

What's Eating You? Io Moth (*Automeris io*)

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Of the 7 species of *Automeris* moths (order, Lepidoptera; family, Saturniidae) found in the United States, *Automeris io* often is the most common and familiar. Its range extends as far north as Quebec, Ontario, and southern Manitoba, Canada; west to Utah, Colorado, Nebraska, and Texas; and south to Florida, eastern Mexico, and Costa Rica.¹⁻³ Across much of its range, the moths and their larvae are among the most common giant silk moths encountered by the public. In Louisiana, the closely related *Automeris louisiana* largely replaces the Io moth in coastal areas.²

The Io moth has 4 life stages: egg, larva (or caterpillar), pupa, and adult. Ecdysis of Io moths from cocoons occurs during late morning or early evening. In the late evening, females release pheromones from specialized glands on their abdomen, "calling" to males who use their plumose quadripectinate antennae to follow the scent trail to the awaiting female. The mated pair remains together for a few hours or until the following day, separating at twilight of the following day when the female flies off to begin oviposition. Females lay small clusters of creamy white ova along stems and ribs of the leaves of host plants. Each female lays several hundred eggs during her brief lifetime. Adults do not feed, as they do not have functional mouthparts, and die in 1 to 2 weeks. Adults frequently are found at streetlights and porch lights in the late evening or early morning hours.²

Accepted for publication March 19, 2008.

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The authors report no conflict of interest.

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About 10 days after being deposited, minute 2- to 3-mm larvae emerge from the ova and feed gregariously upon their host plant. Favorite foods of the Io caterpillars include azaleas, birch, blackberry, cherry, clover, cotton, currant, elm, hackberry, hibiscus, mesquite, oak, pear, poplar, redbud, rose, sassafras, and willow.^{1,2,4} In addition, larvae frequently feed on grasses such as corn or Bermuda grass.^{2,4} Io moths are around in deciduous woodlands, forests, and fields; along power line rights-of-way; and in orchards, parks, and suburban yards.^{2,5}

The sexually dimorphic adults have a wingspan of 2.0 to 3.5 in and are easily recognized by the presence of prominent black to blue eyespots with white centers on the hind wings (Figure 1). Adult males typically have bright yellow forewings, body, and legs, while the females are red-brown. Some subspecies of *A io* in Florida, Mexico, and the Bahamas have males with red-brown forewings.^{2,3}

The caterpillars develop through 5 instars, all possessing urticating spines. First instars are yellow to orange or brown in color and feed in groups. Io caterpillars in the middle instar stages are tan with an orange lateral line (Figure 2A). The last instar form tends to be solitary and is the easiest to recognize. The background color is bright green to blue-green with a distinctive lateral line composed of a red stripe above a white stripe (Figure 2B). Caterpillars of *A louisiana* are virtually identical, though adult moths differ in appearance; both sexes of *A louisiana* are brown to light brown.² The spines, which retain the ground color of the larvae, start out brown and become green in the final instar, giving the caterpillar a bristly or woolly appearance.

Within 4 weeks, larval development is complete and the mature larva spins a loose silken cocoon among leaf debris on the forest floor or in crevices such as between the furrows of tree bark.



Figure 1. Adult male (A) and female (B) *Automeris io* moths.

Depending on day length and ambient temperatures, the pupa will either diapause (enter a resting state) or continue development into an adult moth and emerge within a few weeks. The pupa overwinters in diapause, which is eventually broken by the increasingly warm spring days when the pupa resumes development to the adult Io moth.²

In years with mild winters, caterpillars can be found year-round in southern Florida and Texas. In the Deep South, there are 3 or more generations per year, with caterpillars in all but the coldest months.² Across southern Canada and the northern United States, there is a single generation annually, with caterpillars only during mid to late summer.⁴

Mature *A io* caterpillars might be handled by children who are familiar with the harmless woolly bear caterpillar (*Pyrrharctia isabella*) and may innocently reach out to touch the Io caterpillar. While adult Io moths do not have urticating spines or scales, the caterpillar possesses branched spines that may produce a painful sting. Venom of related saturniid caterpillars contain histamine, but the composition of Io venom is not fully characterized

and the mechanism of reactions to *Automeris* stings is unknown.^{3,6} There is some evidence against a histamine-mediated response, including failure to respond to oral or intradermal antihistamines. There may be other mediators involved, such as acetylcholine, prostaglandins, kinins, or the complement system.⁷

Morphologically, the spines emanate radially from a central spine on the dorsal and lateral surfaces of the thoracic and abdominal segments (Figure 3).² The spines themselves are hollow and contain an irritant substance of unknown composition.^{7,8} The tips of the spines are jointed and are easily broken off; distal portions of the spines may remain embedded in the skin and cause further irritation. Each thoracic and abdominal segment bears several spines that branch out to almost completely vest the larva.⁴

In a prospective study of 112 confirmed caterpillar stings in Louisiana, 11% were attributed to *A io*.⁹ Other implicated caterpillars included *Hemileuca maia* (the eastern buck moth), *Megalopyge opercularis* (the southern flannel moth or puss caterpillar), and *Acharia stimulea* (formerly *Sibine*



Figure 2. *Automeris io* caterpillars develop through 5 instars: third instar (A) and last instar (mature caterpillar)(B).

stimulea)(the saddleback caterpillar). Local pain was reported in 96% of patients, erythema in 89%, and swelling in 72%. Muscle spasms, paresthesia, and radiating pain were reported in 26% of patients. Some effects lasted at least 24 hours.⁹

The cutaneous manifestations specific to *Automeris* contact are not as well-defined as other caterpillars. Exposure to the spines of *A io* caterpillars often are described as stinging as if from a nettle, with the stinging sensation within seconds of exposure, followed by pruritic erythematous papules or urticaria that resolve spontaneously within hours.^{4,6-8} In a controlled study of 4 exposures to *A io* caterpillars, all subjects reacted; 3 subjects had an immediate stinging sensation followed by erythema within 60 seconds and pruritic wheals 2 minutes later that lasted from 6 to 8 hours, resolving without treatment. Interestingly, the same study exposed a rabbit, hamster, and mouse to the caterpillars, and all 3 failed to react.⁷ Everson et al⁹ reported that *Io* caterpillar stings may result in one or more atypical symptoms such as paresthesia, radiating pain, dizziness, diaphoresis, nausea,

abdominal pain, muscle spasms, joint stiffness, or lymphadenopathy.

Data concerning the histologic features of caterpillar dermatitis are sparse. A study of infant rats exposed to *A io* caterpillars demonstrated marked spongiosis and dermal edema, dilated vasculature, and a polymorphonuclear and histiocytic infiltrate. The histologic changes persisted for approximately 6 hours, corresponding to resolution of clinical effects.¹⁰

Prevention is the best form of treatment. Caterpillars are easily identified and avoided. First aid for stings includes removal of spines with adhesive tape, followed by a generous soap and water wash and application of ice.⁸

Topical corticosteroids may play some role in symptomatic treatment, though all reactions reported are self-limited. Oral antihistamines have been reported to be ineffective in controlling or preventing symptoms.⁷ Although anaphylaxis and death have not been reported in association with *A io* caterpillar stings, if severe systemic symptoms are recognized in a patient

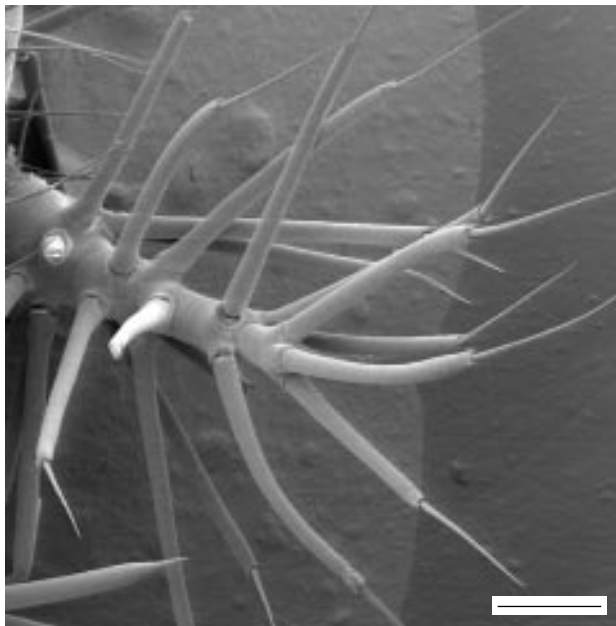


Figure 3. Scanning electron micrograph of spines on an *Automeris io* caterpillar. Point of breakage and location of envenomization is thought to be where the slender tips join the side branches of the spine (bar=50 μm ; original magnification $\times 33$).

with any arthropod exposure, treatment with intramuscular or intravenous epinephrine, systemic corticosteroids, and inhaled bronchodilators should be considered.

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