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Gossamer Mornings

When the sun is just up and slanting down to me over our orchard, I see wafting lines of sparkling light in the air. This has only begun recently, but I used to see them last year, too, into the fall. These are specialized strands of spider silk called “gossamer,” a word that may derive from “goose” and “summer” or maybe not. It has come to mean anything light and airy or filmy, but is used mostly to refer to these lines of spider silk.

Henry Thoreau saw them in late October and wrote of them in his Journal in 1853. He had a book from England called *An Introduction to Entomology*, by Kirby and Spence, which he quotes. “In Germany these flights of gossamer appear so constantly in autumn that they are metaphorically called ‘Der fliegender Sommer,’ (the flying or departing summer.)”

Thoreau’s description is of a scene more thick with silk than what I see in our orchard and garden. But he notes the same thing I do, which is that as long as the silk is between me and the sun it catches the light and I can see it. Otherwise it is invisible, and this is true at other times of day here because the light is not right. We don’t have much open ground, just the garden and orchard.

Over open water, Thoreau saw “myriads” of spiders on the surface, some with lines of silk attached. He writes the spiders were being blown along quite fast and were of varying sizes and colors, though some were very small. Passing by some willows, which were bare of leaves in late October, Thoreau notes, “They are so completely covered with these fine cobwebs or lines, mainly parallel to one another, that they make one solid woof, a misty woof against the sun.”

Another observer, Charles Darwin, noticed gossamer on board the HMS *Beagle* twenty years earlier. He found thousands of tiny spiders on the ship, at a time when he was sixty miles off Argentina. “All the ropes were coated and fringed with gossamer web,” he wrote. And he could not attribute their presence to a strong wind from shore since it was a calm day. The next day he watched the tiny spiders take off with “great speeds” on another windless day.



Thoreau thought the spiders must be carried on small winds, “zephyrs,” as he put it. He went back the next day, November 1, 1853, after a cold night of frost. There were no spiders out, but lots of gossamer remained. He puzzled why all this expenditure of silk at a time when there were no insects to be caught. Like many people, he thought of all spider silk as designed solely for trapping insects.

Now we can learn about all sorts of specific uses spiders have for their silk and how each use gets a different sort of fiber made by specialized glands and spinnerets. We speak of “spinning” but that’s not the way spider silk is made. It is produced by “pultrusion,” which is a marvelous word related to “extrusion,” but which means pulled out, not squeezed out. Sometimes the “pulling” is done by the spider with its feet, and sometimes just by gravity. When a spider makes a drop-line, a way to travel downwards from a branch or bush, with the option of beating a fast retreat back up again if need be, then it is gravity or the spider’s weight which pulls out the fiber.

This fiber is produced on demand. It is not all wound up and stored somehow inside a spider. Rather there is a stored “liquid silk precursor” which, when pulled out, becomes a strand. Spider silk has been noticed by folks for a long time. In fact, there was once an attempt made to keep captive spiders so their silk could be collected and used for weaving into textiles.

But spiders could not be domesticated and raised like barnyard animals. They killed and ate each other when kept captive. Silkworms turned out to be much more manageable: they spin their cocoons when they are caterpillars and then you can kill them before they grow up. Then you simply unwind the cocoons.

People don’t give up easily, though, and as recently as 2009 a piece of cloth eleven-by-four feet was made from the silk of over one million golden orb spiders in Madagascar. It took eighty-four people four years to collect the spiders and extract the silk. This had to be done by “pultrusion,” just the way the spiders do it: pull by hand that fiber out from the spinneret in the abdomen of the spider. 21

Folks have used spider silk as the thread to make crosshairs in telescopes, microscopes, and telescopic rifle sights, and in 2012 someone or perhaps many people working at “pultrusion,” made a set of violin strings by milking a spider. Probably it was many spiders.

That silk precursor or gel-like unspun silk dope has been the subject of much study as folks work to make synthetic spider silk. The molecular structure is both complex and very long, I have read. Meanwhile, the spiders continue to make it for several kinds of webs, also for wrapping up prey. In one species of spider the prey-wrapping silk actually contains venom. The silk is light weight and can absorb a lot of pull without breaking. It has toughness and tensile strength. If there were one strand long enough to encircle the world, it would weigh eighteen ounces.

We know, or can read and try to understand, that spiders use the earth’s electric field to travel fast, to kick off and go by the repulsion of negative charges. I hope Darwin can read about this. Thoreau was satisfied with the idea of zephyrs carrying spiders along, but he didn’t know their silk would some day be found one thousand miles out to sea, also two and one-half miles up in the air.

Lines of gossamer sparkle every clear morning early, as I look east. They are horizontal, wafting, glinting in the early low sun, and disappear for the rest of the day.

— Bonner McAllester