



The Spider and the Wasp Main Event



BACKYARD EXCITEMENT WITH SPIDER & WASP

In contrast to the other essays which comprise this excursion into man and nature, this one derives mostly from direct personal experience. I personally witnessed the action described.

My house is surrounded with woods, so there's lots of wildlife around: foxes, songbirds, hawks, owls, cicada-killer wasps, brutish robber flies, caterpillars adorned with parasitoid wasp eggs, snakes, lizards, scorpions, squirrels -- well, you get the idea. But what I saw for a few minutes one afternoon, on the deck in my own backyard, is unique in my experience -- I've never read about, nor seen on any science or nature shows on television (I do a lot of both) an event quite like the one that comprises the topic for this essay.

To this day I cannot contemplate this particular piece of backyard drama without a sense of wonder.

The Main Event – Act 1

On my deck at around high noon (how appropriate for Gary Cooper fans) I noticed a slight bit of movement from the corner of my eye. A slim dark wasp had evidently landed on a spider web, and it was jerking up and down in an apparently frantic effort to escape. Having seen the original of "The Fly" with its own haunting final spider web scene, this immediately caught my attention. I expected to witness a gladiatorial duel between two of the most powerful terrestrial invertebrate predators, a battle between fangs and stinger that would, in its own miniature fashion, rival the mortal combat of the Coliseum.

The wasp seemed to be making furious struggles to escape, and unlike other insects that blunder into spider webs its wings were not pinioned. Indeed the wasp appeared to be tethered to the web only with its feet. It was jumping up and down in an oddly rhythmic fashion, and looked exactly like a trampoline artist jumping up and down except with feet glued to the trampoline. At the risk of anthropomorphism, it also seemed as if the wasp was -- oddly-- not panicked. And sure enough, after perhaps five or ten seconds of effort, the wasp managed to free itself from the web before the spider could appear and subdue it.

Indeed, to my disappointment the spider was nowhere to be seen. Perhaps it was inexplicably absent, or for unknown reasons had abandoned what appeared to be a perfectly good web. But this disappointment was short-lived, because in perhaps half a minute or less the wasp returned!!!

Act II

Now this really got my attention. Was this a conspicuously stupid wasp about to illustrate Darwin's theory? Was it phenomenally unlucky, an insect fugitive from the law of averages? Or was there a wasp nest unseen below my deck, pouring out an endless supply of spider bait and stings for my family? (Although this looked like a solitary wasp, a recent beehive in my house made this last theory one of particular personal interest).

Answer: none of the above. The second act of this little backyard drama was exactly as Act 1, in that the wasp landed on the center of the web, and immediately began to repeat its tethered trampoline performance. After five or ten seconds of trampoline practice, the wasp flew off again, and once more the spider was nowhere to be seen.

But upon close inspection, the spider was in fact at home the entire time, though instead of rushing forth to subdue and ensnare its apparent captive, the spider was cowering at the furthest corner of the web, at the end of the anchor-line holding the web in place. Rolled into a little spider-ball, it was certainly making every effort to be as inconspicuous as possible as far away as possible from the center of its web, while still being in contact with the web's outmost point.

Post Game Analysis

What was going on here? Surely the wasp was not some sort of freakish daredevil rogue that enjoyed trampoline exercise. But, it looked for all the world as if the wasp was teasing the spider, trying to get its attention by vigorously bouncing up and down on its web, on at least two occasions. Both times, when the spider failed to appear the wasp lost interest and flew off.

Although the "daredevil wasp" theory might be of interest to the producers of Spiderman -- it could after all form the character foundation of a new villain for the next sequel -- we can safely dismiss that particular motivation on the part of the actual wasp I saw.

As such, the only possible explanation for this behavior is that the wasp was actually hunting the spider, attempting to lure it out as if it were a normal prey item caught in the spider's web. The wasp was not merely "playing possum" and acting dead, as some creatures do. Rather, it was "playing prey" and acting like food. But it was obviously only acting, and undoubtedly intended to turn the tables on the spider and ambush it on its own web. The spider was however able to detect the subterfuge and avoid being hoist in its own petard. It probably knew to hide instead of attack, because the vibrations in the web which the wasp's rhythmic jumping produced were markedly different from the non-rhythmic vibrations that the spasmodic struggles of an actual victim would trigger. That is, if I could see the difference, it's a good bet the spider could feel the difference.

And so it hid, and in doing so survived.

I must admit to some disappointment at missing what first appeared to become a real life clash of the titans, albeit in miniature. It would have been a gladiatorial spectacle, micro-style. But the non-clash is actually far more interesting, at least from a rarified academic perspective, even if it lacks the drama of a fight to the death. It illustrates the dynamic nature of predator/prey relationships, and shows how deception and subtle subterfuge -- not subtle enough in this instance -- can figure into these dynamics.

Nature, Red in Tooth and Claw -- Darwin's Favorite Example

Parasitoid wasps lay their eggs on (or in, depending on the species) other insects in order to provide their offspring with a living larder. The wasp does not kill the host, which is often a caterpillar, in order that the meat stays fresh. The caterpillar goes about its business unimpeded for a while by these unwanted passengers, but as the eggs hatch the larvae begin to devour the host, starting with non-vital tissues. When the larvae are near maturity, and no longer need the host to remain alive, they chow down on its vital organs. The caterpillar dies, the larvae pupate and emerge as adult parasitoids ready to begin the next iteration of this grisly cycle. The host, in other words, is slowly eaten alive from the inside out.

In the final stages the host looks like a worn-out sock full of independently wriggling lumps.

This was Charles Darwin's favorite example of Tennyson's famous line, because even though it's only bugs that experience this horrendous fate, the very idea of expiring in this fashion is enough to make one's hair stand on end. It illustrates that Nature has no squeamishness whatsoever. Parasitoid wasps are in fact used by professional entomologists -- who also lack squeamishness -- as an effective alternative to traditional insecticides, in the effort to protect crops from pests without having to resort to chemicals.

Other wasps specialize in hunting spiders to similarly provide a living larder for their larvae, and that's undoubtedly what I witnessed. Unlike the classic parasitoid, the spider-hunters paralyze the spider and transport its immobile but living body to a prepared hole in the ground, which they fill with the spider and an egg. Compared with the caterpillars, the spiders' fate is possibly even more unpleasant, since they are slowly eaten alive in the dark, an arachnid version of Brandon Frasier's Mummy.

It was to avoid this fate that the spider was cowering at the far end of its web's anchor line.

Learning versus Instinct

It is safe to say that neither the spider nor the wasp figured this out. Although there have been experiments that demonstrate the learning abilities of individual insects, the insectoid intelligence demonstrated is probably insufficient to suggest that the actors in my personal backyard drama had created their own plot line.

Bumble bees (which interestingly are in fact warm blooded by virtue of their comparatively massive flight muscles) have actually been able to solve problems in scientific experiments involving proportionate distance changes in the location of alfalfa plants. Bumble bees really go for alfalfa, evidently, and they have demonstrated a certain rudimentary intelligence -- quite impressive actually for an insect -- in solving alfalfa related problems, or more accurately, problems related to their finding alfalfa plants that the scientists relocate specifically to test them. (These problems actually do require multiplicative extrapolation on the part of the brainy bumblebees, which they master far more quickly than the author can find his computer's footnote function).

Rather, it seems more likely that a slower process of gradual collective "intelligent" seeming behavior evolved over time. Those wasps which hunted spiders became incrementally more successful the more they behaved in a fashion to attract spiders, and the more spiders they caught, the more offspring they generated and as a result these deceptive genes gradually came to predominate. Likewise the spiders that learned to distinguish between different vibrations in their webs "learned" by default what to avoid ("by default" because the spiders that didn't make this vibration distinction became wasp larvae food and so failed to pass on their vibration-impaired genes).

Gradually, an arms race unfolds, whereby the next generations of spiders with the best web-radar live to contend with the next generations of wasps with the best acting skills.

These traits undoubtedly evolved over time without conscious participation by the spiders or wasps involved, in more or less the same way Angler fish and certain clams have evolved lures which resemble worms, and how tasty Viceroy butterflies have evolved to closely resemble the poisonous Monarch, to name three among countless examples.

But the interesting thing about this particular backyard example is that it involves not the evolution of a physical characteristic, rather, it involves the evolution of behavioral

patterns: the wasps "learned" to hunt spiders more effectively by mimicking (imperfectly in this example) trapped prey. Likewise the spiders gradually "learned" to fear and avoid the subterfuge vibrations and not to do what they usually do when an insect lands on one's web and causes a commotion in its struggles to free itself.

Man

As a species mankind likes to think of itself as above all this rudimentary instinct stuff, after all that's what drives insects and spiders but not us, ostensibly the apex of life's great chain of being, the presumptive top brick in life's great pyramid. We think of other creatures as being devoid of thought or feelings, almost as if they were merely complex organic mechanisms with programmed behavior patterns, no more able to choose and feel than a computer or a wind-up toy.

However, instinct and emotion are fundamentally synonymous. Our behavior patterns are vastly more complicated and we certainly have the ability to learn and self-program to an extent, but at the root our most fundamental emotions are just as instinctive as the fear the spider seemed to display as it cowered in a tiny ball at the furthest possible end of its web. Next time the reader gets an audit letter from the IRS or sees an armed mugger approach from a dark ally on a lonely street, remember the spider and the wasp and determine if your "instincts" as the sphincter involuntarily tightens, are truly all that different.

Damocles
June 2008