

SLUG CATERPILLARS – LIMACODIDAE

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Relative to other Lepidoptera, slug caterpillars seem more fantasy than reality. They are rivaled only by the prominents in the diversity of their form, color, and armament. While some are rather ordinary, rounded and sluglike, others are peculiarly angulate, lobed, or spined. One of our more striking slug caterpillars is



Euclea obliqua.

flattened and ringed by batteries of stinging hairs. And what may be North America's strangest caterpillar, the Monkey Slug or Hag Moth caterpillar, looks far more like the cast skin of a tarantula than it does a caterpillar. There are about 30 species in our region. Slugs are especially diverse in the tropics—more than 120 species occur in Costa Rica.

RECOGNITION

Easily recognized by an examination of their venter: instead of paired abdominal prolegs, all have medial suckers on the first seven abdominal segments. Rather than crawl, the larvae glide. The head may be deeply retracted into the thorax. Even while feeding, the head is covered by a fleshy extension of the first thoracic segment (Epstein 1996).

LIFE HISTORY NOTES

The minute, flat, shiny, transparent eggs are laid singly or shingled in clusters on the undersides of older foliage. The egg is so thin that larval development is easily observed within. The early instars skeletonize patches of leaf tissue from either leaf surface. Larger caterpillars feed from a leaf margin, nearly always from the leaf underside. Slug caterpillars pass through several instars: usually seven but as many as nine in some species. The caterpillar passes the winter as a prepupa in a dense spherical cocoon of brown silk, impregnated with crystals of calcium oxalate that are released during the formation of the cocoon. The cocoon has a circular escape hatch (operculum) at one end that is popped open at emergence. The larvae are catholic in diet, but show a decided preference for smooth-leaved trees and shrubs: basswood, beech, cherry, maple, and oak are frequent foodplants. The fecal pellets are unique in that they have a distinctive cavity pushed into one end. Several genera possess stinging hairs whose punch is not unlike that of stinging nettle both in intensity and duration. Perhaps because of its greater size, the sting of the Saddleback Caterpillar (*Acharia stimulea*) is the most painful. The serious student of the family will want to obtain Dyar's (1896–1914) and Dyar and Morton's (1895–1896) set of papers on the New York State limacodid fauna and Epstein's (1996) monograph, which is rich in life history observations and illustrated with stunning scanning electron micrographs, photographs, and line drawings.

COLLECTING AND REARING TIPS

Limacodids come well to light—especially mercury vapor lights. Females should be held in smooth-walled containers: plastic bags, film canisters, or glass jars. Many collecting and rearing tips are scattered through the species accounts in this chapter, especially the Red-eyed Button Slug (*Heterogenea shurtleffi*) (see page 38).

RED-CROSSED BUTTON SLUG*Tortricidia pallida*

RECOGNITION Broadly oval, yellow-green, with red "coat-of-arms" mark, edged with bright red and/or brown line, embossed over dorsum. Forward-extending arm of mark flaring outward along front edge of thorax; side arms reaching to edges of body, broad, often extending over two segments, smoothly angular; posterior extension of cross somewhat triangular, often narrowing abruptly over last segment or two. No stinging spines. Larva to about 1cm. Early Button Slug (*Tortricidia testacea*) with more narrowed posterior arm (see opposite). In Abbreviated Button Slug (*T. flexuosa*) lateral arms of red dorsal mark shortened, extending only halfway to sides of body (Dyar 1899) (inset).



OCCURRENCE Woodlands and forests from Missouri to Connecticut south to Mississippi. Likely more widespread, especially westward, but records confused with those of Abbreviated Button Slug (see below). One generation northward with mature caterpillars in August and September; evidently two broods from Maryland and Missouri southward.

COMMON FOODPLANTS Beech, cherry, oak, willow, and many other woody plants.

REMARKS The development of the red buttons in *Tortricidia* is variable to the extent that some individuals cannot be reliably determined based on the characters given above. Moreover, there are no adult characters (including genitalia) that can be used to reliably separate the adults of the Red-crossed Button Slug from those of the Abbreviated Button Slug. Marc Epstein (pers. comm.) is not convinced that the two are distinct. In his support, I once had a female of what I thought was the Red-crossed Button Slug yield larvae that would key here to the Abbreviated Button Slug.

EARLY BUTTON SLUG*Tortricidia testacea*

RECOGNITION Similar to previous species, broadly oval with red "coat-of-arms" mark, edged with bright red and/or brown line, over dorsum. *Posterior arm of cross often narrowed, and thus both anterior and posterior arms roughly similar in development.* Lateral arms usually reaching sides of body; typically spanning 2–3 segments (see inset), but sometimes narrowed to a single segment (above). Larva to about 1cm.



OCCURRENCE Woodlands and forests from Pacific Coast to Maine south to Georgia (in mountains) and Mississippi. One generation with mature caterpillars in July and August over much of East; Richard Heitzman (pers. comm.) records a partial second generation in Missouri.

COMMON FOODPLANTS Basswood, beech, birch, cherry, chestnut, hickory, oak, sour gum, witch hazel, and many other woody plants.

REMARKS Adults fly in May and June, nearly a month before our other button slugs.

Tortricidia and other slug caterpillars are best found by searching the undersides of smooth-leaved, woody plants. Low branches and saplings are the most productive. Basswood, cherry, maple, and oak are good foodplants to begin your search. Cocoons may be overwintered in a cool garage; mesh-covered containers allow for easy misting or wetting once a month or so. To keep an eye on development, try what Marc Epstein does—he slices off a section of the cocoon and glues a microscope slide cover slip over the opening.



RED-EYED BUTTON SLUG*Heterogenea shurtleffi*

RECOGNITION Broadly oval, smooth, *pale green* caterpillar often with *purple to red dorsal spot surrounded by diffuse yellow patch*. Dorsal red spot, when present, often infused with blue. Subdorsal stripes best developed rearward. *Anterior end with yellow ridge that is edged below with red*. Frequently with vague red middorsal spots over anterior segments. Rear projects to form stubby tail. Becoming translucent along sides. Larva to 1cm. Most similar in appearance to Early Button Slug (*Tortricidia testacea*) but reliably distinguished from it by yellow yoke at anterior end of body and more reduced dorsal markings.



OCCURRENCE Woodlands and forests from New York and New Hampshire (rarely) south to Florida and Texas. One generation in North; three or more southward, with mature caterpillars from May onward.

COMMON FOODPLANTS Beech, chestnut, ironwood, oak, and presumably other woody plants.

REMARKS This is a small species with rapid development, sometimes passing through its six larval instars in only a few weeks. It is unusual among our slugs in seeking out a crevice along the bark of its foodplant in which to spin its cocoon and pass the winter (Dyar 1898). To obtain eggs of slug caterpillars, hold females in smooth-walled containers: glass jars, film canisters, and self-sealing plastic bags all work. Add a small moistened plug of cotton. I incubate my eggs in open containers exposed to normal humidities, misting them lightly once every few days until they hatch. Upon emergence, I transfer each caterpillar with a pin onto the underside of a fresh oak leaf that is held in a water pick, then lightly mist the foliage so that each caterpillar will have an opportunity to drink some water.

ELEGANT TAILED SLUG*Packardia elegans*

RECOGNITION Elongate-oval, *yellow-green* slug with *pronounced tail*. *Dorsum dappled with darker greens and wavy (crenulate) yellow subdorsal stripes*. Pointed tail may be marked with a red line above. No stinging spines in last instar. Larva less than 1.5cm. Jeweled Tailed Slug (*Packardia geminata*) larger, blue-green, tending to be more densely pigmented with a whiter and straighter subdorsal line (inset). It co-occurs with the Elegant Tailed Slug over much of the East, and shares many of its same foodplants.

OCCURRENCE Woodlands and forests from northeastern Missouri to Quebec and Maine south to northeast Georgia. One generation with mature caterpillars from July to September.

COMMON FOODPLANTS Beech, cherry, oak, and other woody plants.

REMARKS The Elegant Tailed Slug shows a decided preference for low-growing vegetation. Caterpillars are commonly found on leaves growing within centimeters of the ground. Thin leaves on plants growing in shade are favored. The taxonomic status of a third member of the genus, *Packardia albipunctata*, is still under study, but it appears to be no more than a dark form of the Jeweled Tailed Slug. Occasionally the tail is broken off in *Packardia* larvae. For an unusual look into the world of slugs, place your caterpillar in a clear glass jar or on a glass slide and examine its transparent underside with a lens or microscope.

YELLOW-SHOULDERED SLUG*Lithacodes fasciola*

RECOGNITION Broadly *trapezoidal in cross section*, nearly two times wider than high. *Bright yellow-green with pocked and granulated surface*. Yellow subdorsal stripes connected by transverse yellow line behind head. Subspiracular stripe broken into yellow dots. Body pocked with yellow-edged depressions. Rear projects as short, squared-off tail. No stinging spines in last instar. Larva to 1.5cm. *Apoda* caterpillars are similar, but may be distinguished by the presence of dark edging along the inner side of their subdorsal stripes.



OCCURRENCE Woodlands and forests from southern Canada to Florida and Texas. One generation in North and two or more in South with mature caterpillars from May to November.

COMMON FOODPLANTS American hornbeam, apple, beech, birch, blueberry, cherry, chestnut, hickory, honey locust, hop hornbeam, linden, maple, oak, willow, and many other woody plants.

REMARKS Perhaps two-thirds of the Yellow-shouldered Slug caterpillars that I have collected have been parasitized by a tachinid fly. Parasitized caterpillars hosting a fly larva may be recognized by examining the body for a small black spot. Under a lens or microscope the blemish can be seen to be the breathing siphon of a fly maggot that is growing within the caterpillar. The slug's demise is inevitable—these attacks are always fatal and excruciatingly prolonged, with death coming only after the maggot has reached maturity and consumed much of the caterpillar's internal tissues. The caterpillar in the inset faces a similar fate having been parasitized by a braconid wasp whose 11 larvae have exited the host caterpillar and spun cocoons over its dorsum. In Connecticut the Yellow-shouldered is the most commonly encountered slug, especially on non-oak foodplants.

SHAGREENED SLUG*Apoda biguttata*

RECOGNITION *Pale blue-green* with creamy subdorsal stripe that is darkened along its inner edge. Integument granular, somewhat sparkling under hand lens. Body more or less trapezoidal in cross section. *Yellow subdorsal stripes are not connected by short transverse bar over prothorax*. Rear with *short, squared-off tail*. No stinging spines. Larva less than 2cm. Body not noticeably pocked as in the Yellow-shouldered Slug (*Lithacodes fasciola*). Yellow-collared Slug (*Apoda y-inversum*) with yellow rim along front edge of thorax, more pronounced subdorsal lines, and small blue-black spot over each segment along inner edge of subdorsal stripe; in my images body relatively higher and more trapezoidal as well (inset).

OCCURRENCE Woodlands and forests from Missouri to Nova Scotia south to Florida and Texas. One generation in North and two or more in South with mature caterpillars from May onward.

COMMON FOODPLANTS Especially beech and oak, but also reported from American hornbeam and hickory.

REMARKS White oak is a preferred foodplant—searches are best focused on low branches. First instars of *Apoda* do not feed. Early instars carve distinctive tracks in the leaf as they feed, which are roughly the width of the caterpillar and 3–8 body lengths in reach.

SKIFF MOTH*Prolimacodes badia*

RECOGNITION Coloration highly variable but *shape unmistakable*. Smooth, spindle-shaped caterpillar with flat dorsum and steeply angled sides. Abdomen cresting over A4 with small subdorsal flange to either side that is often brown. Posterior end produced into short, sharp tail. Rounded white spot above spiracles on A7 and A8. No stinging spines. Larva to 1.5cm.



OCCURRENCE Barrens, woodlands, and forests from Illinois to southern Maine south to Florida and Texas. One generation in North, evidently two or more southward with mature caterpillars from June onward.

COMMON FOODPLANTS Birch, blueberry, cherry, chestnut, gale, hawthorn, hop hornbeam, maple, rose, oak, poplar, willow, and many other woody plants.

REMARKS The Skiff Moth caterpillar's pattern often includes markings that resemble necrotic patches of leaf tissue. Occasionally caterpillars are found with an *unpaired, white, oval spot* on the body surface—this is the egg of a parasitic fly. Although these eggs may be removed with a pin, it is almost always too late as the fly maggot hatches quickly and is soon within the caterpillar's body. Curiously, many Skiff Moth caterpillars have a white spot on each side of the body that, at least to my eyes, resembles a tachinid fly egg. What a marvelous evolutionary ploy if this spot affords them some degree of protection (e.g., if there were a tachinid fly that ignored caterpillars assessed as having been previously parasitized by another female). Unlike many of its kin, this slug is sometimes encountered on leaf uppersides. If poked, the larva may exude clear droplets of fluid from ducts along the subdorsal flange. Males fly early and are among the first moths to arrive at lights.

SPUN GLASS SLUG*Isochaetes beutenmuelleri*

RECOGNITION *Flattened*. Late instars *pale green with crown of 18 hairy lobes that radiate from sides of body*. Largely transparent with heart and gut visible as dark green middorsal "stripe," flanked by upright translucent knobs bearing dozens of stinging spines. Last instar (inset) covered by densely setose fleshy lobes (see Remarks). Larva to 1cm.



OCCURRENCE Woodlands and forests from Missouri to southeastern New York south to Florida and Texas. One generation in northern part of range, evidently two or more generations in Gulf States with mature caterpillars from July onward.

COMMON FOODPLANTS Beech and oak.

REMARKS As they glide over a leaf, slug caterpillars deposit a shiny silken "runway." That of the Spun Glass Slug is easily tracked by tilting the leaf and following its shiny trail. Look for caterpillars by turning leaves or examining limbs from below—branches at chest height often yield caterpillars. The caterpillar figured here is typical for the middle through penultimate instars. The eighth and final instar is a strange insect, so enshrouded in hairs that the caterpillar's body is scarcely visible (inset). During the course of the last instar, the fleshy lobes elongate, giving the caterpillar greater height. One old account described the caterpillar as "one mass of delicate floss of finely spun glass." Prior to cocoon construction the "glass" lobes are shed.



MONKEY SLUG (HAG MOTH)

Phobetron pithecium



RECOGNITION Unique, sporting *three pairs of long "arms" and three additional pairs about half as long.* (In case you are looking for the head, two of the three shorter pairs arise from anterior end of body.) Arms deciduous—caterpillars often with missing or shortened lobes. Each arm densely packed with hairlike setae. Larva to 2.5cm.

OCCURRENCE Shrubby fields, woodlands, and forests from Quebec to Maine south to Florida and Arkansas. One generation in North and two or more in South, with mature caterpillars from June to November.

COMMON FOODPLANTS Apple, ash, birch, cherry, chestnut, dogwood, hickory, oak, persimmon, walnut, and willow, as well as many other woody shrubs and trees.

REMARKS Contrary to Forbes (1923) and popular belief, this caterpillar does not sting (or at least I failed to get a response from the single individual that I pressed into my arm). It is claimed that the Monkey Slug mimics the cast skin of a tarantula. At first I regarded the notion as fanciful, since over much of its range in the United States there are no tarantulas. Yet, credence is lent to the supposition when one considers that *Phobetron* is principally a tropical genus and that many of our eastern insectivorous birds winter in the Neotropics. My colleague Richard Heitzman has suggested that the adult female Monkey Slug mimics a bee, even to the point of having her legs appearing to be well provisioned with pollen (via her enlarged mesotibial scale tufts). Her largely diurnal mate (shown here), on the other hand, is clearly a wasp mimic. If ever there was a moth with reason for an identity crisis it is the Monkey Slug—should the above prove correct, then the same insect mimics three different organisms depending on its age and sex.



NASON'S SLUG

Natada nasoni



RECOGNITION *Stocky, trapezoidal in cross section.* Green with two rows of stinging spines down each side. Dorsal spines borne from red-orange warts connected by yellow stripe that extends rearward from T2. Faint beaded pattern running down dorsum. Larva to 2cm.

OCCURRENCE Woodlands and forests from Missouri to Long Island south to Florida and Mississippi. One generation through much of its eastern range, but with additional broods from Missouri southward where mature caterpillars occur from July onward.

COMMON FOODPLANTS American hornbeam, beech, chestnut, hickory, hop hornbeam, oak, and other woody plants.

REMARKS Upon completing a molt, slugs have the curious habit of consuming their old skin—it is unclear if the skin provides nutrients or this is done to "sanitize" the leaf where the caterpillar soon will be taking meals. The stinging spines of Nason's Slug are retractile: normally only their tips are exposed, but spines may be quickly everted and splayed in the presence of danger. Although regarded as generally scarce, this species is among the most common slugs in foothills of the southern Appalachians. *Natada* is an enormous worldwide genus—seven species fly sympatrically at La Selva Biological Station, a lowland tropical rainforest in northeastern Costa Rica, where I work.

CROWNED SLUG*Isa textula*

RECOGNITION Pale green, flattened, with lobes bearing numerous stinging spines radiating out from perimeter of body. Additional stinging hairs arise from paired lobes running down dorsum. Middorsum often marked with red or yellow, especially in latter instars and over segments towards rear of body. Anterior end of body produced forward and edged with orange or red. Larva to 1.5cm.

OCCURRENCE Woodlands and forests from Minnesota, southern Ontario, and Massachusetts to Florida and Mississippi. One generation in North, evidently two or more southward with mature caterpillars from June onward.

COMMON FOODPLANTS Commonly oak, also basswood, beech, elm, hickory, maple, and other woody plants.

REMARKS Upon encountering the Crowned Slug, one's first impression might be that this creature has somehow lost its way out of an Amazonian jungle. In fact, other *Isa* and related slugs are primarily tropical in distribution. So in a sense, with this slug we enjoy a bit of the jungle here in eastern North America. Grazing early-instar *Isa* caterpillars leave telltale zigzagging tracks, scarcely wider than the caterpillar, in the lower side of the leaf. The caterpillars may be active very late in the season, sometimes dropping down with autumn rains and winds. The first instars of our stinging slugs (e.g., *Acharia*, *Adoneta*, *Euclea*, *Isa*, *Monoleuca*, *Natada*, and *Parasa*) do not feed—perhaps, not surprisingly, this instar lasts but a day or two (Dyar 1896–1914).

**PURPLE-CRESTED SLUG***Adoneta spinuloides*

RECOGNITION Small with undulating red- to purple-brown dorsal markings bounded with lemon yellow. Body flattened above, sloping downward at rear of body. Sides blue-green. Anterior end with three pairs of reddish spine-tipped knobs; posterior end with one, larger, gumdrop-shaped pair. Lateral row of green stinging spines. Larva to about 1cm. A second member of the genus, *Adoneta bicaudata*, occurs locally in the East. The purple is more restricted in extent, limited mostly to two, rounded, diamond-shaped spots over the abdomen which are connected by a narrow middorsal line (inset). The posterior knobs are hornlike, being more narrowed, inwardly curved, and 2–3 times longer than those of *A. spinuloides*.

OCCURRENCE Woodlands and forests from Missouri to southern Quebec south to Florida and Mississippi. One generation in North, evidently two or more southward with mature caterpillars from June onward.

COMMON FOODPLANTS American hornbeam, basswood, bayberry, beech, birch, black gum, cherry, chestnut, oak, willow, and other woody plants.

REMARKS August and September are good months for “slug searches” in the Northeast. Early successional and open woodlands or woodland edges seem to be the most productive. Turn branches and inspect leaf undersides. Low-growing limbs and leaves on saplings are best. The sting of the Purple-crested Slug is mild, scarcely noticeable after just a few minutes. Like so many of our slugs, it is susceptible to attack by a tachinid fly, whose presence can be detected by carefully inspecting the integument for the fly maggot's black anal breathing tube, which the maggot pushes out through one wall of the caterpillar's body.



PIN-STRIPED VERMILION SLUG*Monoleuca semifascia*

RECOGNITION Salmon, pink, or most commonly bright red with dorsal and lateral areas each with set of three thin blue-black stripes. Fascicles of 20 or more short, whitish, stinging spines grouped in four lines that run length of body. Anterior end bears four dark (gumdrop-like) conical projections of equal size; posterior end with only two proportionately longer projections. Two prominent patches of dark deciduous spines at posterior end of body. Larva less than 2cm.

OCCURRENCE Barrens northward, dry woodlands and forests in the South; Missouri to Long Island south to Florida and Texas. One generation northward with mature caterpillars in August and September; present throughout much of year in Florida.

COMMON FOODPLANTS Cherry, oak, pecan, persimmon, and presumably many other woody plants.

REMARKS This is a species of barrens and xeric woodlands. The three other *Monoleuca* that are listed by Kimball (1965) from Florida appear to represent nothing more than forms of the Pin-striped Vermilion Slug. The eggs, laid in clusters of 20 or more, are quite unlike those of other slugs: rather than being flattened, they are somewhat raised and covered with hairlike scales from the female's abdomen.

**SPINY OAK-SLUG***Euclea delphinii*

RECOGNITION Exceptionally variable in color but recognizable by its overall shape and the two or four patches of black deciduous spines at rear of body (in last two instars). Ground color pink, orange, red, yellow, green, or tan. Anterior end possessing three pairs of elongate, subdorsal lobes each bearing numerous stinging spines; posterior end with two pairs of elongated subdorsal lobes. Sides with shallow depressions ringed with black or white situated between subdorsal and subspiracular lobes. Larva to 2cm. Stinging Rose Caterpillar (*Parasa indetermina*) has longer lobes, no detachable spine patches, and distinctive pinstripping over dorsum and sides.

OCCURRENCE Barrens, woodlands, and forests from Missouri to southern Quebec and Maine south to Florida and Texas. A single generation over much of East with caterpillars from late June to October; two generations in Missouri and presumably more in Deep South.

COMMON FOODPLANTS Apple, ash, basswood, beech, birch, blueberry, cherry, chestnut, hackberry, hickory, maple, oak, poplar, sycamore, willow, and many other woody plants.

REMARKS Eggs are laid singly or in small clusters. Dyar (1896) regarded Spiny Oak Slug caterpillars to be somewhat secretive and noted that they sometimes hide between leaves by day. Although exceeding other slugs in number of spines, the sting is mild, considerably less severe than that of the Saddleback Caterpillar (*Acharia stimulea*). The dark spine clusters, which are added in the last two instars to the rear of the body, are curiously variable in their expression—they may be essentially absent, occur as a single pair, or, as is most often the case, be represented by two pairs of four dark gumdrop-shaped patches. A tachinid fly has deposited two eggs (the white spots) on the larva in the lower right image.



SMALLER PARASA*Parasa chloris*

RECOGNITION Strongly humpbacked pink, tan, or orange caterpillar with white and red-edged venter and elongate "tail." Abdomen marked with vague wavy lines. Anterior end with three fascicles of whitish stinging spines: largest group arising from top of hump. Posterior end with two prominent clusters of whitish stinging spines. Smaller spine clusters, which follow along a black subdorsal line, connect the two groups. Larva less than 2cm. Earlier instars less angulate with rosettes of exposed spines (inset)—while resembling a *Euclea*, the young caterpillars are distinctly humpbacked with enlarged anterior segments.

OCCURRENCE Barrens, woodlands, and forests from Missouri to southern New England south to Florida and Texas. One principal generation with mature caterpillars from July to October; at least a partial second generation from Missouri southward.

COMMON FOODPLANTS Apple, beech, birch, cherry, dogwood, elm, oak, and many other woody plants.

REMARKS Look for caterpillars on the leaf undersides of shaded branches. The stinging spines are retractible, with only the tips protruding when the caterpillar is feeding or resting. Once alarmed, the fleshy warts, bearing batteries of stinging spines, are everted.

STINGING ROSE CATERPILLAR*Parasa indetermina*

RECOGNITION Yellow, orange, or red caterpillar with long, subdorsal lobes bearing numerous stinging spines on T2, T3, A1, A4, A7, and A8. No patches of dark deciduous stinging spines at posterior end of body. Dorsum marked with four dark and three pale pinstripes; sides of body also with four black pinstripes. Larva to 2cm.

OCCURRENCE Coastal scrub, barrens, woodlands, and

forests from Illinois to Long Island south to Florida and Texas. Evidently at least a partial second generation from Missouri southward with mature caterpillars from late June onward.

COMMON FOODPLANTS Apple, cherry, dogwood, gale, hickory, maple, oak, poplar, rose, and many other woody plants.

REMARKS Slugs soon become a favorite of most caterpillar hunters, largely because of their interesting forms and beautiful colors. They have even more to offer to those who have access to a dissecting microscope. The flat, transparent eggs allow one to watch the entire development of the caterpillar—a fascinating exercise to be sure.



SADDLEBACK CATERPILLAR

Acharia stimulea



RECOGNITION A striking and aptly named caterpillar sporting beautiful *greenish saddle over the abdomen*. Saddle edged with white inwardly and outwardly. *Lobes at either end of body fiercely armed with stinging spines*. Larva to 3cm. In younger caterpillars body color more rusty and sting-bearing lobes at either end proportionately longer.

OCCURRENCE Fields, gardens, edges of wetlands, and woodlands, from Missouri to Massachusetts south to Florida and Texas. One generation over much of range with mature caterpillars from August through October.

COMMON FOODPLANTS Generalist on many plants including apple, aster, blueberry, buttonbush, cabbage, citrus, corn, grass, maple, oak; commonly reported from a variety of garden and ornamental species.

REMARKS Egg are laid in clutches. Initially Saddleback Caterpillars are gregarious, feeding in groups of 30–50 individuals. Older larvae are solitary (although some of its tropical relatives remain clustered). The sting of the Saddleback Caterpillar may be the most potent of any North American caterpillar. In part this is due to the caterpillar's size. The length and diameter of the stinging spines are considerably greater than those of the other slugs in our region. In addition, it has an enormous number of stinging spines, especially about the two ends of the body. When prodded the caterpillar arches its body in such a way as to bring more spines to bear on its attacker. Because the larval spines may accumulate about the cocoon, even this must be handled carefully if stings are to be avoided. The adult is uncommon at light, even in places where the caterpillars are frequently encountered.



FLANNEL MOTHS – MEGALOPYGIDAE

Although they appear soft and harmless, flannel moth larvae are among our most well-defended insects. Beneath the soft outer hair are warts fortified with hollow, poison-filled stinging spines that are capable of delivering painful stings. Only four species of this largely Neotropical family extend into our region. The biological station where I work in Costa Rica is home to 15 species; the country has in excess of 40. Caterpillars of one particularly large Amazonian species reach more than 8cm; stings from this behemoth, “el raton” (the rat), have purportedly resulted in human deaths.

RECOGNITION

Accessory prolegs on abdominal segments A2 and A7 (in addition to normal complement on A3–A6) immediately distinguish our flannel moths. Neither pair of the accessory prolegs bears crochets in our North American species. Three rows of setal tufts (subdorsal, supraspiracular, and subspiracular) bear mixtures of stinging and longer hairlike setae. Look for a fleshy lobe positioned behind each of the spiracles (these are visible in White Flannel Moth image, see page 56).

LIFE HISTORY NOTES

The eggs are covered with hairlike scales from the female abdomen. Our megalopygids appear to be broadly polyphagous on woody plants. Like slug caterpillars, the head is enveloped by the thorax when the caterpillar is feeding (see image of White Flannel Moth). They overwinter in a dense, grayish, spindle-shaped cocoon often spun along the lower trunk of the food-plant. Adults emerge through a circular operculum at one end of the cocoon.

Reaction to the stings may be severe. Even hairs from the body may be problematic for some. Do not leave caterpillars where others, and especially children, might unknowingly handle these seemingly harmless creatures. Until potential symptoms and dangers are better understood, I recommend leaving these caterpillars where you find them. What few collecting and rearing tips I can add for flannel moths appear in the species accounts.



Larval development in Black-waved Flannel Caterpillar (*Megalopyge crispata*)

BLACK-WAVED FLANNEL CATERPILLAR*Megalopyge crispata* (= *Lagoa crispata*)

RECOGNITION Orange to gray, densely hairy caterpillar with variously developed middorsal crest of darker setae.

Body tapering rearward to wispy tail that scarcely extends beyond body. Larva less than 3cm. Earlier instars bear a wild flurry of long white setae (see top image on page 53).

Caterpillars of Yellow Flannel Moth (*Megalopyge pyxidifera*) indistinguishable to my eye; Pennsylvania south to Florida and Mississippi.

OCCURRENCE Fields with woody growth, woodlands, and forests, from Missouri to New Hampshire (especially along coast in New England) south to Florida and Louisiana. One generation northward; presumably two or more southward with mature caterpillars from June onward.

COMMON FOODPLANTS Alder, apple, birch, blackberry, cherry, hackberry, oak, persimmon, poplar, sassafras, wax myrtle, willow, witch hazel, and many other woody plants.

REMARKS A good way to find caterpillars is to go into fields with widely scattered cherry saplings. Examine the underside of leaves on branches growing within a meter or so of the ground. Coastal meadows and fields are productive in southern New England. Once, while servicing my caterpillar collections, I managed to inhale what I suspect were setae from a *Megalopyge* caterpillar (or its cast skin). This precipitated a severe reaction: my nose started dripping, then running, but soon thereafter clogged completely. Pressure started to build in my sinus (just on one side), enough to put considerable internal pressure on my eye. About this time I decided to check myself into the nearest emergency room, where I did what most do in emergency rooms—sit and wait. Fortunately, the reaction subsided within an hour, so I discharged myself, and returned home to finish servicing my caterpillar collections. Thereafter, I have been reluctant to reproduce this experience by “reinoculating” myself.

**PUSS CATERPILLAR (SOUTHERN FLANNEL MOTH)***Megalopyge opercularis*

RECOGNITION Densely hairy, gray to tan caterpillar with middorsal crest of rusty to smoky setae.

Body tapering rearward to thick tail that extends well beyond body (greater than two body segments). Larva less than 3cm. Middle instar disheveled, with long, often curly hairs extending in all directions and a tangle of rusty and smoky setae over dorsum; pelt considerably sparser—stinging spines visible along sides of body; “tail” setae long but not gathered into bundle (inset below).

OCCURRENCE Woodlands and forests from Missouri (historic?) to Maryland south to Florida and Texas. In Deep South it has multiple generations with mature caterpillars from spring onward.

COMMON FOODPLANTS Widely polyphagous on woody plants. Covell (1984) lists almond, apple, birch, hackberry, oak, orange, pecan, persimmon, and rose.

REMARKS This caterpillar is known locally in Texas and elsewhere as the Asp. Reports of stings are common, especially from the Gulf States. People are occasionally stung while doing yard work or walking off-trail through woodlands, when the caterpillars are inadvertently brushed. The sting described below by Joe Culin (for the White Flannel Moth) is probably a typical reaction for our *Megalopygids*. Sensitive individuals who begin to develop systemic symptoms should seek immediate medical attention. Gravid females lay readily if held in a container for a night or two.



WHITE FLANNEL MOTH

Norape ovina



RECOGNITION Distinctively patterned yellow, orange, and black caterpillar. Stinging spines and postspiracular lobes clearly visible. Some lateral hairs more than two times body width. Dark quadrangular patch over dorsum of A1–A7. Thoracic segments smoky orange above. Larva less than 3cm.

OCCURRENCE Fields and woodlands from Missouri to

Washington DC south to Florida and Texas. Two generations over most of range with mature caterpillars from late May onward; presumably with additional broods in Deep South.

COMMON FOODPLANTS Black locust, greenbrier, elm, hackberry, redbud, and presumably other woody plants. This caterpillar was reared on shade leaves of white oak.

REMARKS My colleague Joe Culin had this to stay about the White Flannel Moth: "... the guy who collected it said that it stung him but I picked it up with my fingertips and did not get stung. So, perhaps fool that I am, I gently rubbed the inside of my wrist over it. It took probably a minute and a half or two minutes, but it started with an itchy burning that within five minutes turned to a red spot the size of a quarter. After about 15 minutes, three white blisters appeared that lasted about two hours, burning the whole time, but gradually diminishing in intensity (the blisters also shrank to nothing in that time). After the blisters disappeared, the itching lasted another several hours, and the redness until the next morning." This caterpillar (shown above) took eight weeks to mature in the lab.



SMOKY MOTHS – ZYGAENIDAE

This heterogeneous family of about 1,000 species is most diverse in the Neotropics and Old World. Only four of the 22 species that occur north of Mexico are found in the East; most of the others are Southwestern. The caterpillars are stout and often flattened. As in related families, the head is partially covered by a fleshy extension of the prothorax. In our species the crochets, all of one size, are in a single band. At least two of the Eastern species feed on grape as do many Western smoky moths. Oddly, caterpillars of the Orange-patched Smoky Moth (*Pyromorpha dimidiata*) feed on dead leaves.



GRAPELEAF SKELETONIZER

Harrisina americana

RECOGNITION Boldly set with ten bright yellow and 11 black bands. Black bands include tufts of short, shiny black setae. Gregarious. Black subdorsal stripe with spur reaching subventer on T3 and A1. Sides waxy white. Four long white setae extend from either end of body. Larva to 1.5cm.

OCCURRENCE Fields and woodland edges from Missouri to New Hampshire south to Florida and Texas. One generation northward; up to three broods in Missouri with mature caterpillars from late May onward; breeding nearly year-round in parts of Florida and Texas.

COMMON FOODPLANTS Grape and Virginia creeper.

REMARKS Gregarious in early instars but then striking out in small groups; solitary by last instar. The larval aggregations, always on leaf undersides, are impressive with dozens of the bright, warningly colored caterpillars lined up side by side. Contact with the larvae (hairs) may result in a rash for 1–3 days. The life cycle takes about 65 days with 40 of these spent as a caterpillar. The pupa overwinters in a cocoon spun among fallen leaves at the base of the foodplant.



SKIPPERS – HESPERIIDAE

More than 280 skippers have been recorded north of Mexico, although a great many of these occur only along our southern border and especially in Texas. Skippers are very diverse in the tropics, particularly across ecotones where early successional areas and forest intermix. Although skippers are our most numerous lepidopteran garden visitors, few people are familiar with their distinctive caterpillars: they are a furtive lot, feeding at night and retiring to silken leaf shelters by day. The majority of our grass-feeding species are seldom seen. Because only a few skipper caterpillars are apt to be encountered by users of this guide, I have given them short shrift, especially the grass skippers (*Hesperinae*). Readers are encouraged to consult Allen (1997), Allen *et al.* (2005), and Minno *et al.* (2005), which do more to give skipper caterpillars their due.

RECOGNITION

The narrow neck and enlarged head will distinguish nearly all of our skippers. The body is somewhat spindle-shaped, usually thickest in the midabdominal segments, and densely vested in short, fine setae (a hand lens may be needed to appreciate their number). Skippers possess an anal comb (a toothed, fan-shaped plate above the anus) that facilitates the ejection of their excreta. The crochets of two or three different lengths are arranged in a circle.

LIFE HISTORY NOTES

The relatively large hemispherical eggs are laid singly or, rarely, in small clusters. All instars construct shelters. Early instars either roll a leaf (grass-feeders) or cut two transverse channels into a blade, draw the free section upward, fold it over, and tie down the flap with silk (insets). Many grass skippers incorporate wax from glands on their abdominal venter into the walls of the shelter and cocoon. Nearly all overwinter as partly to fully-fed larvae.



COLLECTING AND REARING TIPS

The best way to secure livestock may be to follow an ovipositing female and gather a few eggs. Finding caterpillars of those species that feed on dicotyledonous foodplants is practically routine—the characteristic leaf-flap shelters are recognizable at a distance. By contrast, I have had little success searching for grass skippers. Watch for rolled leaves (young instars) or tubular shelters incorporating a few leaves (middle and late instars). In bunch grass-feeders it is often possible to find accumulations of pale brown frass in the vicinity of the larva. Patience or doses of luck are required—grass skippers rarely occur in high density. Often it is possible to switch grass- and sedge-feeders from their original foodplant to yard grasses such as bluegrass and orchard grass. I often supply potted grasses and sleeve the container, so that I do not have to worry about the daily maintenance of the caterpillars.

Spread-wing Skippers – Subfamily Pyrginae

Temperate representatives have rather modest patterning and tend to be heavily salted with minute white spots. Many feed on broad-leaved plants, especially members of the pigweed (*Chenopodiaceae*), legume (*Fabaceae*), mallow (*Malvaceae*), and oak (*Fagaceae*) families. Foodplant identifications are helpful in establishing larval identities. The large eggs are ribbed or have reticulations.



SILVER-SPOTTED SKIPPER

Epargyreus clarus

RECOGNITION Readily recognized by its *yellow color, somewhat wrinkled appearance, and bold orange head spots*. Each body segment ringed with alternating yellow and green bands. Often with elongate dark spot above spiracle on A1–A7. Larva to 3.5cm. Zestos Skipper (*Epargyreus zestos*) similar, but yellow rings subdued and averaging more green; it feeds on *Galactia* in southern Florida.

OCCURRENCE Woodland and forest clearings, fields, gardens, and empty lots from lower Canada south in East to Florida and Texas. Two or three generations over most of range with mature caterpillars from June onward; throughout growing season in Deep South.

COMMON FOODPLANTS Cassia, false indigo, groundnut, locust, rose acacia, wisteria, and other legumes.

REMARKS Skippers employ their anal comb to forcibly propel their excreta from the feeding shelter. The comb works as a mechanical latch that engages tissue about the anus. After a frass pellet has been pushed to the ready position, blood pressure in the hind end is increased to as much as 60 millibars before the comb finally releases and sends the pellet sailing—up to 153cm or 38 body lengths in this species (Weiss 2003). As both predatory and parasitic wasps are known to use the volatiles in feculae to locate their prey, there are clear survival advantages to caterpillars that have evolved mechanisms to “ballistically” eject their droppings.



BEAN LEAF ROLLER (LONG-TAILED SKIPPER)*Urbanus proteus*

RECOGNITION Yellow-green caterpillar with fine black middorsal, broader yellow subdorsal, and creamy subspiracular stripes. *Adjacent to eyes, orange spots separated by large, black medial spot.* T1 with shiny black thoracic shield. *Subdorsal stripe gives way to diffuse orange patch over A8 that continues to anal plate.* Midabdominal prolegs marked with orange. Larva to 3.5cm. Dorantes Longtail (*Urbanus dorantes*) more subdued in coloration: head more uniformly brown, body tending towards brown, and subdorsal stripes wanting; beggar's ticks and other legumes. Several other Longtails (*Urbanus*) species occur sporadically in the Rio Grande Valley of Texas.

OCCURRENCE Forest edges, pinelands, fields, gardens, and other open habitats. Resident in Florida and Texas and perhaps along Gulf north to coastal South Carolina, straying northward to coastal New England, Illinois, and Kansas; at least three generations in Deep South with mature caterpillars throughout growing season.

COMMON FOODPLANTS Beans, beggar's ticks, butterfly pea, and others; especially viney legumes.

REMARKS The larva feeds concealed within a leaf shelter. The caterpillar makes its "nest" by drawing up the edges of a single leaflet or silking together two or more overlapping leaves. Through the course of its development, each larva will make several shelters, typically in the vicinity of one another. Opler (1992) notes that Longtails are freeze-intolerant and overwinter as reproductively arrested adults in tropical and subtropical areas of mild climate.

**HOARY EDGE***Achalarus lyciades*

RECOGNITION Green to pinkish with smoky middorsal and orange subdorsal stripe running length of abdomen. Nearly black head and prothoracic shield. *Setae on head erect.* *Upper half of body densely salted with orange to white spots* that are especially conspicuous over dorsum. Spiracles relatively large, blackened. Larva to 3.5cm. Cloudywings (*Thorybes*) have similar caterpillars, but are less hairy, and the setae on head are shorter, down-curved, and mostly directed forward.

OCCURRENCE Woodland and forest trails and edges in North; oak and pine woodlands in South. Wisconsin to central New Hampshire, south to northern Florida and eastern Texas. In Northeast, one generation with caterpillars maturing late July to September; two broods over much of East with mature caterpillars from May onward.

COMMON FOODPLANTS Beggar's ticks and less frequently bush clover and wild indigo.

REMARKS Throughout its range the Hoary Edge has a long flight period, and often small facultative broods—expect to find the occasional caterpillar out of season. In the fall, mature larvae crawl down into leaf litter to form cocoons in which they will spend the winter. Pupation follows with the return of warmer springtime temperatures. Given that adults of the Hoary Edge are more apt to frequent wooded and partially shaded areas, I expect that the caterpillars also occur on plants found in more shaded areas than those routinely utilized by our cloudywings.



NORTHERN CLOUDYWING

Thorybes pylades



RECOGNITION Pale green to brown body vested in short hairs, many of which arise from creamy spots.

Vague or blurry smoky middorsal stripe and a creamy to yellow subdorsal stripe that typically begins on T3 and runs to A8. Spiracles pale. Larva to 3cm. I am unaware of characters that can be used to separate caterpillars of the Northern Cloudywing from those of Southern Cloudywing (*Thorybes bathyllus*) and Confusing Cloudywing (*T. confusus*).

Also similar to Hoary Edge (*Achalarus lyciades*, see page 61) but not as hairy and the hairs on head directed forward in cloudywings.

OCCURRENCE Forest and woodland clearings, powerline right of ways, brushy fields, grasslands, and meadows, from central Canada south in East through Florida and much of Texas. A single generation in Northeast with caterpillars maturing in July and August; two or more broods in Missouri; present throughout the growing season in parts of Florida, along Gulf, and southern Texas.

COMMON FOODPLANTS Many legumes including beggar's ticks and bush clover.

REMARKS The aforementioned legume-feeding skippers (*Achalarus* and *Thorybes*) are conspicuous in their egg-laying behavior. A sporting way to secure livestock of known identity is to follow females as they move about patches of their foodplants. Ovipositing females have a distinctive fluttering flight, with frequent touchdowns to "taste" foliage of possible foodplants with their feet and genitalia. Presumably the caterpillars leave the plant and seek a cocooning site in leaf litter. Pupation presumably occurs in the spring. Careful study of our cloudywings will surely reveal differences in the larval characters and habits of our three Eastern species.



DREAMY DUSKYWING

Erynnis icelus



RECOGNITION Most readily distinguished by its diet, being our *only willow- and poplar-feeding skipper*. Pale green ground color abundantly dappled with white dots. Heart visible as darkened green middorsal stripe; creamy subdorsal stripe most evident on A1–A8. Head brown to orange-brown without prominent orange spots of many of our other duskywings. Larva to 2.5cm.

OCCURRENCE Forest clearings and roads, wet meadows, fields, and other open areas near rivers, lakes, and other bodies of water from central Canada south in East to northern Georgia and Alabama (mountains) and Ozarks. One generation with mature (overwintering) caterpillars from August to May.

COMMON FOODPLANTS Aspen, poplar and willow, but also locust (see below), as well as birch.

REMARKS Once one develops a search image for the larval shelters, caterpillars can be reliably found from June until leaf fall, especially by searching aspen. I have found caterpillars feeding on locust on two occasions. In many parts of the Appalachians bristly locust appears to be the principal foodplant of this skipper. While I initially suspected these individuals represented a cryptic species, I now am leaning toward the notion that duskywings may be more polyphagous than previously thought (cf. Juvenal's Duskywing). Opler (1992) also lists birch as a foodplant. The fully-fed larva overwinters in its shelter, dropping to the ground with leaf fall. In all our duskywings pupation occurs in late winter or early spring, often in a newly made leaf shelter.



JUVENAL'S DUSKYWING

Erynnis juvenalis



RECOGNITION Ground color ranges from pale waxy to yellow-green. Markings over body like those of other duskywings: there is a *green heart line* and *pale subdorsal stripe*, either or both of which may be indistinct. *Three orange spots on each side of light to deep orange-brown head*, occasionally upper two spots may fuse. Larva to 3cm. Two other oak-feeding duskywings are widespread in East. Caterpillar of Horace's Duskywing (*Erynnis horatius*) tends to be a lighter, waxy blue-green, but there is significant overlap in appearance; unlike the Juvenal's Duskywing it is multiple-brooded. The head of the Sleepy Duskywing (*E. brizo*) often has only the lowermost orange spot (Scott 1986), although Allen (1997) figures a larva with all three sets. Additional oak-feeding *Erynnis* occur in south and west Texas. Until reliable characters are discovered, the identification of oak-feeding duskywings should be confirmed through rearing.



OCCURRENCE Forest clearings and roads, woodlands, balds, and oak barrens, straying into many habitats from southern Canada south in East to Florida and eastern Texas. One brood with mature (overwintering) caterpillars from August to April.

COMMON FOODPLANTS Oaks; hickory frequently used in New Jersey (Bob Barber pers. comm.).

REMARKS The caterpillars are slow-growing, taking the whole summer to mature. The fully-fed caterpillar holes up in its leaf shelter and falls to the ground with other leaves. Bob Barber sent this series of three images in which a late season caterpillar's coloration mirrors that of the leaf upon which it has fashioned its shelter.

