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extract from

Insiders Series: Insects and Spiders

published by

Templar

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Silk is one of the most amazing substances in nature and it plays an important role in the life of all spiders. Silk is not just for making webs–it can be used to wrap up prey, protect eggs, build a shelter, or serve as a safety line. This versatile substance is produced as a liquid inside a spider's silk glands, which open onto one to three pairs of spinnerets at the end of the abdomen. When the liquid silk is drawn out by the back pair of legs, it forms very fine but strong fibers. Spider silk is almost as strong as steel wire of the same width. Some silks are elastic and can be stretched to three times their length before breaking. Spiders can produce as many as eight types of silk, each for a different purpose.

Spinnerets *The tip of each spinneret is covered in tiny nozzles called spigots. The silk is squeezed out of the spigots to form fine fibers that quickly combine in a single thread. The spinnerets are mobile and can knit different types of silk together.*

Fly-fishing

Orb-weavers are a family of spiders that build the familiar spiral-shaped webs found in gardens, fields, and forests all over the world. Most species build their webs at night and hide during the day. Others are active both day and night. Building a web is hard work. Afterward, the spider conserves energy and waits patiently for an insect to fly into its sticky trap.

Sticky situation *This fly has become entangled in the sticky spiral threads of the web. As it struggles, vibrations are sent up the radial threads to the spider waiting at the hub. In an instant, the spider rushes to the prey to inject venom and then wrap it in silk to be dealt with later.*

How to build an orb web

1. A strong horizontal line is anchored at each end. Then the first two radial spokes are added to form the hub.
2. A stabilizing frame is added around the circumference, anchored at several points. Then more radials are added.
3. Starting from the hub and working outward, the nonsticky auxiliary spiral is laid down to connect the radials.
4. Using the auxiliary spiral as a guide, the sticky catching spiral is laid down. The auxiliary spiral is demolished in the process.

WEB TYPES

The conspicuous orb web is the most familiar type of web, but it is only one of many kinds that spiders make.

Hammock web *This web traps insects in a maze of vertical threads. They eventually fall onto a platform, where they are snatched by the waiting spider.*

Triangle web *This spider forms a bridge between the web and an attachment thread. On contact with prey, it lets go of the web, causing it to collapse.*

Scaffold web *The scaffold web has sticky vertical threads that are anchored to the ground to trap insects that walk by.*

Food parcel *After an orb-weaver spider catches a fly, it injects it with saliva and wraps it in silk. The spider cannot eat until the saliva has dissolved the fly's internal organs, forming a liquid "soup" that can be sucked out.*

Leg *Orb spiders have a middle claw that they use for walking on the nonsticky radial threads of the web. This claw hooks over the thread and locks it against a row of barbed bristles projecting from the underside of the claw.*

Moving Around

Insects are among the most mobile of all animals. Some species are specialized for walking or running—their six jointed legs allow them to move fast while keeping stable. Because insects weigh so little, they can start, stop, and change direction much more suddenly than we can. But most insects prefer to fly. Flying is an effective way to escape from danger, find a mate, or search for food. For example, dragonflies fly so quickly, they can hunt other insects in the air. Most insects have two pairs of wings. Wings are thin, often transparent blades strengthened internally by rigid structures called veins. Insects can only fly once they have reached adulthood. As larvae, some insects swim in water; others, like fly maggots, wriggle around. Caterpillars walk on up to 16 legs. Ant and bee larvae do not need to move at all because their food is delivered to them. Some insects, such as silverfish, fleas, and lice, have no wings at all.

INSECTS ON THE MOVE

While the legs of most insects are designed for walking and running, some are adapted for moving in other ways.

Mole cricket *A mole cricket uses its powerful shovel-shaped front legs for tunneling underground.*

Water beetle *A water beetle's rear pair of legs are flattened and fringed with stout hairs. These legs are used as paddles and allow the beetle to dive below the surface of ponds.*

Inchworm *These caterpillars move by first pulling the abdomen toward the head to form a loop. The head end then reaches forward and the cycle is repeated.*

Flea *Inside a flea's large rear legs is an elastic material that stores energy like a spring. When it is released, the flea is catapulted upward and forward.*

Zigzagger
When an insect walks or runs, it always moves three legs at a time, forming a pattern of alternating tripods. The first and third legs of one side move together with the middle leg of the other side. This results in a slightly zigzagging walk.

1 Grounded *A ladybug spends most of its time walking on branches, leaves, and flowers, where it preys on other small insects. Its flight wings are usually packed away under its hardened wing case.*

Ladybug liftoff
Beetles like this ladybug have a hardened first pair of wings that form a protective covering over the delicate flight wings below. Many predators have difficulty penetrating this coat of armor.

2 Ready for launch *To launch itself into the air, the ladybug stands erect, opens its wing case, and unfurls its flight wings, ready for takeoff.*

3 Airborne *The ladybug releases its firm hold on the plant and begins to flap its wings. The wing case is shaped to provide lift in the air.*

The power to fly
In most flying insects, the flight muscles are attached to the inside wall of the thorax. Contractions from top to bottom cause the thorax to flatten, which drives the wings upward. Contractions from front to back cause the thorax to expand and drive the wings downward. Some insects, like butterflies, beat their wings only a few times per second, but midges are on the other end of the scale—they beat their wings an astonishing 1,000 times per second!