Gypsy Moth in Colorado - Identification of Insects and Damage of Similar Appearance

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Figure 1. Gypsy moth egg masses. *Photo courtesy of Daniela Lupastean*

Figure 2. Gypsy moth larva feeding. *Photo courtesy of E. Bradford Walker*

Figure 3. Gypsy moth female laying egg mass. *Photo courtesy of USDA-APHIS*

The gypsy moth (*Lymantria dispar*) is the most important defoliating caterpillar of forest and shade trees in eastern North America. Caterpillars chew leaves of a very wide range of trees and shrubs and sustained defoliation seriously weakens plants. Were it to become established in Colorado it may provide a new source of stress for important forest species including aspen, poplars, and oak.

Gypsy moth is also a regulated insect subject to internal quarantines in the United States. The very presence of established gypsy moth in Colorado could result in trade restrictions of many products. Nursery products originating from gypsy moth infested states require special treatment or are outright banned from shipment to areas where this insect does not occur.

From its original introduction in Massachusetts in the late 1800s, gypsy moth has steadily expanded its range. It is now generally distributed throughout the states east of the Mississippi, excluding the southeastern states. It is also found in parts of Ontario. It recently became well established in Wisconsin. The most severe outbreaks are currently in Michigan.

(The Asian strain of the gypsy moth, *Lymantria dispar dispar*, has been detected at port cities in British Columbia, Washington, and Oregon. This species is not known to be established in North America but is also a threat to forests and shade trees. The insect is virtually identical in appearance, but differs in that females can fly, unlike the European strain.)

The most common way that gypsy moth is transported is in the form of egg masses attached to nursery plants, firewood, outdoor furniture, campers, or trailers that originate from areas where gypsy moth is present (Figure 4). Gypsy moth has been introduced into Colorado on several occasions. Past detections have occurred near campgrounds and in neighborhoods where people have recently moved from gypsy moth infested states.

Figure 4. Gypsy moth female laying egg mass on car tire. *Photo courtesy of Rusty Haskell*

There is in place an extensive effort by the United States Department of Agriculture-Animal and Plant Health Inspection Service in conjunction with Colorado Department of Agriculture and Colorado State Forest Service to detect the presence of these new infestations. Where reproducing populations have been discovered, eradication programs have been put in place that eliminated the infestation. To

date, there are no remaining established populations of gypsy moth in Colorado, although there is continuous threat of reintroduction. (Information on this insect is also available through Colorado State Extension Fact Sheet 5.539. The link to this is http://www.ext.colostate.edu/PUBS/INSECT/05539.html).

Identification of the Gypsy Moth

Figure 5. Gypsy moth larva. *Photo courtesy of PA-DCNR*

The caterpillars are generally dark colored but have some distinctive markings (Figures 5 and 16). Pairs of tubercles, 5 blue and 6 reddish-orange, occur in rows along the back. Gypsy moth larvae have prominent hairs but these do not densely cover the body in the manner of tussock moths, dagger moths or woollybears. Unlike some tent making species, gypsy moth caterpillars do not feed in groups nor do they produce silken tents. A small amount of silk is produced to support the pupal stage but gypsy moth pupae do not occur within a silken cocoon.

Adult females are heavy bodied moths with well developed wings, but are flightless (Figures 3 and 6 - top). The forewings are generally white but have some distinctive black markings: a row of spots along the hind edge, a wavy indistinct band that crosses the wing, and an invert U-shape mark. Male moths are generally brown with darker wavy markings running across the forewing and a lighter and more uniformly colored hindwing (Figure 6 - bottom). Characteristically the wings of the resting males are held so that they give the insect a roughly triangular shape.


Figure 6. Gypsy moth pair. Female moth pictured on top and darker and smaller male moth on bottom. *Photo courtesy of USDA-APHIS*

Eggs are laid in masses, typically on tree trunks (Figure 1). However, the full-grown caterpillars often wander several yards from where they fed and some will pupate throughout the general vicinity of an infested tree. Where ever a female caterpillar pupates, eggs will be laid adjacent to that spot. The egg mass, which typically can contain 600-1,000 eggs, is covered with pale brown hairs plucked from the body of the mother moth.

Methods to Monitor Gypsy Moth

Most monitoring of gypsy moth involves use of traps (Figure 7) that contain the sex attractant (sex pheromone) used by a female gypsy moth to attract a male. These pheromone traps can be very effective in determining if male gypsy moths are present as the lure is highly attractive to the male moth. All initial Colorado detections of gypsy moth have involved use of these traps.

Other stages of the gypsy moth may also be detectable and the egg masses (Figure 22) are particularly distinctive. Gypsy moth caterpillars and adult moths (of both sexes) may be mistaken for some native insects found in Colorado but can be separated easily.


Figure 7. Gypsy moth males in trap. *Photo courtesy William Carothers USDA- FS*

Regional Insects Similar in Appearance to Gypsy Moth - *Male Moths*

Figure 8. *Dasychira grisefecta, D. mescalero,* and *D. vagans.*

There are some closely related moths already established in Colorado that have a general similarity to a male gypsy moth. These are found in two genera - *Dasychira* (Figure 8) and *Orgyia* (Figure 9 - right) - and are known as tussock moths. None of them are highly attracted to the pheromone of the gypsy moth but they can sometimes be found in traps. These moths can be distinguished by wing markings that differ from male gypsy moth. The most common of these and most similar to the gypsy moth is the **Douglas-fir tussock moth** (*Orgyia pseudotsugata*), but it is considerably darker and substantially smaller (Figure 9).

Figure 9. Comparison between gypsy moth (left) and the darker and substantially smaller Douglas-fir tussock moth (right).

In addition other moths may be accidentally captured in a gypsy moth trap. Two species that are commonly found in traps set out in Colorado include:

Western tent caterpillar (*Malacosoma californicum*). The western tent caterpillar is sometimes an abundant insect in late spring and early summer. Adult moths are generally light reddish-brown with distinctive banding, are somewhat smaller in size but have a heavier body than gypsy moth males (Figure 10).

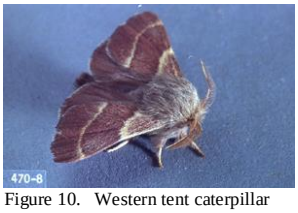

Figure 10. Western tent caterpillar adult. *Photo courtesy of the Ken Gray Collection*

Army cutworm (*Euxoa auxiliaris*). The army cutworm is commonly known in much of Colorado as the "miller moth" that is notable because it's annual migrations from lower elevations to the mountains in late spring and early summer. During outbreak years they may commonly be captured incidentally in all manner of insect traps because of their habit of seeking dark protective sites to spend the day. Color of the moths is extremely variable but often there are kidney shape markings on the wings. Army cutworm moths also do not normally hold their wings to form a triangular pattern, but fold them so that they are straighter (Figure 11).

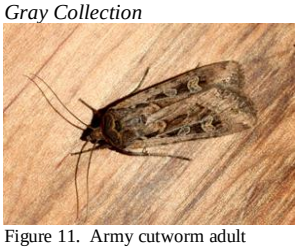

Figure 11. Army cutworm adult

Regional Insects Similar in Appearance to Gypsy Moth - *Female Moths*

Female gypsy moths (Figure 12) will not be attracted to the gypsy moth traps. Furthermore, the European strain of gypsy moth that occurs in the eastern US is flightless, although they possess wings. They are always found very close to where it pupated and is not attracted to lights.

Figure 12. Gypsy moth female. *Photo courtesy of USDA-APHIS*

Despite this, various white colored moths that occur in Colorado are sometimes mistaken for female gypsy moth. There are several such species, all within the woollybear family of moths (Arctiidae). They can be distinguished from the female gypsy moth by either having pure white forewings or forewings with black markings that differ from that of the gypsy moth.

Among the most common white moths found in Colorado that may be mistaken for a female gypsy moth are the following:

Figure 13. *Spilosoma virginica* (female). *Photo courtesy of the Ken Gray Collection*

Virginia tiger moth (*Spilosoma virginica*). This is the adult (figure 13) of the caterpillar known as the yellow woollybear. The forewings are pure white, although a few black spots may be present on the hindwing. There are yellow patches on the abdomen.

Figure 14. Fall webworm (female). *Photo courtesy of H. C Ellis*

Fall webworm (*Hyphantria cunea*). Fall webworm (Figure 14) is a very common caterpillar associated with trees and shrubs, making large loose conspicuous webs in foliage. The adult moth is pure white and lacks the dark wavy band markings of a female gypsy moth.

Cycnia tenera. This moth has forewings that are white and without markings except for a thin orange-brown border along the front edge.

Acrea moth (*Estigmene acrea*). The acrea moth is the adult stage of the saltmarsh caterpillar, one of the most common woollybear caterpillars. The forewings and hindwings have numerous black spots, but lack wavy dark lines and inverted U-shaped markings.

Turuptiana permaculata. This moth has white wings but is highly spotted with black markings.

Figure 15. American dagger moth (female). *Photo courtesy of Joseph Berger*

Dagger moths (*Acronicta americana, A. lepusculina, A. innotata*). Several dagger moths (Figure 15) have a generally pale gray coloration. Wing markings are different from that of the gypsy moth female.

Regional Insects Similar in Appearance to Gypsy Moth - *Caterpillars*

Figure 16. Gypsy moth caterpillar. *Photo courtesy of USDA-APHIS*

Gypsy moth caterpillars (Figure 16) have prominent hairs, but they neither densely cover the body nor occur in tufts. Pairs of raised tubercules, often colorful, line the back of the caterpillar. Many caterpillars of similar size to gypsy moth occur in Colorado and feed on trees and shrubs:

Tent Caterpillars. There are several species of tent caterpillars (*Malacosoma* spp.) that occur in Colorado. They may be most easily distinguished by their habit of feeding in groups and producing dense silken tents in crotches of plants. Tent caterpillars (Figure 17) are less noticeably hairy than gypsy moth larvae and have very different marking.

Figure 17. Western tent caterpillars

(Note: Information on tent caterpillars as well as the following insect, fall webworm, is found in Colorado State Extension Fact Sheet 5.583, *Tent-making Caterpillars*. It can be accessed at: http://www.ext.colostate.edu/pubs/insect/05583.html)

Fall Webworm. Fall webworm (Figure 18) is often the most commonly seen tent making caterpillar in much of the state. Like tent caterpillars they also feed in groups but construct large loose silken tents that cover the foliage on which they feed. Fall webworm caterpillars are usually light brown and lack the colored tubercules on the back that occur with gypsy moth caterpillars.

Figure 18. Fall webworm caterpillars

Tussock Moths. Caterpillars of various kinds of tussock moths (Figure 19) are fairly hairy and somewhat similar in appearance to gypsy moth. Most have considerably more hairs and often dense bunches of hairs (tussocks) are present on the back. Adults of the tussock moths are similar in appearance to the male gypsy moth. Several native tussock moths occur in Colorado, notably the Douglas-fir tussock moth.

Figure 19. Pine tussock moth caterpillar. *Photo courtesy of William Ciesla*

Figure 20. Dagger moth caterpillar. *Photo courtesy of Joseph Berge*

Dagger moths. Several species of dagger moths (Figure 20) are present in Colorado. The caterpillars are densely covered in hairs. In some spots there will be thin clumps of long black hairs.

Figure 21. Yellow woollybear caterpillar.

Woollybears. The term woollybear is given to certain caterpillars that are densely covered with hairs and wander. The saltmarsh caterpillar is often the most common species and is highly variable in color, ranging from largely yellow to nearly black. The yellow woollybear (Figure 21) is uniformly some shade of yellow, but may range from rather dark to nearly white.

Regional Insects Similar in Appearance to Gypsy Moth - *Egg Masses*

Inspections are made for the presence of egg masses. These are generally oval, light brown due to a covering of hairs, and about an inch in length. As the eggs are not piled very deeply, only 2-3 layers at most, the overall egg mass is relatively flat and only slightly raised in the middle. Gypsy moth eggs will be laid on plants but can occur on almost anything that was in the vicinity of infested trees when the caterpillars migrated to seek pupation sites (Figure 22).

Some other related moths, notably tussock moths, also lay masses of eggs and cover them with body hairs. However, these egg masses are more deeply piled and covered with grayish hairs (Figure 23). Differences in color and thickness of the egg masses can reliably distinguish them from gypsy moth eggs.

Figure 22. Female Gypsy moth laying egg mass. *Photo courtesy of Jim Occi.*

Figure 23. Douglas-fir tussock moth egg mass. *Photo courtesy of David Leatherman.*