

Darwin's Hawk Moth and the Star Orchid – Extreme Co-Evolution

'Endless forms most beautiful..'

By Elizabeth Craig



In 1862, Charles Darwin received a live Star or Comet Orchid (*Angraecum sesquipedale*) from Madagascar. After studying the large white flower with its long spur or nectary, measuring close to 12 inches, Darwin declared, "Good Heavens what insect can suck it?" Applying his new theory of co-evolution, he then famously predicted an insect, likely a hawk moth with a great proboscis or tongue that could reach all the way down into the star orchid's spur to drink the nectar.

No insect had been observed in Madagascar or anywhere else with such an extremely long tongue. Many fellow scientists thought the idea of an insect with a 12-inch proboscis was ridiculous. However, Darwin stood by his prediction that was based on the size of the flower and the concept of mutual evolution of flower and insect. But he never saw his imaginary moth.

In 1903 more than 20 years after Darwin's death, a giant hawk moth (*Xanthopan morgani praedicta*) was discovered in Madagascar. It wasn't until 1991 that the moth was actually observed and documented visiting and pollinating the orchid. Why would a plant and its pollinator go to such extremes with co-evolution? An orchid's 12-inch nectary and the hawk moth's matching 12-inch proboscis do seem ridiculous. The star orchid turned out to be a perfect example of co-evolution, where two organisms—insect and flower— affect each other's ability to grow and adapt. With a long spur, an orchid can limit access to valuable nectar and allow access only to insects with long tongues that pollinate efficiently. The specially adapted hawk moth is the only one that has access to the nectar and is so guaranteed food from its host plant, while others are denied. The flower in turn can cut back on its investment in nectar. Co-evolution is now a cornerstone of biology, developed with numerous examples of flowering plants and insects, parasites and hosts, predators and prey and gut microbiomes and human health.



Closer to home, right here in the Northeast, we have amazing moths too. A standout is the pink primrose moth (*Schinia florida*), an owlet moth. Moths are often given their common names after their host plants and its host plant is the common evening primrose (*Oenothera biennis*). Male primrose moths may be found resting in flowers in the morning waiting for females to fly by.

The following descriptors identify the pink primrose moth: fuchsia; pink; bright; yellow; hairy yellow thorax; lemonade; flying yellow bottom; yellow

head; pink body, typically 0.5 inches to 0.7 inches (15mm to 19mm) in size.

Many moths are drab colored and well camouflaged against tree bark and soil. The color of the primrose moth has been described as Pepto-Bismol pink; however, a wilted, already pollinated evening primrose flower turns pink, so the moth at rest on the plant may appear to be an old flower.



Common evening primrose (*Oenothera biennis*), a native plant and truly magnificent wildflower, may grow to heights of 7 ft (more commonly 3ft). An erect biennial (may act like an annual), it has fragrant flowers, typical for night blooming species, which open in the evening and close in the morning. It has large yellow, lemon scented, blooms early summer to fall, grows full sun to part shade. Found in a wide variety of habitats – seaside, roadside, in fields and disturbed areas. Easy to grow and sold at many native nurseries, including Gilbertie's in Westport.

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Recommended reading –

Endless Forms Most Beautiful, the new science of Evo Devo by Sean B. Carroll.

<https://www.butterflyidentification.org/moths-by-state-listing.php?reach=Connecticut>