



Species Spotlight **Cecropia Moth**

Hyalophora cecropia



Your first encounter with the caterpillar of the cecropia moth may leave you feeling as if you've been Punk'd. As fat as your thumb and covered in brightly colored balls perched upon stalks, it looks to be more at home on the pages of a Dr. Seuss book rather than an entomology text. The adult moth is no less spectacular. Short-lived and nocturnal, it's found in and around hardwood forests east of the Rocky Mountains, and is the largest native moth of North America. Its intricate orange, black, and brown wings span 5-7 inches and are adorned with eyespots and commas. All this is topped with a fuzzy, orange head.

Of Ancient Greeks and Romans

Compared to the more showy butterflies, moths generally don't elicit much fanfare. But the folks in charge of naming and classifying this moth gave it a downright classical heritage befitting its spectacular appearance. The name "cecropia" is contrived from an ancient Greek phrase meaning: "face with a tail." It harkens to the mythical first king of Athens named Cecrops, who was said to have a man's upper half and a snake's form below the waist. The name is less of a stretch than it first appears. Look closely at the tips of the cecropia's wings and the connection becomes clear: the eyespots and shape resemble a snake's head. The moth hopes enough so that it fools a would-be predator long-enough to make a getaway.

Cecropia's belong to the celestial-sounding family "Saturniidae" of giant silkworms and royal moths. They are named after the daughter of the god Saturn as well as the queen of the gods in Roman mythology. The connection here is that the eyespots on some moths in the family have concentric rings reminiscent of the planet Saturn.

Like a Moth to a Flame. But Why?

Your best chance of seeing a cecropia moth might be catching one fluttering around a porch or street light on a summer's eve, along with many other moth species.

But why do they do that? No one knows for sure but there are theories.

One has to do with how moths use moonlight to navigate. To a moth, the moon is essentially an infinite distance away. Keeping it in a fixed position relative to themselves they use its light as a guidepost, much in the same way people used the North Star in days of yore. From the moth's perspective, human lights mimic moonlight and overwhelm it's ability to orient. Bright artificial illumination can act as a super-stimulant and a disoriented moth will fly in circles around it in a constant attempt to maintain a direct flight path.

It Was a Very Good Year.

A cecropia moth packs a lot of living into a year. In fact it packs *all* of it's living into a one-year life cycle. Considering at least 10 months of that year are spent encased in a cocoon, they really only have a couple months to do what needs doing to create the next generation of moths. They will take several forms and have to survive a host of predators and weather conditions to succeed. Their Homeric Odyssey begins as a tiny, white egg. Sometime in June or July in the Northeast, female cecropia moths spread around one-hundred of them, usually in groups of 2 to 6 on both sides of a leaf of one of it's host plants (including oaks, cherry, beech, apple, and button bush). In 2-weeks, plus or minus, the eggs hatch tiny, hungry black caterpillars. Their first meal is the egg shell they just emerged from. Only a handful of them will reach adulthood. Importantly, this time of year also coincides to when migratory birds are feeding their chicks, and caterpillars are a prized meal. Packed with protein, fats, and other nutrients, caterpillars are essential to birds successfully rearing the next generation of songsters.

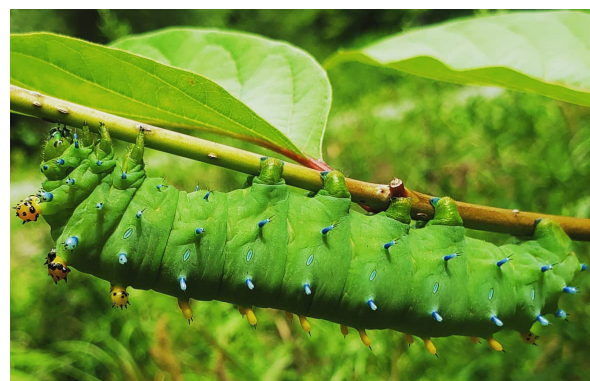
The Larva - the Instars of the Show.

If they aren't picked-off by predators, the voracious rice-grain sized caterpillars will grow exponentially over the next month as they devour host-plant leaves. Their skin can only stretch so far as they grow, requiring them to molt through 4 separate 'instar' stages. To do so, it spins and attaches itself to a silken pad. It remains there for several days as it creates a new exoskeleton. When ready, it then literally just walks out of its old skin and starts eating again. As they grow in size through each instar, they change in color from black, to yellow, to green. By late August, they can be 5-inches long, with multi-colored spikes, balls, and black hairs along the length of their body. The caterpillar is not poisonous, but it looks funky enough to ward off some predators.



The snake-faced wings of an adult cecropia moth could be enough to make a would-be predator hesitate on making it their next meal.

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A cecropia caterpillar in its final instar stage (left). Soon it will spin its silken cocoon to spend the winter in (center). After emerging as an adult, it will only have a couple weeks to successfully find and mate with a partner (right). Note the females much larger abdomen and the males larger antennae.

Pupa don't Breech - Until Spring.

Sometime in August or early September, the fat green caterpillar will spin itself in to a silken cocoon for which the so-called group of "silk moths" get their name. The caterpillar finds a thin branch or sometimes a tree-trunk to create the cocoon, which can look convincingly like just another "nothing to see here" dried leaf. The clever camouflage will hopefully be good enough to fool squirrels and other potential pupae pilferers.

The cocoon, or chrysalis, consists of three layers of different densities of silk (insect silk is far too fascinating to just gloss over, see the center-bar for silk research in modern medicine). It is hydrophobic (water-shedding) and semi-impermeable, and will protect the developing moth from withering winter winds and ice. After about a week-and-a-half of being entombed, the caterpillar sheds its exoskeleton for the last time and morphs into a tightly-packaged pupa. For the next 10 or so months it will stay dormant in this state until warmer, humid weather ushers it into its final transformation to a moth.

The Insect of Full Eclosure.

If it survives the ravages of winter, predator-prowling, potential parasites, and such - the adult moth will "eclose" (emerge, essentially) from its protective cocoon in May or June through a silk pathway. Once free from the cocoon, they need to 'inflate' their wings for a few hours. By dusk, the males are ready to take flight to search for a mate, and their is no time to waste.

Adult moths don't have a gut nor working mouthparts, and cannot eat. Their sole purpose is to find a mate and

Silk, the Moth-er of Invention

Though only a simple concoction of protein, salt and water, silk is a medical-marvel known to have anti-bacterial and anti-fungal properties. The human body has almost no immune response to silk, making it ideal for many medical applications. Silk sutures are already FDA-approved and have been used in patients world-wide for centuries. More recently, medical science has figured out how to reverse engineer caterpillar cocoons into a fluid protein, and ongoing research is looking at using it as a biomaterial base for myriad medical uses. Silk nanoparticles, silk drug delivery systems, surgical silk screws and plates, silk scaffolds that hold organs together, silk surgical gels and more are just some of the possibilities. Amazingly, doctors can "program" silk to degrade at a predetermined rate, making them last a few days, weeks, or even a few years. Another research team has genetically engineered a silkworm that creates a cocoon composed of 95% silkworm proteins and 5% spider silk proteins. The composite silk is 48% stronger than normal silk and about 61% as strong as "dragline" spider silk - the strongest of all spider silk. They hope it can be mass produced and used to make products such as stronger artificial limbs, tendons, parachutes, and bullet-proof vests.

reproduce before expiring in just a week or two. Males, with their large, brush-like antennae, will sweep the air for the alluring (literally) scent of a female. During the darkness of dusk to dawn, a female will waft into the breeze pheromones produced from a retractable protrusion at the end of her abdomen. Males can detect them from over a mile, and possibly as far as three miles, away - even if diluted to just a few molecules. When he does, he'll fly upwind towards higher concentrations of pheromones until finding her. Kind of romantic, no? Less romantic, other life has learned to take advantage of a males desperate need to find a mate quickly. Female bolas spiders can produce a chemical cocktail that mimics pheromones produced by insects like the cecropia moth. Male moths are entranced into following the scent-trail of what they think is a receptive female moth. When they get close however, the spider slings a single silk line at them with a super-sticky ball of glue at the end, and reels the moth in for dinner.

It's known as "aggressive chemical mimicry", and its a pretty spot-on description if there ever was one. Female moths may have to wait patiently for a male, sometimes for a day or more. Males usually arrive near dusk or before dawn. If the moths do successfully find each other, they will attach at the abdomen for up to 24 hours. Soon the female will lay her eggs, and both will expire. And soeth the cycle doth begin again.

