

Fir Tussock Moth *Orgyia detrita* Guérin-Ménéville, 1831 (Lepidoptera: Erebidae: Lymantriinae)¹

Donald W. Hall and Lyle Buss²

Introduction

Tussock moths in the genus *Orgyia* are small moths that are best-known because of their attractive larvae.

In some years the larvae are very numerous and become a problem when they leave their host plants to search for suitable sites to spin their cocoons. Only the three species that are found in Florida will be discussed here. *Orgyia detrita* (the fir tussock moth) is the most common of the species in Florida followed by *Orgyia leucostigma* (the whitemarked tussock moth) and finally *Orgyia defnita* (the definite tussock moth), which is rare in Florida (Foltz 2004).

Much of the older literature places the tussock moths in the family Liparidae and more recently in the Lymantriidae. They are now classified in the subfamily Lymantriinae in the family Erebidae (Beadle & Leckie 2012). *Orgyia leucostigma* was formerly placed in the genus Hemerocampa. For a detailed taxonomic history and synonyms, see Ferguson (1978).

Distribution

Orgyia detrita: Coastal Plain from Long Island to Florida and Gulf States west to Texas (Ferguson 1978, Wagner 2005, *Orgyia detrita* entry at North American Moth Photographers Group web site). It is uncommon in the northern parts of its range.



Figure 1. Fir tussock moth (*Orgyia detrita*) caterpillar (dorsal view). Credits: Donald W. Hall, University of Florida.

Orgyia leucostigma: Entire eastern U.S. and west to Minnesota and Texas (Ferguson 1978, *Orgyia leucostigma* entry at North American Moth Photographers Group web site). The form that occurs from South Carolina to Texas is subspecies *Orgyia leucostigma leucostigma* (Godfrey 1987).

Orgyia defnita: Entire eastern U.S. Most common in Northeast and Mid-Atlantic states (Ferguson 1978, *Orgyia defnita* entry at North American Moth Photographers Group web site).

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Description

Larvae

Larvae are 1-1.5 inches in length. They are characterized by hair pencils of black setae that extend forward from the prespiracular verrucae of the prothorax, a dorsal hair pencil of black setae on the eighth abdominal segment, dorsal tussocks on the first four abdominal segments, and mid-dorsal glandular structures on abdominal segments six and seven.



Figure 2. Fir tussock moth (*Orgyia detrita*) caterpillar (dorsal view)
Credits: Donald W. Hall, University of Florida.



Figure 3. Fir tussock moth (*Orgyia detrita*) caterpillar (light form).
Credits: Donald W. Hall, University of Florida.

Orgyia detrita has two common color forms in Florida, a dark form and a light form. The sub-dorsal areas (sides) can be a dark gray as in **Figures 1 and 2**, or they can be light gray to light yellow as in **Figure 3**. The sides of *Orgyia leucostigma* are light in color, similar to the light form of *detrita*. There is a white or yellow line on each side of the dark mid-dorsal line of *leucostigma* (Ferguson 1978, Godfrey 1987). *Orgyia detrita* has bright orange spots along the back and sides while the spots on *leucostigma* are yellow (Foltz 2004).

Detrita and U.S. populations of *leucostigma* have bright red heads while *definita* are unique because of their tan or yellow heads. *Definita* is also lighter in body color than the other two species (Foltz 2004).

The dorsal glandular structures on segments six and seven of *leucostigma* are bright red, those of *detrita* are orange, and those of *definita* are pale yellow.

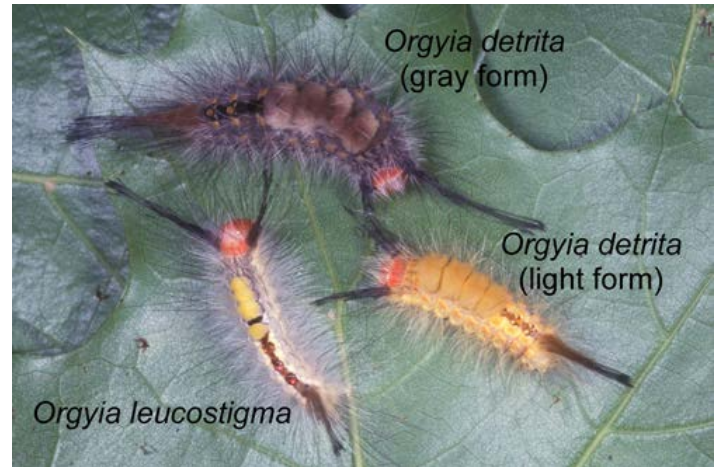


Figure 4. Fir tussock moth (light and dark forms), *Orgyia detrita*, and whitemarked tussock moth, *Orgyia leucostigma*, caterpillars.
Credits: Lyle Buss, University of Florida



Figure 5. Definite tussock moth (*Orgyia definita*) caterpillar (front view).
Credits: Lyle Buss, University of Florida



Figure 6. Definite tussock moth (*Orgyia definita*) caterpillar (abdomen).
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Cocoons & Pupae

Cocoons are constructed of silk and setae from the caterpillars. They are usually found in protected places - in furrows in bark, undersides of limbs, in tree cavities, under loose bark, and often under the soffits of buildings. Also, they are commonly spun in dense masses among the foliage of epiphytic bromeliads (*Tillandsia* spp.).



Figure 7. Early cocoon of fir tussock moth (*Orgyia detrita*) before many setae are incorporated.
Credits: Donald W. Hall, University of Florida.



Figure 8. Completed cocoon of fir tussock moth (*Orgyia detrita*).
Credits: Donald W. Hall, University of Florida.



Figure 9. *Orgyia* sp. cocoons under eaves of building.
Credits: Donald W. Hall, University of Florida.



Figure 10. *Orgyia* sp. cocoons among foliage of ballmoss (*Tillandsia recurvata*).

Credits: Donald W. Hall, University of Florida.

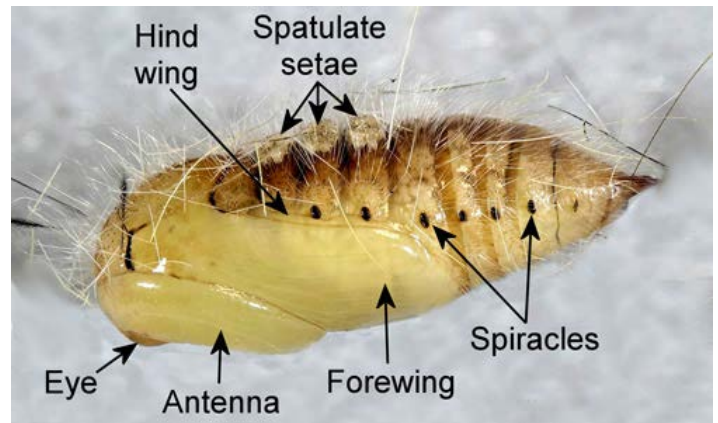


Figure 11. Recently molted male fir tussock moth (*Orgyia detrita*) pupa (lateral view), *Orgyia detrita*.

Credits: Donald W. Hall, University of Florida.

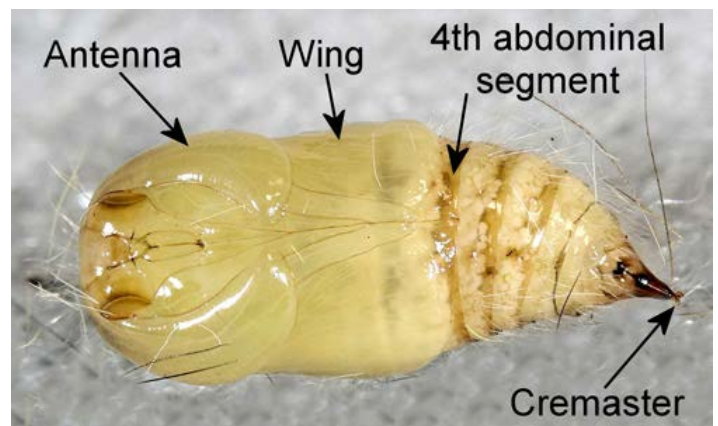


Figure 12. Recently molted male fir tussock moth (*Orgyia detrita*) pupa (ventral view).

Credits: Donald W. Hall, University of Florida.



Figure 13. Mature female fir tussock moth (*Orgyia detrita*) pupa. Credits: Donald W. Hall, University of Florida.

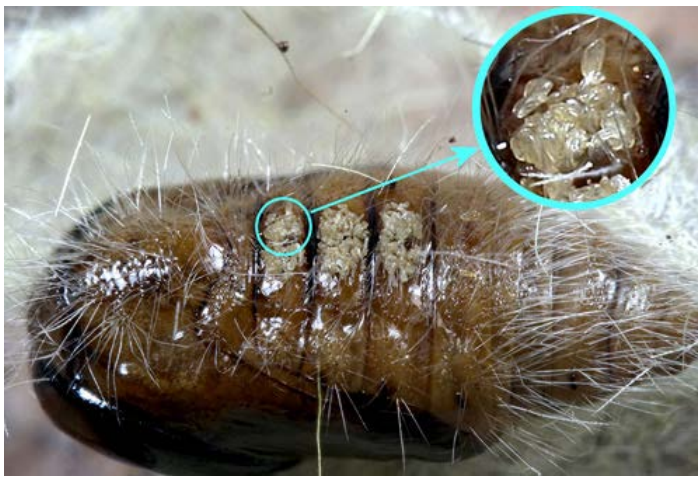


Figure 14. Mature tussock moth (*Orgyia* sp.) pupa with spatulate setae. Credits: Donald W. Hall, University of Florida.

Pupae appear hairy and have patches of dorsal spatulate setae (“vesicles” of Mosher 1916) on abdominal segments 1-3. The antennae of male pupae are longer and broader than those of females and the wings of male pupae are longer than those of female pupae. The wings of female pupae reach only slightly beyond the anterior margin of the fourth abdominal segment while those of male pupae extend nearly to the posterior margin of the segment (Mosher 1916).

Adults

Adults are dimorphic. Males are small, relatively dull-colored moths with prominent bipectinate antennae. At rest, they hold their first pair of legs in an outstretched position. The genus name *Orgyia* (Greek for “the length of the outstretched arms” [Borror 1960]), is based on this pose. Wingspreads of *Orgyia* species are 2.0-3.5 cm (0.78-1.4 in).

For photographs of pinned and spread specimens of males of the Lymantriinae, see Ferguson (1978). Males are difficult to distinguish, but fresh specimens of *Orgyia leucostigma* and *Orgyia defnita* have a purplish tint that is lacking in *Orgyia detrita*. *Detrita* also lacks the whitish tormal spot of *leucostigma* and *defnita* (Ferguson 1978).



Figure 15. Male fir tussock moth (*Orgyia detrita*). Credits: Donald W. Hall, University of Florida.



Figure 16. Male whitemarked tussock moth (*Orgyia leucostigma*). Note purple tint on wings and white tormal spot. Credits: Lyle Buss, University of Florida

The literature frequently describes the females as being wingless. Actually, they are brachypterous (short-winged) but cannot fly. At present, females can be identified to species only by association with their respective larvae (or in the case of Florida *Orgyia detrita* by association with their egg masses).

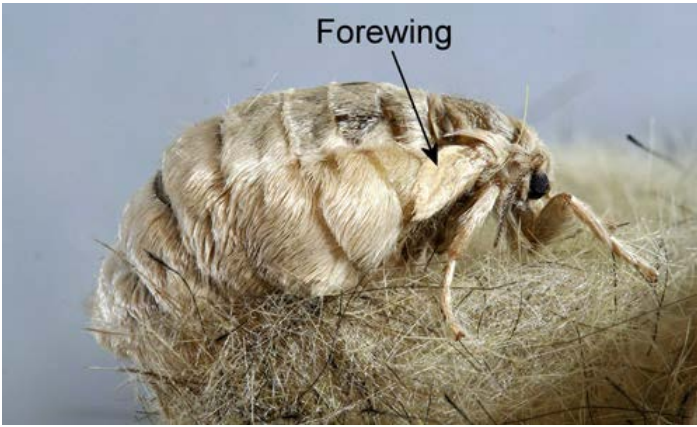


Figure 17. Female fir tussock moth (*Orgyia detrita*)
Credits: Donald W. Hall, University of Florida.

Life Cycle and Biology

Orgyia detrita is univoltine (one generation per year) while the other two species are bivoltine in Florida (Foltz 2006). In Florida, the overwintering eggs begin to hatch in late February. After hatching, the young larvae feed on the remaining egg mass and then spin a silk thread that they use to “balloon” for dispersal (Thurston 2002). Because adult females are flightless, ballooning by young larvae is the major mode of dispersal. Ballooning is also important given their propensity for spinning cocoons off their host plants (i.e., on buildings, fences, and other man-made objects).



Figure 18. Newly-hatched larvae of the fir tussock moth (*Orgyia detrita*).

Credits: Donald W. Hall, University of Florida.

By the second instar, the larvae are already recognizable because of their short hair pencils. Young larvae eat holes in leaves. Older larvae are leaf-edge feeders.

Caterpillars reach maturity and wander in search of sites to spin their cocoons in early April in Florida.



Figure 19. Second instar fir tussock moth larva (*Orgyia detrita*).
Credits: Donald W. Hall, University of Florida.

Adults emerge from mid-April to early May. The flightless females remain on their cocoons and release a sex pheromone to attract males. The sex pheromones of *Orgyia detrita* and *Orgyia leucostigma* have been characterized (Grant et al. 2003, Gries et al. 2003).

After mating, the females lay a mass of eggs directly on the cocoon and cover them with a protective covering. *Detrita* and *definita* females cover their eggs with a secretion and then rub setae from their bodies onto the secretion to form a protective layer over the eggs. *Leucostigma* females cover their eggs with a frothy secretion but do not cover the secretion with setae (Ferguson 1978). The egg stage is the overwintering stage for all three species.



Figure 20. Female fir tussock moth (*Orgyia detrita*) applying secretion to her egg mass.

Credits: Donald W. Hall, University of Florida.



Figure 21. Female fir tussock moth (*Orgyia detrita*) rubbing setae from her abdomen onto her egg mass.

Credits: Donald W. Hall, University of Florida.



Figure 22. Fir tussock moth (*Orgyia detrita*) cocoon with egg mass covered with setae from female's abdomen.

Credits: Donald W. Hall, University of Florida.



Figure 23. Female whitemarked tussock moth (*Orgyia leucostigma*) on egg mass.

Credits: Jerry F. Butler, University of Florida.

Host Plants

Orgyia detrita: Although the common name is “fir tussock moth,” the only documented hosts are oaks and bald cypress (*Taxodium distichum*) (Ferguson 1978).

Orgyia leucostigma: Polyphagous. Heppner (2003) listed plants belonging to 116 genera that have been reported as hosts. A few common hosts include oak, cherry, hackberry, and willow.

Orgyia definita: Only willow (*Salix* sp.) has been confirmed as a host in Florida, but other host plants are also likely (Heppner 2003). Common hosts in other parts of its range include oak, maple, hackberry, birch, and willow (Wagner 2005).

Medical Importance

The medical importance of *Orgyia* species caterpillars is well-documented in the scientific (Diaz 2005, Gilmer 1925, Goldman et al. 1960, Knight 1922) and clinical dermatology (Hossler 2009 & 2010) literature. Pruritic (itching) dermatitis due to tussock moth caterpillars has been reported to be a problem at child day-care centers and elementary schools in Florida (Atrubin et al. 2012, Atrubin & Granger 2006, Cruse et al. 2007). Contact with the cocoons produces the same symptoms.

The caterpillars may be contacted when they drop from the host trees or when they wander from the trees in search of a place to spin their cocoons. Home owners develop dermatitis from contact with the cocoons while removing them from the soffits of houses. Hairs in the cocoons retain their urticating capability for up to a year or longer.

Most of the urticating hairs are in the dorsal tussocks of the caterpillars (Knight 1922), but a few are also found on the lateral verrucae and intermingled with the black plume hairs of the hair pencils (Gilmer 1925). Gilmer (1925) conducted histological studies of the urticating setae of *Orgyia leucostigma* and found that each seta has a venom gland at its base. The venom has not been adequately characterized.

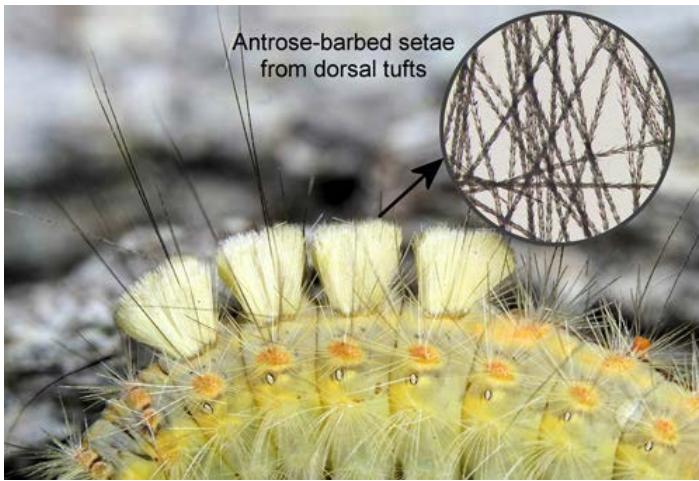


Figure 24. Tussocks of the fir tussock moth (*Orgyia detrita*). (Inset: photomicrograph of antrose [distally projecting] barbs on urticating setae of the tussocks).

Credits: Donald W. Hall, University of Florida.

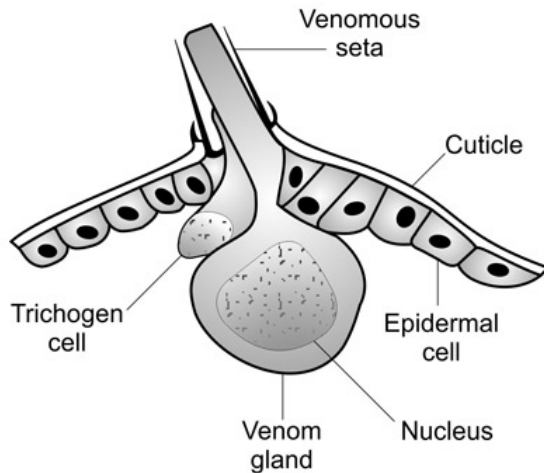


Figure 25. Diagram of urticating seta and associated venom gland of whitemarked tussock moth (*Orgyia leucostigma*).

Credits: Jane C. Medley, University of Florida.



Figure 26. Pruritic welts and erythema resulting from rubbing hairs from the dorsal tussocks of the fir tussock moth (*Orgyia detrita*) onto the author's forearm.

Credits: Donald W. Hall, University of Florida.

Welts resulting from contact with *Orgyia* hairs usually appear within minutes and subside by the next day, but itching and erythema commonly continue for another day or two. People apparently vary somewhat in their sensitivity to *Orgyia* species hairs. Goldman et al. (1960) studied the histopathology of a sensitive person and reported perivascular concentrations of eosinophils and leucocytes beneath the irritated areas.

Natural Enemies

Predators

Tussock moth larvae have various natural enemies. Medina and Barbosa (2002) looked at predation of small and large *Orgyia leucostigma* larvae in a temperate forest and suggested that birds were the major predators of large larvae but most mortality of smaller larvae was probably due to failure to find a suitable host during ballooning dispersal and also possibly to predation by invertebrate predators in the leaf litter. Large ground beetles (Henn et al. 2009) and *Polistes* paper wasps (Castellanos et al. 2011) have also been reported to attack the larvae up in the trees.

Pathogens

Orgyia caterpillars are infected by nuclear polyhedrosis viruses (*Baculovirus*) (Cunningham 1972) and cytoplasmic polyhedrosis viruses (*Cypovirus*) (Hayashi and Bird 1968). Those infected with nuclear polyhedrosis virus typically die in a characteristic pose - hanging limp by their prolegs.



Figure 27. Fir tussock moth caterpillar (*Orgyia detrita*) exhibiting pose typical of nuclear polyhedrosis virus (*Baculovirus*) infection.

Credits: Donald W. Hall, University of Florida.

Parasitoids

Larvae and pupae are killed by various parasitoids. Foltz (personal communication) counted egg masses on cocoons and found that there were far less than the 50 percent that would be expected based on a 50:50 ratio of females to males obtained by laboratory rearings. In the year 2000, only 70 of 730 (9.6%) cocoons he examined had egg masses suggesting a high rate of mortality. He has suggested that levels of parasitism of pupae often approach 50 percent (Foltz 2004, 2006).

Parasitoids of *Orgyia detrita* and *Orgyia definita* have not been well-studied, but those of *Orgyia leucostigma* are well documented. There is little doubt that *Orgyia detrita* and *Orgyia definita* also have many parasitoids.

Arnaud (1978, pp. 632-633) listed the following tachinid parasitoids of *Orgyia leucostigma*: *Bessa selecta* (Meigen), *Carcelia amplexa* (Coquillet), *Carcelia perplexa* Sellers, *Carcelia yalensis* Sellers, *Compsilura concinnata* (Meigen), *Drino inconspicua* (Meigen)*, *Euphorocera claripennis* (Macquart), *Euphorocera edwardsii* (Williston), *Exorista lobelia* Coquillet (currently *Nilea lobelia* [Coquillet]), *Exorista mella* Walker, *Leshenaultia* spp., *Lespesia aletiae* (Riley), *Lespesia frenchii* (Williston), *Patella leucaniae* (Coquillet), *Phorocera* spp., *Sisyropa* spp., *Winthemia datanae* (Townsend), and *Winthemia quadripustulata* (Fabricius).

*This species is not currently recorded from N.A. north of Mexico (O'Hara 2012).

Names from Arnaud (1978) have been updated by O'Hara and Wood (2004) and O'Hara (2012).



Figure 28. Tachinid puparium from *Orgyia* sp. larva. Credits: Donald W. Hall, University of Florida.

Orgyia definita

The following wasp parasitoids of *Orgyia definita* and *Orgyia leucostigma* are recorded by Krombein et al. (1979):

<i>Apanteles diacrisiae</i> Gahan (Braconidae)	(p. 245)
<i>Phobocampe pallipes</i> (Provancher) (Ichneumonidae)	(p. 660)
<i>Hyposoter fugitivus</i> (Say) (Ichneumonidae)	(p. 677)
<i>Elachertus hyphantriae</i> Crawford (Ichneumonidae)	(p.980)

Orgyia leucostigma

<i>Bracon xanthonotus</i> Ashmead (Braconidae)	(pp. 168-169)
<i>Apanteles acronyctae</i> (Riley) (Braconidae)	(p. 242)
<i>Apanteles delicatus</i> Howard (Braconidae)	(p. 245)
<i>Apanteles diacrisiae</i> Gahan (Braconidae)	(p. 245)
<i>Apanteles hyphantriae</i> Riley* (Braconidae)	(p. 248)
<i>Meteorus autographae</i> Muesebeck (Braconidae)	(p. 282)
<i>Meteorus hyphantriae</i> Riley* (Braconidae)	(p. 283)
<i>Meteorus versicolor</i> (Wesmael) (Braconidae), introduction from Europe	(p. 285)
<i>Iseropus coelebs</i> (Walsh)* (Ichneumonidae)	(p. 332)
<i>Iseropus stercorator orgyiae</i> (Ashmead) (Ichneumonidae)	(p. 332)
<i>Itopectus conquistator</i> (Say)* (Ichneumonidae)	(p. 340)
<i>Ephialtes annulicornus comptonotus</i> (Davis) (Ichneumonidae)	(p. 342)
<i>Coccygomimus maurus</i> (Cresson) (Ichneumonidae)	(p. 345)
<i>Theronia atalantae fulvescens</i> (Cresson) (Ichneumonidae)	(p. 347)
<i>Gelis insolitus</i> (Howard) (Ichneumonidae), hyperparasite	(p. 406)
<i>Gambrus canadensis burkei</i> (Viereck) (Ichneumonidae)	(p. 449)
<i>Orgichneumon calcatorius</i> (Thunberg) (Ichneumonidae)	(p. 518)
<i>Casinaria limenitidis</i> (Howard) (Ichneumonidae)	(p. 637)
<i>Phobocampe pallipes</i> (Provancher) (Ichneumonidae)	(p. 660)
<i>Psychophagus omnivorus</i> (Walker) (Pteromalidae), introduction from Europe	(p. 807)
<i>Habrocytus thyridopterigis</i> Howard (Pteromalidae)	(p. 813)
<i>Tritneptis hemerocampae</i> Viereck (Pteromalidae)	(p. 825)
<i>Syntomosphyrum esurus</i> (Riley) (Eulophidae)	(p. 1004)
<i>Syntomosphyrum orgyiazele</i> Burks (Eulophidae)	(p. 1005)
<i>Telenomus dalmani</i> (Ratzeburg) (Scelionidae)	(p. 1168)
*Listed range includes Florida.	

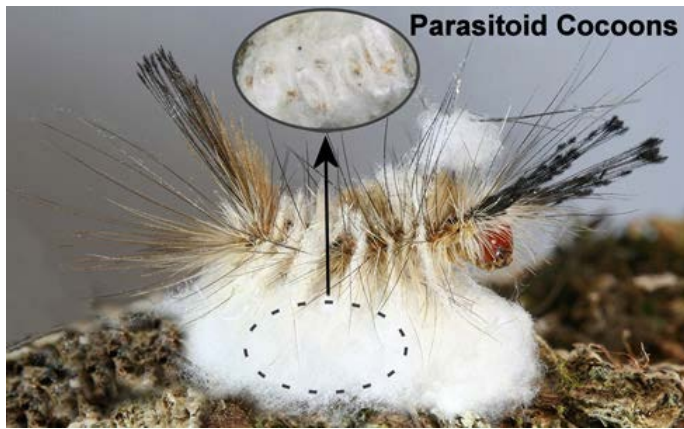


Figure 29. Fir tussock moth caterpillar (*Orgyia detrita*) parasitized by wasps. The parasitoid cocoons are cloaked by the silk covering (spun by the wasp larvae) beneath the parasitized caterpillar (Inset: parasitoid cocoons from under silk covering - wasps have already emerged).

Credits: Donald W. Hall, University of Florida.

Control

Control of the caterpillars is difficult because by the time they are migrating from the trees, it is too late. In Florida, feeding damage to large trees by *Orgyia* species does not usually harm the trees. However, they may occasionally be sufficiently numerous to completely defoliate large trees. Also, large numbers of larvae blown onto small landscape trees may result in severe defoliation.



Figure 30. Large live oak tree defoliated by fir tussock moth (*Orgyia detrita*) caterpillars.

Credits: Lyle Buss, University of Florida

If control measures are required, chemical insecticide or *Bacillus thuringiensis* applications recommended for control of other caterpillars should be effective. For current control recommendations, contact your county Extension agent.

Cultural Entomology

Insects are very popular in human culture. Images of butterflies and moths are common in movies, art, jewelry, and fabrics. Although the fir tussock moth is not a highly familiar moth even to most entomologists, an image of an adult male does appear in a popular design used on ornamental paper, wall art, journal covers, purses, and fabric (Tim Holtz, personal communication).

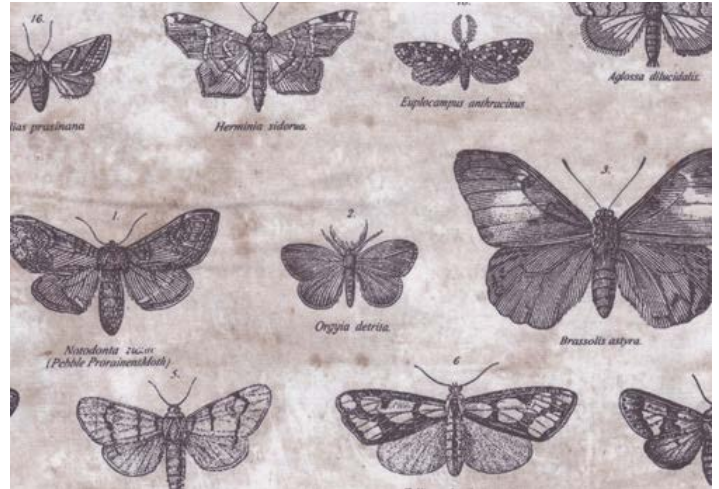


Figure 31. Fabric with image of *Orgyia detrita* male. © ECLECTIC ELEMENTS (PWTH004.TAUPE Butterfly).

Credits: Tim Holtz.com. Used with permission.

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[Orgia detrita](#) entry at [North American Moth Photographer's Group](#). Mississippi Entomological Museum, Mississippi State University, Starkville, MS. (17 February 2014)

[Orgia defnita](#) entry at [North American Moth Photographer's Group](#). Mississippi Entomological Museum, Mississippi State University, Starkville, MS. (17 February 2014)

[Orgia leucostigma](#) entry at [North American Moth Photographer's Group](#). Mississippi Entomological Museum, Mississippi State University, Starkville, MS. (17 February 2014)

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