags the spiderling into the air. Ballooning spiders fly until they are deposited by the wind in a new location. Ballooning can be impressively effective and partly explains why spiders are found in just about every type of habitat imaginable. Spiders are often the first organisms found in areas recovering from natural disasters (e.g., volcanic eruptions) and in new patches of habitat (e.g., green roofs).

Since spiders are covered with a hardened exoskeleton, they grow by moulting or shedding their old skin. The period between sheds is called an "instar". The number and duration of instars prior to maturity varies among species, between the sexes, and even among individuals of one sex and species, depending on resource availability, temperature and other variables.

Adult spiders are often sexually dimorphic, that is, males and females are different in terms of body shape, size and colour. This is particularly common in many web-building and ambush predators; less so among the active hunters. In some cases, this difference is extreme. Female *Argiope aurantia* spiders are three times longer and as much as 40 times heavier than their male counterparts!

Toronto's (un)Official Spider: Yellow garden spider

The Yellow garden spider, *Argiope aurantia*, can be found throughout southern Canada and is a common inhabitant of open, sunny fields and among flowers, shrubs and tall garden plants.

Females are much larger (19-28 mm in length) than their male counterparts (5-9 mm in length). Their iridescent black bodies, bright yellow markings and large size gives the appearance of an aggressive and intimidating spider but they are not dangerous to humans. They are beneficial to gardeners as they are avid predators of many garden pests.

You are more likely to encounter a female in her orbweb than the much smaller male. She hangs upside down in the centre of her web, which can have a diameter of up to 60 cm, lying in wait for a meal. Common to these webs is the stabilimentum – a zig-zag silk pattern that extends downwards from the centre. The stabilimentum may be used to attract prey, to help camouflage the spider as it sits in the web's centre or to warn off birds in flight.

When threatened, the female will quickly drop down to the ground and remain out of sight until the threat has passed. She will then climb back up her silk safety line and return to the centre of her web.

Once an insect lands in her web, the female first determines if it is safe to approach. If the insect is harmless and edible, she will dart out to the trapped victim and give it a quick bite, during which venom is injected into its body; if it is edible and potentially harmful (such as a large bee or wasp) she will immobilize it in silk before biting it; if it is inedible then she will simply dislodge it from her web.

Yellow garden spider

After quickly wrapping her prize in silk, the female will return to the web's centre with meal in tow. Feeding consists of regurgitating a digestive enzyme onto her prey – this has the effect of liquefying the prey's body – and she is then able to ingest these nutrients.

Yellow garden spiders mate once a year. When the much smaller male approaches, he gently plucks at the female's web to announce his presence and to communicate to her that he should not be mistaken for prey. But just to be safe, he attaches his own silk dragline to her web so he may retreat if necessary. During mating, the male will die – sometimes he is eaten by the female. When the female is ready to lay her eggs, she lays them on a s silken sheet. The eggs are covered with m layers of silk and eventually wrapped into ball, which is then moved to the centre of the web as this is where the female spends most of her time.

By late autumn, the female will have died but the eggs are capable of overwintering their silk-lined egg sac, and the young spi will emerge and disperse the following sp

Yellow gard
Illustration:

Spider Silk

"Scientists and entrepreneurs have spent millions of dollars trying to copy what spiders accomplish on a budget of dead bugs." – Leslie Brunetta and Catherine Craig, *Spider Silk*, 2010.

All spiders produce silk – a complex protein used to wrap and immobilize prey, line burrows, create webs, and/or encase and protect eggs. Although some insects produce silk or silk-like substances at some point in their life, only spiders produce it from spinnerets (cone-shaped structures) located on the abdomen, and only in spiders is it produced by all individuals – male and female – throughout their lives.

Spiders produce many different types of silk with different, often remarkable, physical properties. Some types of silk are incredibly elastic and can be stretched 300 percent before snapping. Other types are relatively stiff and impressively strong. Tests of tensile strength (the total stress a substance can bear before tearing apart) show that silk can be stronger than tendons and bone, and some silk is as strong as steel and as tough as nylon. Silk is sometimes covered in glue to entrap insects. Other silks lack glue but are still effective traps, due to a wool-like structure that entangles prey that contact the strands.

The production of silk is as amazing as are its physical properties. Silk is formed by secretions from multiple glands located inside the spider's abdomen. Each gland ends in a tiny spigot at the tip of a structure called a spinneret. Silk is formed as these secretions are extruded or pulled out from the spinnerets. Variation in this part of the process can alter the physical properties of the silk.

The extraordinarily light-weight and strong silk of some spiders could be an effective alternative to Kevlar in bullet-proof vests. This has inspired scientists to try to synthesize spider silk for decades. Recent efforts include inserting spider silk genes into goats, which then produce silk in their milk! However, these methods have been largely unsuccessful. No process developed to date can reliably produce spider silk with the properties desired in the quantities needed for the manufacture of silk-based commercial products.

Yellow garden spider wrapping prey

Silk use

Spiders use silk for many different purposes, including lining their burrows, protecting their egg sacs, anchoring themselves with safety lines and, of course, building webs.

Egg sacs

Spider eggs are always enclosed by silk. These egg packages come in two general forms. One form is a loose tangle of silk where the eggs are held in a bundle. For example, Pholcidae (cellar spiders) have only a few silk strands around eggs, which are carried in their chelicerae. The second form is a silken egg sac: the eggs are laid on a thick plate and then enclosed and capped. The eggs are often nestled in a layer of soft silk inside the sac. Egg sac shapes are also variable, with some resembling flattened envelopes, others spherical, and some irregular or glued to the interior walls of silken retreats or burrows. Egg sacs maintain stable conditions for egg development, insulating eggs against fluctuations in humidity and temperature. Sacs may also protect eggs against parasites, as the outer layer of silk is typically quite tough and formed from tightly woven, criss-crossing silk fibres.

Draglines

As spiders move, they release a silk dragline. The dragline provides an attachment point in the habitat as the spider travels, like a safety line in rock climbing. Draglines also allow rapid movement up or down through space. The silk is anchored to a plant or other structure and reeled from the spinnerets, allowing the spider to lower itself from a high point. The spider can also climb back up the dragline, typically using the first two pairs of legs, to return to its starting point. Jumping spiders use the dragline as a tether, and it may help them decelerate before landing at the end of the jump. Draglines are also critical for the construction of orbwebs, where they are used to create the main frame of the web. Finally, draglines of some wandering species contain chemicals (pheromones) that provide important information about gender and mating status, allowing spiders to find a potential mate.

A female jumping spider, *Phidippus clarus*, lands on a leaf, still anchored to her point of departure with a dragline.
Photo: Ken Jones © MCB Andrade

Burrow lining

Burrows are tunnel-like retreats lined with a layer of silk that helps moderate humidity and maintain the integrity of the structure of the tunnel. Species with burrows are often efficient predators of ground-dwelling insects. Some burrow-dwelling spiders lurk below a camouflaged trapdoor that is built of debris glued together and shaped using silk. In many of these species, silk lines also radiate out from the top of the burrow. These aid in the detection of walking prey, which cause vibrations transmitted via the silk to the spider inside the burrow. When an insect approaches, the spider springs out, flipping the trapdoor open. It then grasps the hapless insect with its fangs and drags it back into its burrow as the trapdoor snaps shut.

Common question:
How do spiders move across their own webs without getting stuck?

Answer:
Not all silk is sticky. Spiders can move rapidly across their webs while avoiding contact with the sticky silk. In addition, the structure of a spider's 'feet' (tarsi) allows them to move without adhering to glue droplets because there is minimal surface area in contact with the sticky silk. They are essentially able to 'tiptoe' across their own webs.

Types of Webs

In ecological terms, spiders can be divided into two major groups, the wandering/hunting spiders and the web spinners. Only the web spinners use silk to construct prey-capturing webs.

Spider webs are made up of different types of silk, which vary in their physical properties. While some are sticky and entrap prey using glue, others are not sticky, and function in supporting the web, or entangling prey. Although the concentric circles of the wheel-shaped orbweb may be the most familiar of all web types, there are many other web forms. Other commonly encountered webs include meshwebs, cobwebs, sheetwebs and funnelwebs.

Webs may be built near to the ground, among fallen branches, in all types of plants, high up in forest canopies, or on and in structures built by humans. The position and structure of the web will affect the types of prey likely to be caught (such as flying, jumping or walking insects).

Orbwebs
Orbwebs are considered to be the crowning achievement of web spinning spiders – they are an engineering marvel and are almost invisible in daylight. They consist of three elements: (1) non-sticky frame threads (the external frame of the web), (2) non-sticky radial threads that are attached to the frame threads and converge in the centre or hub of the web (much like spokes on a bicycle wheel) and (3) the sticky catching spiral upon which the spider places many drops of glue. Near the centre of the web is the free zone, an open area which allows the spider to quickly move from one side of the web to the other.

Meshwebs
Meshwebs often have the appearance of small, irregular webs but they are, in fact, quite complex in structure. The framework consists of dry lines of silk laid down in subparallel rows, which are then crossed to form a symmetrical latticework of silk. Sticky, hackled bands of silk are also incorporated into the web's structure. These webs are often found at the tip of twigs, deeply hidden in spun-over leaves, under rocks or stones, in plain sight or on the inner corner of windows. The inhabitants of these webs are among the smallest of spiders, typically less than 5 mm in length.

Cobwebs
Cobwebs are an irregular and loose three-dimensional tangle of silk. The silken threads are so fine that they often go unnoticed. Incorporated into the web's structure is a densely woven silken sheet that the spider often uses as a shelter from the elements. Cobweb weavers may also incorporate leaves or sand grains as building materials. The web is often held in place by a series of long, silken, sticky lines that are pulled tight. As prey encounter these lines, they are held in place by these droplets of glue and, as they struggle to free themselves, the lines snap and they are lifted upwards, deeper into the web, where the spider rushes out to meet them.


© Nancy Collins

Sheetwebs
Sheetwebs typically consist of a flat, sheet-like web of relatively dense webbing that is held in place by vertical suspension threads. Dropping and flying insects fall upon the sheet after being stopped mid flight or when jumping by these suspension threads. The spider typically hangs below the sheet, waiting for its prey. When they are detected, the spider then shakes its web until the prey falls onto the sheet. After a quick bite through the sheet, the spider then pulls its prey through. Repairs to the sheet are completed after the spider has finished eating. Sheetwebs may consist of two sheets, both of which protect the spider from predators above and below.


© Lewis Scharpf

Funnelwebs
Funnelwebs include a sheet of dense silk with a funnel-shaped refuge, located off to the side of the sheet or in its centre, in which the spider can often be seen waiting for prey. A small trip line radiates from the funnel out onto the sheet and transmits vibrations from the sheet back to the spider. Once the spider receives these vibrations, it rushes out of the funnel and, if it determines that the cause of the vibrations is prey, it quickly bites it and drags the prey back into the funnel where it begins to feed. Webs of this type are common on ornamental shrubs, rocky crevices, rotting logs and dense underbrush.


© Royal Ontario Museum

Web Builders

10 Families: 78 Species

Spiders that build a silk snare to entrap prey, and sit and wait for prey to enter their webs

Web-building spiders typically sit with some or all of their legs in contact with the silk strands of the web. These spiders typically have poor eyesight (despite their eight eyes!), but have very sensitive organs for detecting vibration. These vibration-sensitive organs are located on their legs. The vibrations caused by the struggles of an insect caught in the web trigger a rapid response by the spider, which races to the prey and uses silk and venom to subdue the insect before it can escape.

Featured Web Builders: Longjawed orbweaver *(Tetragnatha versicolor)*

© Bev Wigney

Longjawed orbweavers often build their webs in important and fragile ecosystems, such as wetlands and along river systems. Their webs tend to be more horizontal than vertical in orientation, and the centre is open and consists of few radial lines. The spirals are often spaced far apart and are fewer in number than those found in webs made by true orbweavers (Araneidae). Adult spiders sit in the centre of their web and, when disturbed, will either drop off the web or run and hide on surrounding vegetation. When feeling threatened, they can be seen with their front legs stretched out before them on long, thin blades of grass, allowing them to blend in with their environment to avoid potential predators. Males have exceptionally large chelicerae that they use to hold onto the female during mating. After the female has laid her eggs, she may camouflage them to look like bird droppings.

Barn funnel weaver *(Tegenaria domestica)*

© David Fenwick

Barn funnel weavers (also known as domestic house spiders in Europe) are typically dark orange to beige in colour, with striped legs and two black stripes on their cephalothorax. They are agile hunters and, on occasion, will leave their webs in search of prey. When away from their web, they rely on their vision and speed to track down and subdue prey. Their webs are often built in corners inside buildings, with a funnel extending from the flat sheet into the corner – this is where the spider will often lie in wait. When an insect lands in the web and begins to struggle, vibrations are transmitted along the silk thread to the spider. The spider quickly darts out from its funnel, bites its prey and carries it back inside the funnel, where it begins to feed. Under ideal conditions – plenty of food and undisturbed webs – females have been reported to live as long as seven years.

Featured Web Builders:

Cobweb weaver/False widow *(Steatoda triangulosa)*

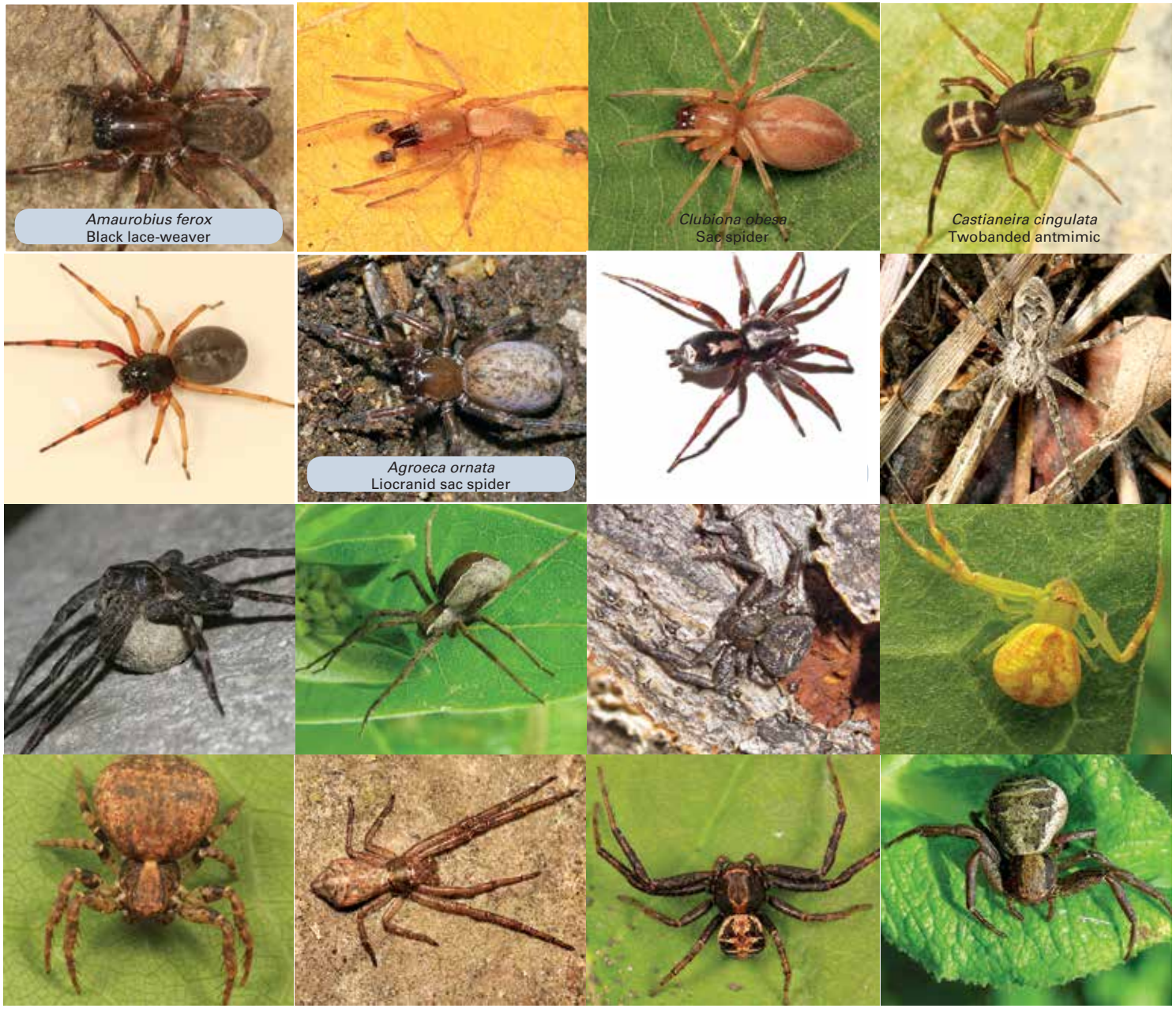
© Tom Mason

The Cobweb weaver is commonly found inside houses, garages and sheds, lying in their irregularly shaped webs – they may take several days, even up to a week, to finish constructing their web. While they prefer to build in dark areas, they will also construct their webs near lights that attract night-flying insects. They lie in wait upside down in their web, waiting for unsuspecting prey. Unlike many other spiders that bite their prey prior to wrapping it in silk, this spider uses specialized combs on its hind legs to quickly wrap its prey in silk. Once its helpless victim has stopped struggling, the spider will bite it. They will feed on a variety of insects and will even feed on other spiders! With their globular body and long, spindly legs, they are often mistaken for the Black widow; however, this cobweb spider is not harmful to humans.

Bowl and doily weaver *(Frontinella communis)*

© Bev Wigney

The Bowl and doily weaver is a small spider that builds a complex web consisting of two parts: an inverted dome called the bowl that is built atop a flat sheet called the doily. The spider hangs under the bowl waiting for small insects to fall into it and entangle themselves in the non-sticky threads of the bowl. The spider then bites its prey through the web. Their webs are often built in weedy fields and shrubs. Both male and female spiders may share the same web. The doily also serves to protect the spider from predators below. When disturbed, the spider can quickly run away into nearby vegetation.



Ambush Predators

10 Families: 64 Species

Camouflaged spiders that lie in wait for wandering prey

Sit-and-wait tactics are also used by ambush predators, but they do not build webs, instead remaining immobile on vegetation until prey approaches. This group includes some of the most impressively camouflaged spiders, as their success as predators depends on being virtually invisible to prey. Although they have eyesight superior to the webweavers, they cannot form images. Many of them have sensitive vibration sensors in each of their eight legs, which are capable of responding to airborne sounds as well as direct vibration.

Featured Ambush Predators: Hacklemesh weaver *(Callobius bennetti)*

© Tom Murray

Hacklemesh weavers prefer dark, concealed places. They can be found underneath stones, in and under decomposing logs and within leaf litter. They have eight eyes arranged in two rows. The cephalothorax is reddish-brown, and their abdomen and legs are lighter in colour. Some species, such as *Callobius bennetti*, have chevron-type patterning on their abdomen. Males are able to survive our cold winters as immature spiders. They molt twice in the spring, mate and die shortly thereafter. Females are able to live for up to two years. Instead of having spinnerets, Hacklemesh weavers have a small silk-producing organ called a cribellum that consists of one or more plates with thousands of tiny spigots. The silk that is produced is so fine that insects are easily trapped in it without the need for any glue on the silk.

Sixspotted fishing spider *(Dolomedes triton)*

© Richard Orr

Fishing spiders are quite similar in appearance to wolf spiders. One way to tell them apart is that the female fishing spider carries her egg sac underneath her chelicerae, whereas a female wolf spider carries her egg sac under her abdomen. When not on the prowl, females build a nursery web in which they hang their egg sac. They wait nearby and defend it from any potential predators. With their long, outstretched legs, fishing spiders are capable of floating on top of still or slow-moving water. Despite being fairly large spiders, they do not break the surface tension of the water. They feed upon a variety of animals within the water, including small fish, insects, frogs and tadpoles, and will even grab flying insects that have fallen onto the water and are trapped on its surface. When threatened, they hide among aquatic vegetation or they dive under the water to escape nearby predators.

Featured Ambush Predators: Goldenrod crab spider *(Misumena vatia)*

Goldenrod crab spiders are capable of changing their colour to yellow or white, depending on the flower upon which they are perched. With their outstretched forelegs and general crab-like posture, they patiently wait to ambush any insect that approaches. But once prey is within range, the spider acts with incredible speed. They are formidable ambush predators and will capture insects ranging in size from small flies to large bumble bees. If you see an insect that appears to be at an odd angle in a flower, chances are it has been captured by one of these spiders. Females are much larger in size than males (8 mm versus 3 mm long). While capable of spinning silk, they don't use it for capturing prey but for protecting their eggs. Males will use silk to immobilize the female prior to mating – after all, mating can be a risky business!

© Bev Wigney

Yellow sac spider/Black-footed spider *(Cheiracanthium mildei)*

Yellow sac spiders where introduced from Europe to North America in the 1940s. They are small, pale spiders with dark fangs that are common inside and outside of homes. Black-footed spiders, as their name suggests, have black "feet". They tend to be nocturnal and are formidable hunters of insects – they often spend daylight hours resting in their silken bivouac that can be seen in corners between ceilings and walls. Yellow sac spiders have often been believed to be responsible for bites that have led to mild necrosis (blisters and lesions) but recent evidence indicates that this spider should not be considered to be of medical concern.

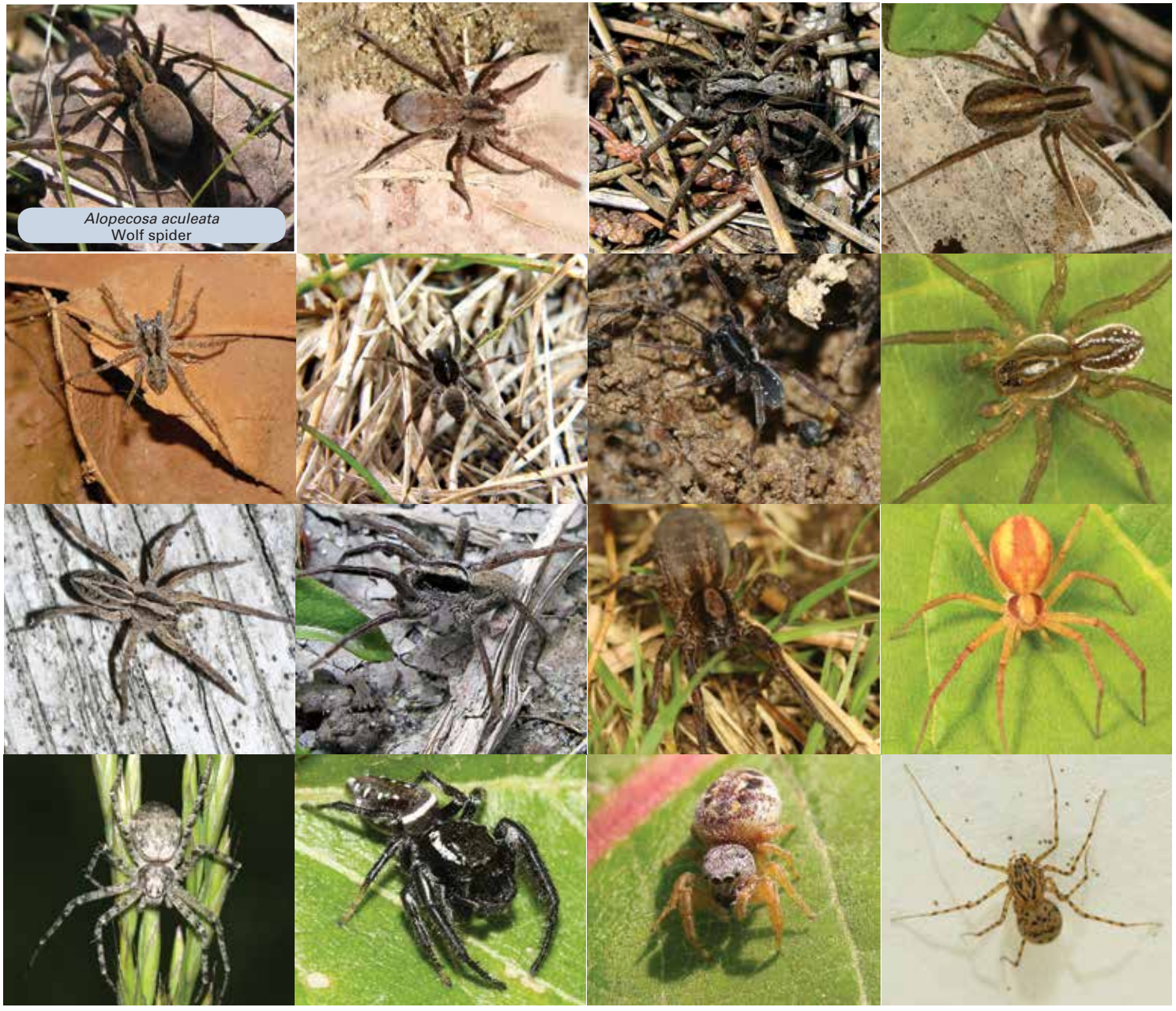
© Bo Zaremba

Active Predators

5 Families: 58 Species

Spiders that seek out or stalk their prey

Unlike the webweavers and ambush predators, active hunters are very mobile, have the most developed eyesight of any spiders, and have the cognitive abilities to match. Active predators roam through their habitat, seeking prey, which they track and attack. Jumping spiders (Salticidae) may well be the most impressive of the active hunters. These spiders have large, forward-facing eyes that are able to form true images. They use their vision to track prey. Most impressive is their ability to stalk prey while avoiding obstacles in their path. They do this by anticipating where the prey will move even while it is out of sight, a skill not often demonstrated in invertebrates.



Featured Active Predators:
Woodlouse hunter
(Dysdera crocata)

© Mike VanValen

The Woodlouse hunter feeds exclusively on woodlice (also known as pill bugs, sow bugs or roly-polys). They have a bright red cephalothorax and lighter yellow-brown abdomen. Among their distinguishing features are their oversized chelicerae, which are strong enough to pierce the armour-like exoskeleton of a sow bug. Woodlouse hunters spend the day in a silken cocoon, usually under logs, emerging at night to hunt their prey – they do not use webs to capture their prey. Adults are able to survive through the winter. In the spring, females lay about 70 eggs in their retreat. The young spiderlings will stay with the female for a short period of time before venturing out on their own.

Zebra jumper
(Salticus scenicus)

© Bev Wigney

Zebra jumpers are often found on walls, fences, window frames and tree trunks. They are the only spiders known to see in colour and they use their large front eyes to locate prey. Small insects are carefully stalked – the spider moves very slowly until it determines it is close enough to jump on top of it. A dragline of silk trails the spider; this is a safety measure that ensures the spider is not injured if they are knocked over or fall. Should this happen, they can quickly climb back up this safety line. When it comes to mating, a male will carefully wave his front legs in front of the female to get her attention and to communicate to her that she should not mistake him for food.

Featured Active Predators:

Wolf spider
(Hogna helluo)

© Lewis Scharpf

Wolf spiders tend to be solitary in nature. They are strong, agile hunters with good eyesight. Their eight eyes are arranged in three rows. The first row consists of four small eyes, the middle row consists of two large eyes, and the top row consists of two medium-sized eyes. Most species are nocturnal; if you go out at night and shine a light on the ground, and you see small lights reflecting back at you, you are probably looking at a wolf spider. Many species actively search for prey, chasing it down and pouncing upon it. Females can be seen with their egg sacs attached to their spinnerets at the end of their abdomen. If you see a similar spider carrying an egg sac in its mouth, then it is probably a Fishing spider (Pisauridae). Newly hatched spiderlings crawl up onto the female's abdomen and stay there until they are ready to strike out on their own.

Slender crab spider
(Tibellus oblongus)

© Bev Wigney

The Slender crab spider is not to be confused with the more robust crab spiders of the family Thomisidae. Unlike thomisid crab spiders, slender crab spiders do not lie in wait in flowers for their prey. Instead they actively hunt down their food. Two distinguishing features of this spider are its long slender abdomen and second set of elongate legs, which are longer than its first set of legs. While at rest on long blades of grass, they position their first two pairs of legs straight out in front of them, their third set to their sides holding onto the grass blade and their fourth set stretched backwards. When disturbed, they can be seen running in a sideways motion – much like true crabs run.

Non-Native Species

This section highlights three of the 24 species of spiders that have been introduced to the Toronto Area.

Cross orbweaver *(Araneus diadematus)*

The Cross orbweaver is an orb-weaving spider native to western Europe that can now be found in the northern regions of the United States and adjacent areas of Canada, as well as Asia and Japan. Cross orbweavers are most frequently encountered from July to late autumn and begin to disappear after the first frost of the season. Females lay their eggs and wrap them into a silk-lined egg sac that is capable of withstanding our harsh winters. The following spring, the spiderlings emerge and quickly disperse.

This species has a distinctive appearance. The patterning on the abdomen consists of alternating light and dark, brownish-beige bands, with cream-coloured spots that give the appearance of a cross. Their legs also have alternating light and dark-coloured bands.

A female is larger than her male counterpart and her abdomen is considerably larger than her cephalothorax. Females are often found hanging upside down in the center of their webs, lying in wait for flying insects. Their webs are spun in gardens, across paths, among shrubs and trees, and even in doorways and windows. They will feed on a variety of insects ranging in size from small flies to large grasshoppers and moths. Once an insect lands in the web, the female quickly rushes out and subdues it by wrapping it in silk. She will also bite it and inject venom into her prey – her venom paralyzes but does not kill the captured insect.

Although they are formidable predators of insects, they are harmless to humans. Their first response to being touched is to flee, by either running to the edge of their web and hiding in a covered spot or by dropping down from their web by means of a dragline of silk. Given the number of insects that they feed upon, these spiders are truly beneficial in controlling insect pests.

Longbodied cellar spider *(Pholcus phalangioides)*

Often misnamed “Daddy longlegs”, this spider is found in basements across the city. It is easily recognized by its long legs on a small body, sitting quietly in a cobweb-like web in an upper corner of a dark room. If you blow on one, it proceeds to vibrate rapidly in its web for several seconds before it calms down.

Longbodied cellar spiders have been recorded in Toronto for many years and are common in most cities in North America. A cosmopolitan species known as far away as New Zealand, they probably arrived in North America (on several occasions) in luggage from Europe. Able to survive only indoors in our area, their origins are assumed to be tropical.

Feeding on insects and other house-dwelling arthropods, this species is especially lethal to other spiders. If food is plentiful, they may have interconnecting webs covering a ceiling. However, should the food supply decrease, then a neighbouring spider will become a quick meal. Their long legs and method of hunting give them an advantage over shorter legged prey. It can honestly be said that these spiders would not survive in a home if food was not available. Being an indoor dweller, Longbodied cellar spiders are capable of reproducing at any time of year.

One urban myth would have us believe that this is the “Daddy longlegs” that has the deadliest venom of any spider. This rumour comes from the fact that they are capable of killing and feeding on spiders such as the Red back of Australia (a Black widow). In fact, the venom is quite mild and not dangerous to humans.

Spitting spider
(Scytodes thoracica)

Spitting spiders are slow-moving and small, ranging in size from 3-6 mm. Unlike most spiders that have eight eyes, this species only has six. Its body is light in colour with a dark, symmetrical pattern on its cephalothorax, dark lines and spots on its abdomen and dark bands on its legs. Found primarily in the southern hemisphere, this species can now be found in the Toronto area.

As with other spiders, its venom gland is located in its cephalothorax. However, unlike other spiders, this gland is divided into two parts: the front section produces venom and the back produces a sticky, glue-like adhesive.

When the spider gets close to an insect, it judges the remaining distance between itself and its potential meal with the use of its long forelegs, all the while being very careful not to touch its prey. The spider then squeezes the muscles in its cephalothorax and, from its fangs, "spits" out in a zig-zag pattern a mix of silk and adhesive upon its hapless victim, in effect gluing it in place. This serves two purposes: it prevents its potential meal from escaping, while large prey that might be harmful to the spider are quickly immobilized so they can't harm the spider.

Once its prey is subdued, the spider slowly approaches it, injects venom into it by biting it, then moves back and waits. If the insect continues to struggle, it carefully moves back in and bites it again until its meal is completely immobilized, after which it can begin its feast. This behaviour makes this spider truly remarkeable in the manner in which it captures prey.

A Chronology of the Toronto Spider Year

WINTER

There is no season during which spiders can't be found, even outside, although one may have to look a little closer when snow is on the ground. The first heavy frosts have killed off many of the annual species and the overwintering forms have found shelter that will protect them from the worst weather. Indoors, of course, little has changed. In cooler basements activity will slow down but as long as they don't freeze, spiders will survive.

But the winter can hold more surprises. A myriad of spiders dwell in cracks, under bark, nestled into grass or leaf litter, or any other shelter. The smallest may be overwintering in their egg sacs, as eggs or as newly hatched spiderlings, but they won't come out until spring. The larger individuals take longer periods to warm up, so they also may not move. The small active hunters will be the first to react to a warming trend. To survive, some species find cover where they won't freeze, whereas others are actually capable of withstanding freezing. Spiders stop eating and may even purposely become dehydrated. In this way, freezing does not damage them. Once the weather warms up, they rehydrate and look for a meal. In some cases, it has been shown that spiders can sometimes gain weight over the winter.

On short, sunny days when the temperature hovers around 0°C, a watchful eye can find those small creatures moving around in areas where the wind hasn't lowered the temperature. The easiest spiders to find are the small wolf spiders in the genus *Pardosa*. They can be seen on south-facing grassy slopes, sometimes walking across the snow. At other times, other species appear, such as the small black ground spiders in the family Gnaphosidae.

Wolf spider, *Hogna helluo*
Illustration: Tiffany Yau

SPRING

As the days grow longer and the weather turns warmer, spiders are among the first invertebrates to become active. The small wolf spiders and ground spiders are the first that one will see. They have rehydrated and are now on the hunt. Many insects must be consumed before a spider can store enough fat to produce large quantities of eggs. By the end of April, large orbwebs will appear around windows or back door lights. Adult and sub-adult orbweavers have emerged from hiding, and have set up their traps to catch spring midges and overwintered flies. Most often seen are species in the genus *Larinioides*. This is also the time for a visit from one of the largest spiders in Toronto – *Dolomedes* spp. – our most widespread nursery web spider. Many species of *Dolomedes* wander about looking for the ideal site to feed and mature. Some leave the shelter of their wooded ravines and end up in suburban backyards. This wandering sometimes brings the spider to an open window or a crack under a door. The house owner gets a large surprise as this spider, with its 8-cm leg span, crosses the floor.

This is also the time that eggs laid the previous summer begin to hatch. Thousands of newly emerged spiderlings leave the comfort and shelter of their egg sacs. Sometimes, you can observe them in a little clump near the egg sac before they disperse. Soon, one leaves, trailing a thin layer of silk, followed by others. When they reach the top of a post, building or bush, they set a strand of silk loose into the breeze and balloon away. By the end of the spring, all the spiders are active and ready for summer.

Fishing spider, *Dolomedes tenebrosus*
Illustration: Tiffany Yau

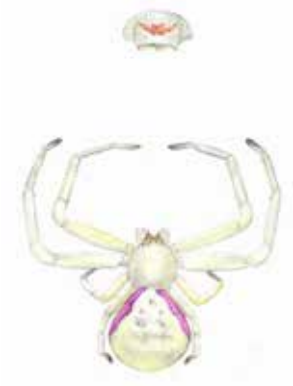
SUMMER

Summer is the peak time for spiders. Mosquitoes, flies, grasshoppers and all other sorts of prey are active and reproducing. The weather is warm and the morning dew is supplying them with all the moisture they need. Spiderlings mature into reproductive adults who seek out mates. Different species use every available micro habitat. Webs are being spun and traps set. The spiders are doing their job of controlling the ever-present insects. Grass wolf spiders in the genus *Pardosa* scurry from beneath one's feet and funnel weavers and sheetweb weavers disperse across short grass meadows and into the forest edge. In wet meadows, horizontal orbwebs of Long-jawed spiders can be observed. Turning a rock may expose a ground spider while, on the wall of a house, a Zebra jumper may be seen feeding on his most recent fly. In the early summer, a walk through the meadow may reward you with a Starbellied orbweaver. Milkweed is a great site to find one of the larger jumping spiders, *Phidippus clarus*, plus some of its smaller relatives in the genus *Pelegrina*. A look through the tall grasses will eventually show you an unusual web holding a blade of grass in a peculiar triangular shape. This is the home of some of our native sac spiders in the genus *Clubiona*. On forest leaves or on

protected rock faces, Comb-footed spiders spin their tangled webs. Some use a dead leaf in the web as a refuge. In the forest, species in the genus *Cyclosa* are hiding along the row of dead carcasses they use for camouflage. On forest floors, larger Wolf spiders, Ground spiders and Hacklemesh spiders can be found. Even the ends of dead twigs and branches hold the tiny webs of mesh spiders.

Summer is also the time of the flower spider. Look closely at a black-eyed Susan or a white daisy and you may be lucky enough to find one of a couple of genera of crab spiders that wait patiently for their next meal. They are so well adapted that they are capable of changing colour from white to bright yellow, depending on the flower on which they lie in wait for prey. They become especially visible on purple vetch, turning white against the deep purple of the flower. Other crab spiders and running crab spiders can also be seen walking on flat surfaces, or stretched along twigs.

As the summer wanes, the spiderlings of spring are growing. Shamrock spiders, ranging from white to sunset orange to deep red, have grown to their full potential. This is one of several members of the genus *Araneus* found throughout the area. Our magnificent Yellow garden spiders can also be seen at this time of year. Many of the females look particularly large, as this is the time when eggs are laid.



Goldenrod crab spider,
Misumena vatia
Illustration: Tiffany Yau

FALL

Early fall is a good time to see spiders. Many species have reached maturity and are easier to see. The Yellow garden spider is a great example. Having spent the summer growing, the female has reached maturity, mated and now sits in her web in all her glory. She will eat as much as possible to store nutrients for her eggs. Occasionally, she leaves the web to lay an egg mass in a protected spot. But soon she either returns to her web or makes a fresh one. She continues this cycle until the cold or a predator takes her. She does not overwinter. Her line is carried on by the eggs that she has carefully sheltered. This method of survival is repeated by many species.

Other species are also preparing for winter. Some have hatched over the summer and others have been mature for a year or more. Many are still juveniles. In early fall, these spiders can be seen on the move, feeding or looking for winter refuges. Some of these are arriving in houses or garages in their search for the perfect home. As the days shorten and the evenings get colder, movement slows. Frost at night starts to reduce the number of spiders that have not found appropriate shelter. Insect prey and predators begin to diminish and life slows down. By late fall, all that may be seen outdoors are old webs in disrepair. The spiders are ready for another winter.

Indoors, things are a little different. The spiders have been well fed all summer. Life has been productive. Beetles, flies and a variety of crawling insects are coming indoors, attracted to the heat and shelter of the building. Many of these invertebrates wander into webs, winding up as a meal for these indoor spiders. Also arriving are the fall spiders. This is the best season to see Yellow sac spiders.

Yellow sac spider
Cheiracanthium mildei
Illustration: Tiffany Yau

They are busily moving over walls and ceilings, looking for the next meal or creating little hammocks where walls meet ceilings. As the days become shorter and fewer prey venture indoors, the spiders' diets start to change. Many of the indoor specialists are very adept at eating their kin. The first spiders to go are those that have ventured indoors for shelter but are more adapted to the outdoor life. They are out of their element. Then, as winter approaches, the residents begin to feed on one another. Perhaps the best at this is the Longbodied cellar spider. Their long legs and delicate webs give them a reach that other spiders don't have. These are often the last spiders to be seen as the cold finally arrives outside. Indoors, activity continues at a slower pace as winter returns.

Checklist of the Spiders of the Toronto Area (2012)

25 families: 200 species,
24 introduced species, marked with an asterisk (*)

Note: This checklist contains only published spider records. The real number of species of Toronto is probably three or even four times larger.

Web Builders

Agelenidae (Funnel weavers)

- ☐ *Agelenopsis emertoni*
- ☐ *Agelenopsis utahana*
- ☐ **Tegenaria domestica*

Araneidae (Orbweavers)

- ☐ *Acanthepeira stellata*
- ☐ *Araneus cavaticus*
- ☐ *Araneus corticarius*
- ☐ **Araneus diadematus*
- ☐ *Araneus marmoreus*
- ☐ *Araneus nordmanni*
- ☐ *Araneus trifolium*
- ☐ *Araniella displicata*
- ☐ *Argiope aurantia*
- ☐ *Argiope trifasciata*
- ☐ *Cyclosa conica*
- ☐ *Eustala anastera*
- ☐ *Hypsosinga pygmaea*
- ☐ *Hypsosinga rubens*
- ☐ *Larinioides cornutus*
- ☐ *Larinioides patagiatus*
- ☐ **Larinioides sclopetarius*
- ☐ *Mangora gibberosa*
- ☐ *Mangora placida*
- ☐ *Metepeira labyrinthea*
- ☐ *Neoscona arabesca*
- ☐ *Neoscona pratensis*
- ☐ **Zygiella atrica*

Dictynidae (Meshweavers)

- ☐ *Cicurina placida*
- ☐ *Emblyna annulipes*
- ☐ *Emblyna sublata*

Hahniidae (Hahniid spiders)

- ☐ *Antistea brunnea*
- ☐ *Hahnia cinerea*
- ☐ *Neoantistea agilis*
- ☐ *Neoantistea magna*

Linyphiidae (Dwarf and sheetweb weavers)

- ☐ *Baryphyma trifrons*
- ☐ *Baryphyma trifrons affine*
- ☐ *Bathyphantes pallidus*
- ☐ *Diplocephalus cristatus*
- ☐ *Diplostyla concolor*
- ☐ *Frontinella communis*
- ☐ *Hypselistes semiflavus*
- ☐ *Improphantes complicatus*
- ☐ **Lepthyphantes leprosus*
- ☐ **Megalepthyphantes nebulosus*
- ☐ *Neriene clathrata*
- ☐ *Neriene radiata*
- ☐ *Neriene variabilis*
- ☐ *Pityohyphantes costatus*
- ☐ *Tennesseellum formica*

Pholcidae (Longbodied cellar spiders)

- ☐ **Pholcus phalangioides*

Tetragnathidae (Longjawed orbweavers)

- ☐ *Glenognatha foxi*
- ☐ *Leucauge venusta*
- ☐ *Meta ovalis*
- ☐ *Pachygnatha autumnalis*
- ☐ *Pachygnatha dorothea*
- ☐ *Pachygnatha tristriata*
- ☐ *Pachygnatha xanthostoma*
- ☐ *Tetragnatha caudata*
- ☐ *Tetragnatha dearmata*
- ☐ *Tetragnatha extensa*
- ☐ *Tetragnatha guatemalensis*
- ☐ *Tetragnatha laboriosa*
- ☐ *Tetragnatha straminea*
- ☐ *Tetragnatha versicolor*

Theridiidae (Cobweb weavers)

- ☐ *Enoplognatha caricis*
- ☐ **Enoplognatha latimana*
- ☐ **Enoplognatha ovata*
- ☐ *Latrodectus variolus*
- ☐ *Neospintharus trigonum*
- ☐ **Parasteatoda tabulata*
- ☐ **Parasteatoda tepidariorum*
- ☐ *Rugathodes sexpunctatus*
- ☐ **Steatoda bipunctata*
- ☐ **Steatoda borealis*
- ☐ *Steatoda triangulosa*
- ☐ *Theridion differens*
- ☐ *Thymoites unimaculatus*

Theridiosomatidae (Ray orbweavers)

- ☐ *Theridiosoma gemmosum*

Uloboridae (Hackled orbweavers)

- ☐ *Uloborus glomosus*

Ambush Predators

Amaurobiidae (Hacklemesh weavers)

- ☐ **Amaurobius ferox*
- ☐ *Callobius bennetti*

Anyphaenidae (Ghost spiders)

- ☐ *Anyphaena celer*
- ☐ *Wulfila saltabundus*

Clubionidae (Sac spiders)

- ☐ *Clubiona abboti*
- ☐ *Clubiona bryantae*
- ☐ *Clubiona canadensis*
- ☐ *Clubiona johnsoni*
- ☐ *Clubiona kastoni*
- ☐ *Clubiona maritima*
- ☐ *Clubiona mixta*
- ☐ *Clubiona moesta*
- ☐ *Clubiona obesa*
- ☐ **Clubiona pallidula*
- ☐ *Clubiona pygmaea*
- ☐ *Clubiona riparia*
- ☐ *Clubiona spiralis*

Corinnidae (Antmimic spiders)
- ☐ *Castianeira cingulata*
- ☐ *Castianeira descripta*
- ☐ *Castianeira longipalpa*
- ☐ *Phrurotimpus alarius*
- ☐ *Phrurotimpus borealis*
- ☐ *Scotinella minnetonka*
- ☐ *Scotinella pugnata*
- ☐ *Trachelas tranquillus*

Gnaphosidae (Stealthy ground spiders)
- ☐ *Drassyllus depressus*
- ☐ *Drassyllus eremitus*
- ☐ *Drassyllus niger*
- ☐ *Gnaphosa parvula*
- ☐ *Haplodrassus hiemalis*
- ☐ *Haplodrassus signifer*
- ☐ *Herpyllus ecclesiasticus*
- ☐ *Micaria longispina*
- ☐ *Micaria porta*
- ☐ *Micaria pulicaria*
- ☐ *Sergiolus decoratus*
- ☐ *Sosticus insularis*
- ☐ **Urozelotes rusticus*
- ☐ *Zelotes fratris*
- ☐ *Zelotes hentzi*

Liocranidae (Liocranid spiders)
- ☐ *Agroeca ornata*
- ☐ *Agroeca pratensis*

Miturgidae (Prowling spiders)
- ☐ **Cheiracanthium mildei*

Nesticidae (Cave cobweb spiders)
- ☐ **Nesticus cellulanus*

Pisauridae (Nursery web spiders)
- ☐ *Dolomedes scriptus*
- ☐ *Dolomedes tenebrosus*
- ☐ *Dolomedes triton*
- ☐ *Pisaurina brevipes*
- ☐ *Pisaurina mira*

Thomisidae (Crab spiders)
- ☐ *Bassaniana utahensis*
- ☐ *Mecaphesa asperata*
- ☐ *Misumena vatia*
- ☐ *Misumessus oblongus*
- ☐ **Ozyptila praticola*
- ☐ *Tmarus angulatus*
- ☐ *Xysticus alboniger*
- ☐ *Xysticus bicuspis*
- ☐ *Xysticus discursans*
- ☐ *Xysticus elegans*
- ☐ *Xysticus emertoni*
- ☐ *Xysticus gulosus*
- ☐ *Xysticus luctans*
- ☐ *Xysticus pellax*
- ☐ *Xysticus punctatus*

Active Predators

Dysderidae (Cell spiders)
- ☐ **Dysdera crocata*

Lycosidae (Wolf spiders)
- ☐ *Alopecosa aculeata*
- ☐ *Alopecosa kochi*
- ☐ *Arctosa emertoni*
- ☐ *Arctosa littoralis*
- ☐ *Arctosa rubicunda*
- ☐ *Geolycosa domifex*
- ☐ *Gladicosa gulosa*
- ☐ *Hogna baltimoriana*
- ☐ *Hogna frondicola*
- ☐ *Hogna helluo*
- ☐ *Pardosa concinna*
- ☐ *Pardosa distincta*
- ☐ *Pardosa fuscula*
- ☐ *Pardosa lapidicina*
- ☐ *Pardosa mackenziana*
- ☐ *Pardosa milvina*
- ☐ *Pardosa modica*
- ☐ *Pardosa moesta*
- ☐ *Pardosa saxatilis*
- ☐ *Pardosa xerampelina*
- ☐ *Pirata aspirans*
- ☐ *Pirata insularis*
- ☐ *Pirata minutus*
- ☐ *Pirata montanus*
- ☐ *Pirata piraticus*
- ☐ *Pirata zelotes*
- ☐ *Schizocosa avida*
- ☐ *Schizocosa crassipalpata*
- ☐ *Schizocosa ocreata*
- ☐ *Schizocosa saltatrix*
- ☐ **Trochosa ruricola*
- ☐ *Trochosa terricola*
- ☐ *Varacosa avara*

Philodromidae (Running crab spiders)
- ☐ *Philodromus cespitum*
- ☐ *Philodromus exilis*
- ☐ *Philodromus pernix*
- ☐ *Philodromus placidus*
- ☐ *Philodromus praelustris*
- ☐ *Philodromus rufus vibrans*
- ☐ *Thanatus striatus*
- ☐ *Tibellus maritimus*
- ☐ *Tibellus oblongus*

Salticidae (Jumping spiders)
- ☐ *Attidops youngi*
- ☐ *Evarcha hoyi*
- ☐ *Habronattus decorus*
- ☐ *Naphrys pulex*
- ☐ *Paraphidippus aurantius*
- ☐ *Pelegrina insignis*
- ☐ *Pelegrina proterva*
- ☐ *Phidippus audax*
- ☐ *Phidippus clarus*
- ☐ *Phidippus princeps*
- ☐ *Platycryptus undatus*
- ☐ **Salticus scenicus*
- ☐ **Sitticus fasciger*
- ☐ *Tutelina similis*

Scytodidae (Spitting spiders)
- ☐ **Scytodes thoracica*

Where to Find Spiders in Toronto

From the tops of the city's highest buildings to the interiors of residential houses, from urban gardens to fields of wildflowers, from the treetops of forests to the edges of flowing streams, spiders can be found almost anywhere. There are species that are adapted to living inside buildings and others that are adapted to living outside. Yet, they all have one thing in common: they are remarkable in their ability to utilize a wide range of habitats, both urban and rural.

Buildings

Certain species are quite adept at living indoors and prefer to find places that we tend to overlook. The Longbodied cellar spider, *Pholcus phalangioides*, prefers dark areas, such as basements, but can also be found in upper, open corners of rooms. The Barn funnel weaver, *Tegenaria domestica*, tends to prefer damper areas, such as cellars and laundry rooms. Our Common house spider, *Parasteatoda tepidariorum*, usually resides in corners in rooms, basements and garages. Often observed in the fall, the translucent Yellow sac spider, *Cheiracanthium mildei*, is often identified by finding a small, silken hammock adhered to the edges of ceilings and walls; it can also be found in hanging curtains. The Boreal cobweb weaver, *Steatoda borealis*, can often be found living inside sheds or garages. The Zebra jumper, *Salticus scenicus*, is found on window sills or sunny walls of a house. Although small, sooner or later this alert little hunter catches the eye of every child. Like all jumping spiders, it exudes a sense of intelligence as it looks back at the human observer.

There are also species that do well around buildings, bridges, and other structures. The ability of these spiders to balloon allows them to attain incredible heights. Orbweavers in the genus *Larinioides* are quite comfortable on a window 20 storeys high.

Some outdoor species may be seen inside on occasion, but most of these are accidental occurrences where the spiders have made their way under cracks or have arrived as hitchhikers on items brought into buildings. These species don't last long inside and usually end up as a meal for the indoor dwellers.

Commom house spider
© Tom Murray

Barn funnel weaver
© John Sloan

Boreal cobweb weaver
© Tom Murray

Furrow orbweaver
© Tom Murray

Gardens

Gardens and green roofs attract a wide variety of insects that serve as prey for spiders. A commonly encountered garden spider is the Cross orbweaver, *Araneus diadematus*. In shrubs, one can often find the beautiful Yellow garden spider, *Argiope aurantia*, with its orbweb showing the characteristic stabilimentum. If the web lacks this dense silk design in the centre, then its inhabitant may be the Shamrock spider, *Araneus trifolium*. Look closely on the tops of dead-heads of last year's goldenrod or Queen Anne's lace and you will find tiny meshweavers of the family Dictynidae.

Many species of spiders can be found in rock gardens, log piles or compost sites. These are the homes of ambush predators, such as ground spiders, wolf spiders, jumping spiders and the Woodlouse hunter, with its massive chelicerae. These are the hunters of soil insects. They can be fast, quick to react, and in some cases, have excellent eyesight, but they are very often overlooked, primarily because they prefer to be hidden. While spiders are predators and are dominant over most creatures their own size, they are quite a delicacy to small birds and are constantly under threat from their number one enemy: the wasps.

Yellow garden spider
© Bev Wigney

Shamrock spider
© Bev Wigney

Woodlouse hunter
© Kerry Matz

Sheetweb weaver
© John Sloan

Even healthy lawns – as long as they have not been subjected to pesticides and herbicides – can provide habitats for spiders, and the early morning dew may reveal the webs of sheetweb weavers.

Natural habitats

City parks with old meadows, forests, streams and wetlands contain the largest diversity of our native spiders. On the first warm, sunny days of spring, one can see little dark spiders running across flattened dead grass or patches of snow. These could be ground spiders, but most often are wolf spiders in the genus *Pardosa*.

In well-established meadows, the Nursery web spider, *Pisaurina mira*, may be found guarding spiderlings in a web built especially for them. By the end of July, orbweavers of several genera have become large enough to be easily seen. Among tall grasses, an interesting group of spiders dwells. Sac spiders in the genus *Clubiona* fold blades of grass into a triangular shape and hold it in place with silk to form a characteristic abode. Sometimes, they also use milkweed leaves. In the meadow, milkweed is probably the best plant to search for spiders,

as several jumping spiders find them the perfect place to live and hunt. Some large crab spiders in the genus *Xysticus* and running crab spiders, such as *Tibellus oblongus*, *Thanatus striatus* and *Philodromus* spp., also dwell on milkweed. The spider that people are most often pleased to see is the Goldenrod crab spider, *Misumena vatia*. With its outstretched forelegs, this spider lies in wait on a flower to snare unsuspecting prey. In the shorter meadow grasses, wolf spiders of the genus *Pardosa* can be seen actively hunting.

Forests and ravines can also be treasure troves of spider diversity. Most spider families seem to have species that find the protected habitat of a forest to their liking. Spiders may be found in the foliage, on the bark or under the abundant groundcover littering the forest floor. Orbweavers, sheetweavers, wolf spiders, nursery web spiders, ground spiders, jumping spiders, native comb-footed spiders, long-jawed spiders and the unusual antmimic spiders in the family Corinnidae can also be found there.

Nursery web spider

Ground crab spider

Hammock spider

Sixspotted orbweaver

Again, it is the early morning dew that really gives away the presence of untold numbers of spiders. Look for sheetweb weavers, such as *Neriene clathrata* and *Pityohyphantes costatus,* in the trees. Orbweavers, such as the Sixspotted orbweaver, *Araniella displicata*, or the Marbled orbweaver, *Araneus marmoreus*, are also forest inhabitants. Forests also provide habitats for jumping spiders, such as the well-camouflaged Tan jumping spider, *Platycryptus undatus*.

In the sedges and grasses along the streams, one can find several species of Longjawed orbweavers of the genus *Tetragnatha*. On rocks by rivers, lakes and open water, look for dock spiders, fishing spiders or nursery web weavers in the genus *Dolomedes*.

Widows, Hobos and Recluses – Separating Fact from Fiction

Experts at the Toronto Zoo, Royal Ontario Museum, and University of Toronto are often asked to identify spiders found in groceries, in homes and in back yards. The vast majority of spiders that are submitted for identification are harmless to people. However, there are two species that may be of medical concern: the Northern Black widow, *Latrodectus variolus*, and the Western Black widow, *Latrodectus hesperus* – the former is native to Ontario, the latter is not.

Although not reported from within the city limits, Northern Black widows have been found in surrounding areas, hanging upside down in strong cobwebs outdoors, or sometimes in old sheds. Preferring dark areas, these spiders will usually remain in their webs, lying in wait to trap their next insect meal. Adult females can be identified as relatively small (about the size of a grape), bulbous, black spiders with a red hour glass – which is usually broken in the middle – on the underside of their abdomen. Males are much smaller, mostly white, and rarely seen. Another species, the Western Black widow, may occasionally be found in grapes imported from the west coast, but there are no confirmed cases of this species living in the Greater Toronto Area. Fortunately, both species are shy and non-aggressive – they will only bite when threatened, particularly if protecting an egg sac – and are rarely encountered in Ontario. In both species, only females are likely to bite and the severity of the reaction to their bite depends on the age and physical condition of the person. Young children, immuno-compromised individuals and the elderly tend to be affected more than healthy adults.

Northern Black widow,
Latrodectus variolus
© Tom Murray

Western Black widow,
Latrodectus hesperus
© Tom Murray

Another species that has unfairly earned a bad reputation is the Hobo spider, *Tegenaria agrestis* (which means weaver of the fields). Like most spiders, Hobos are likely to bite only in self-defense. Native to Europe, they first appeared in Seattle, Washington, in the 1930s. Until recently, the only Canadian records of Hobo spiders were in British Columbia and Alberta; however, recent spider surveys in the Rouge Park and in Guelph have uncovered Hobos in Ontario. In the 1990s, this species became infamous as its range expanded and it was blamed for bites that caused minor tissue necrosis (sores). However, research has not shown that the venom of this species is capable of causing harm to people. Therefore, statements that it should be considered of medical concern are unfounded.

The last species that must be mentioned is the Brown recluse, *Loxosceles reclusa*. Bites from this species can cause large, ulcerating sores. While this species is considered to be of medical concern, there has never been a verified record of the Brown recluse occurring anywhere in Ontario.

Local Policy Initiatives

City of Toronto

Protecting and enhancing the natural environment and biodiversity is a high priority for the City of Toronto. The Official Plan is the City's guiding land use planning document. It protects important natural areas and functions, supports biodiversity and requires that the natural environment be taken into account as part of our city building activities.

Toronto's natural heritage features and functions have been mapped and are identified as a natural heritage system on Map 9 of the Official Plan. Most of these areas are located within the extensive network of valleys and ravines that cross our City, along the shoreline of Lake Ontario and in Rouge Park, and are protected by zoning and land use designations. These areas provide habitat for a wide variety of native plants and animals, and help sustain local biodiversity. When new development is proposed in or near the natural heritage system, the proposed development's impact must be evaluated and measures must be identified to protect the system, mitigate negative impacts and improve the system.

Good stewardship supports and enhances biodiversity. The Ravine and Natural Feature Protection Bylaw protects forests and valley slopes by regulating removal of trees and changes to grade.

The City also undertakes a wide range of stewardship activities in parks and natural areas, often in partnerships with other agencies, institutions and community groups. Examples include control of invasive species in ravines and woodlands; naturalization programs; tree planting events; ecological enhancement of existing habitats; creation of new habitats, such as wetlands and meadows; and restoration of rivers and streams.

Initiatives are underway to reduce the impact of the urban environment on biodiversity and the natural environment. Toronto's *Bird-Friendly Development Guidelines* and the "Lights Out Toronto!" campaign identify building design and lighting strategies that reduce migratory bird deaths. The Green Roof Bylaw is creating green spaces on rooftops that support insects and some birds, and have the potential for further biodiversity enhancements. The Toronto Green Standard, which all new development applications are required to meet, includes performance measures that help preserve the urban forest, encourage tree survival and growth, and ensure native species are planted. Collectively, all of these actions reduce the impact of our city building activities on the natural environment, and help protect and increase biodiversity.

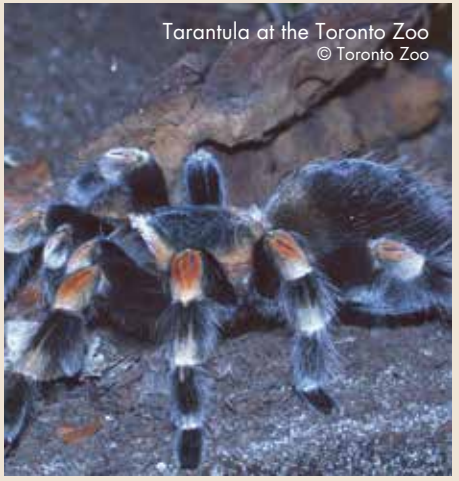
Toronto Zoo

The Toronto Zoo is nestled within Rouge Park, the largest urban wildlife park in the world. Wildlife is the Zoo's business, and every effort is made to conserve habitat and restore areas so that the native species can co-exist with the exotic. In 1986, invertebrates became an integral part of the species diversity on display. Spiders were one of the first groups of invertebrates to be added.

Two goals of the Toronto Zoo are to educate visitors and to conserve our natural heritage. Most of the species displayed are part of self-sustaining populations, with surplus going to zoos and institutes across Canada and around the world. In this way, wild populations are not affected by collecting for zoos, and specimens are available to study behaviour and life histories. With well over a million species of arthropods known to science, and millions more still to be discovered and named, every new piece of information is important in helping us understand how spiders and other arthropods fit into our world.

The Toronto Zoo is constantly changing to maintain its position as a leader in conservation. Native plants have been planted to restore natural habitat and staff have completed biodiversity surveys that help in the planning process. The Toronto Zoo is a member of the Rouge Council and all information gathered is offered to Rouge Park to help it manage the habitat. This is all part of our mandate to conserve habitat and species, and is made possible because of zoo visitors.

More information can be found at: www.torontozoo.com



Tarantula at the Toronto Zoo
© Toronto Zoo

The Toronto Zoo has worked with tarantulas for several years. In the mid 1980s, the zoo was looking at displaying invertebrates; tarantulas were the first group considered since no other zoo was working with this group, although many displayed them. The Toronto Zoo was the first zoo to set up a breeding program that produced tarantulas for their own and other zoos' display requirements. Later, when tarantulas were protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Toronto Zoo became a repository for seized animals, bred and produced these animals for other zoos, and assisted in research that helped identify protected spiders through mapping of their DNA.

The Toronto Zoo and the Royal Ontario Museum thank Dr. Paul D.N. Hebert and all the staff of the Biodiversity Institute of Ontario, University of Guelph, for barcoding services, funded by the Government of Canada through Genome Canada and the Ontario Genomics Institute (2008-OGI-ICI-03) for their support of the BOLD project "Spiders of Toronto" [SPITO].

Biodiversity Surveys: The number of species of spiders that live in Toronto is unclear, and the checklist in this guide is almost certainly an underestimate. In 2010, available records documented 179 species of spiders in Toronto. This list quickly expanded, with collections made on the University of Toronto Scarborough and Toronto Zoo lands, which in turn inspired a partnership, sponsored by the Toronto Zoo, to survey the spiders in Rouge Park. Participants included the Biodiversity Institute of Ontario (using DNA barcoding, accurate identification of collected specimens was achieved) and the Royal Ontario Museum (which added the spiders to its permanent collection). Over the summer of 2011, over 600 additional specimens were collected and 10 species added to the checklist.

How You Can Help

Spiders are all around us. All spiders in Canada are predators that feed on insects and other arthropods, and play a significant role in protecting our crops, ourselves and our homes from pest insects. Yet many people have an uncontrollable fear of spiders (arachnophobia). Arachnophobes may scream at the sight of a spider. Unfortunately, they may also destroy the spider and follow this up with the application of a pesticide likely to be more toxic than any spider in Toronto ever will be. Since very few spiders have venom that affects humans, it is clear that arachnophobia is irrational. Realizing this is the first step to acceptance.

Moving away from arachnophobia and towards tolerance of these helpful, intriguing natural marvels is an easy but important way to help the spider fauna of Toronto. Before destroying the spider you find in your home, consider that spiders only live where they can catch enough food to survive. So ask yourself whether you would rather have one spider in your home, or the many insects it is eating! Still, even a die-hard spider enthusiast may not want a spider in the living room or front entranceway. A simple strategy for solving this problem is to remove the web. If you do this a few times, the spider will move. Since some spider species do not live outside in Canada, putting spiders outside may kill them, except in the early spring. Learning to live with these small animals may be beneficial for us as well as them.

Another way to help the spider fauna of Toronto is by providing your own small patch of spider-friendly habitat. Spiders are extremely diverse in their habits, habitats and activity. Certain species thrive in human-disturbed or artificial habitats (like condos!) but others require older, non-disturbed natural areas in which to hunt and mate. These natural spaces support the widest diversity of spider species. Maintaining diversity is important to healthy ecosystems since different groups of spiders are active at different times of year, different times of day, and catch different types of insect prey. A city that includes islands of spider-friendly habitat in parks, ravines, gardens and green roofs would support a healthy city-wide spider population. This would not require huge efforts and individuals can make a difference. Since most spiders are quite small, even small patches of appropriate habitat – a balcony laden with planters, a small front lawn converted to a garden – can make a considerable difference.

Unfortunately, spiders are sensitive to chemicals used to control "undesirables" in gardens, parks and elsewhere. Chemicals in pesticides (illegal in Toronto), herbicides and fungicides can kill them, reduce their activity levels or cause them to build inefficient webs that simply do not catch prey effectively. Using these chemicals will reduce the natural ability of a spider-rich ecosystem to moderate its own pest population. Avoiding use of these toxins in your home and garden is another way to help the spiders of Toronto thrive. Remember, healthy and diverse spider communities are indicative of healthy and diverse ecosystems.

Running crab spider
© Bev Wigney

Funnelweb spider
© Bev Wigney

Conclusion

Despite our aversion to spiders, we should take a moment and reflect upon the importance of these eight-legged, multi-eyed, silk-spinning arthropods.

We live with a tremendous amount of biodiversity around us, of which spiders are a critical component. To keep our natural areas safe, we need to understand and allow every kind of life to fill its niche, including all varieties of spiders. Spiders are indicators of healthy ecosystems, as they not only feed upon a wide variety of insect pests but are also a source of food for many other animals, including reptiles, amphibians, birds, small mammals and even wasps (in particular the appropriately named spider wasps). Removing spiders from an ecosystem can cause irreparable and long-lasting damage. Fortunately, spiders are still part of Toronto's ecosystems!

Most spiders are not picky when it comes to the type of prey upon which they will feed. The vast majority prey on invertebrates that eat fruits and vegetables that we grow in our gardens or on blooming wildflowers in forests and meadows – in other words, pests. Pesticides not only kill off these unwanted pests, but also their predators. When these chemicals have worn off, flying insect pests can quickly recolonize a garden, but spiders take much longer to return.

Take a moment to observe and admire the diversity of spiders in your environment. Go out to a garden or a park, find a spider on a flower head and lightly touch it. Its immediate reaction is to retreat to safety. Blow on one sitting in the middle of its web and you will likely see it scurry along its silken threads to hide in a nearby plant, or drop to the ground with the aid of its dragline. But if you are a flying insect snared in its web, that's a different story – you will become a nutritious meal for this amazing predator.

We shouldn't fear the spiders that live with us and around us. They are an essential part of Toronto's biodiversity. We should treasure their presence, for not only are they beneficial to us, they contribute to the maintenance of healthy and vibrant ecosystems that we share with them. By simply taking the time to check out your local spaces, you can be inspired to realize just how much life shares our space; such a pasttime gives new meaning to the phrase, "Slow down and smell the roses."

Select Spider Resources

Books

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Smithsonian National Museum of Natural History
www.mnh.si.edu/highlight/sem/spiders.html

Tree of Life – Araneae – Spiders
http://tolweb.org/Araneae

The Spider Myths Site at the Burke Museum – University of Washington
www.burkemuseum.org/spidermyth/index.html

Ohio State University Extension Fact Sheet – Spiders in and Around the House
http://ohioline.osu.edu/hyg-fact/2000/2060.html

Spider Identification, Pictures and Educational Resources
www.spiders.us

Acknowledgements

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Toronto Field Naturalists: **www.torontofieldnaturalists.org**
Toronto and Region Conservation: **www.trca.on.ca**
Toronto Zoo: **www.torontozoo.com**
Biodiversity Institute of Ontario, University of Guelph: **www.biodiversity.uoguelph.ca**
University of Toronto Scarborough: **www.utsc.utoronto.ca**

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Tiffany Yau – Tiffany graduated from the Universityof Guelph, B.Sc., Animal Biology Honours Degree.She started painting when she was five and won a number of competitions. During her studies, she worked with flies and made detailed illustrations for future publications on unidentified species. After graduation, she worked with the spider survey project at the Toronto Zoo.

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