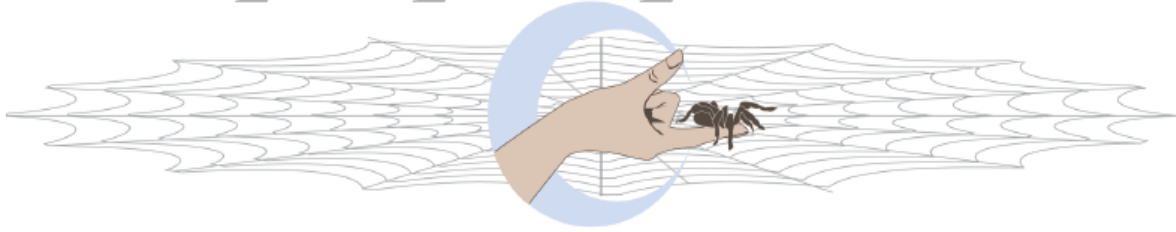


EIGHT LEGGED ENCOUNTERS



V. CRIBELLATE VS. ECRIBELLATE SILK

GOAL: To learn about the two different ways in which spiders have evolved to improve the efficiency of prey capture with their webs.

BACKGROUND:

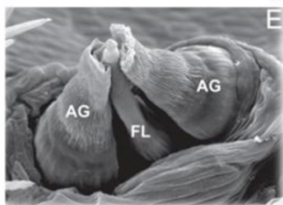
Tens of millions of years before the orb web evolved, spiders used major *ampullate silk* in various forms (lampshades, tangles, sheets, funnels, etc.). The first webs were horizontal and were not orbs. Currently, scientists believe that orb web evolved only once. Cribellate silk is produced from numerous tiny silk glands underneath a specialized spinning organ called the *cribellum*.

The cribellum is derived from spinnerets (the anterior median spinnerets) and its surface is covered by hundreds-thousands of tiny, elongate spigots which each produces an extremely thin single fibril of cribellate silk (~0.00001mm thick). All spigots act together to produce a single cribellate thread made up of thousands of silk fibrils. All araneomorph spiders were once cribellate, but the cribellum has been lost numerous times.

Cribellate spiders also possess a row of toothed bristles – the *calamistrum* – on the metatarsal segment (2nd to last) of the last leg (4th walking leg). These bristles are used to comb out the cribellate fibrils.

The combination of *flagelliform* silk threads and *aggregate* silk protein glue ~136 mya represents a major explosion in spider species numbers. Spiders that combine flagelliform and aggregate silk proteins are in the superfamily *Araneoidea*. In these spiders, a sticky liquid silk is carried on fibrous silk support lines.

In summary, cribellate (wooly) and ecribellate (sticky) catching silks increase the prey holding efficiency of webs that act as snares or traps. They represent completely different evolutionary solutions to the same problem.



MATERIALS:

- Pre-cut pieces of yarn
- Eyebrow brushes/combs
- Glue
- Confetti (or something small and light with lots of points)

PROCEDURE:

- Take a piece of pre-cut yarn.
- Pick up one piece of confetti.
- Toss the confetti at the yarn...does it stick?
- On $\frac{1}{2}$ of the yarn, add droplets of glue and toss the confetti at the yarn...does it stick?
- On the other $\frac{1}{2}$ of the yarn, comb it out using the eyebrow brush.
- Once the yarn is combed out, toss a piece of confetti at it...does it stick?