

Lymantria monacha

Other scientific names: *Psilura monacha* Linnaeus; *Liparis monacha* Linnaeus; *Ocneria monacha* Linnaeus; *Phalaena monacha* Linnaeus; *Porthetria monacha* Linnaeus; *Bombyx monacha* Linnaeus, 1758; *Noctua heteroclita* Müller, 1764; *Bombyx eremita* Hübner, 1808; *Bombyx nigra* Freyer, 1833; *Liparis monacha* var. *oethiops* De Selys-Longchamps, 1857; *Psilura transiens* Thierry Mieg, 1886; *Lymantria transiens* Lambillion, 1909; *Lymantria monacha flaviventer* Krulikovsky; *Lymantria monacha gracilis* Krulikovsky; *Lymantria fasciata* Hannemann, 1916; *Lymantria kusnezovi* Kulossow, 1928; *Lymantria brunnea* Stipan, 1933; *Lymantria monacha chosenibia* Bryk; *Lymantria monacha matuta* Bryk; *Lymantria monacha idae* Bryk; *Lymantria monacha lateralis* Bryk; *Lymantria monacha eremita*; *Lymantria monacha nigra*

Order and Family: Lepidoptera: Lymantriidae

Common names: nun moth; tussock moth; black arches moth; black-arched tussock moth

Lymantria monacha Linnaeus, 1758 is a major pest of broadleaved and coniferous trees in Europe and Asia. Defoliation by nun moth larvae can kill host trees especially conifers and has caused extensive losses despite intervention with biological and chemical insecticides. In parts of Europe, the occurrence of outbreaks has increased possibly as a result of the establishment of extensive pine plantations in poor quality areas. A serious outbreak was recorded in Europe between 1978 and 1985 and again in 1992 in Poland which involved hundreds of thousands of hectares.



BUGWOOD.ORG/ID. ADAMI/2515023



BUGWOOD.ORG/H. LEMME/1260007

Lymantria monacha larva and adults (female and male)

DISTRIBUTION

Native: Asia and the Pacific; Europe

Introduced: No records to date

IDENTIFICATION

Adult nun moths are moderately sized, hairy and often stout-bodied. Their forewings are white with numerous black, transverse, wavy lines and patches and the hind wings are greyish, with dark patches along the outer edge (Humphreys and Allen, 2002). Black and grey-brown forms occasionally occur. Females have a reddish-brown abdomen with black bands, short saw-like antennae, an extremely long extensible ovipositor and a wingspan of 45 to 55 mm (Humphreys and Allen, 2002; Kimoto and Duthie-Holt, 2006). Males have a grey-black abdomen, feathery antennae and a wingspan of 35 to 45 mm (Wallner, 2000b; Kimoto and Duthie-Holt, 2006).

Pupae are stout, shiny reddish-brown with light-coloured hair, and approximately 18 to 25 mm in length (Humphreys and Allen, 2002).

Newly hatched larvae are approximately 4 mm long and tan in colour though they turn black within 24 hours (Wallner, 2000b). Mature larvae are 30 to 40 mm long, light to dark brown with an orange to pale-brown head with black markings (Wallner, 2000b; Kimoto and Duthie-Holt, 2006). The first four abdominal segments have a dorsal pair of small, bluish glandular protrusions, the sixth and seventh segments have prominent mid-dorsal, orange glandular warts, and a dark dorsal band runs from the second to the eleventh segment (Kimoto and Duthie-Holt, 2006). Numerous short black and white hairs are present; hairs on the prothoracic and anal segments are longer.

Eggs are round, slightly concave in the centre, one millimetre in diameter, and initially orange-brown or purple in colour, turning dark brown over time (Kimoto and Duthie-Holt, 2006). They are laid in masses in bark crevasses of host trees and cannot be seen unless the outer bark is peeled away (Wallner, 2000b).

HOSTS

Species of *Pinus*, *Picea*, *Larix* and *Abies* are preferred hosts but the nun moth will also feed on many broadleaf trees including *Acer*, *Betula*, *Carpinus*, *Fagus*, *Fraxinus*, *Malus*, *Prunus*, *Quercus* and *Ulmus* species and other fruit trees. Host tree preference varies between areas.

BIOLOGY

Nun moth has one generation per year. Both male and female adults are strong fliers and are active for 3 to 5 weeks between July and September when they mate and deposit eggs (Wallner, 2000b). Females lay masses of 70 to 300 eggs, typically in bark crevices. However they will also lay on any hard surface such as motor vehicles. They overwinter as eggs and hatch in spring. Newly hatched larvae feed on young foliage, often towards the top of trees, while older larvae feed on older foliage. Larvae develop through five to seven instars depending on host type and health, weather and other factors (Wallner, 2000b). Pupation usually occurs in July on the tree trunks, but when populations are high, pupae can also be found high in tree crowns. Adults emerge in mid-summer; females live approximately 10 days while males may live up to 24 days after emerging (Wallner, 2000b).

SYMPTOMS AND DAMAGE

Nun moth larvae feed on needles or leaves and can severely defoliate host trees resulting in tree mortality. They tend to attack monoculture stands of trees that are growing in poor conditions. The nun moth can decimate vast areas of forest and increase the risk of attack by other insects such as bark beetles. Outbreaks last for approximately five years in pine forests and seven years in spruce forests (Humphreys and Allen, 2002).



BUGWOOD.ORG/JI_LISKAVI197019

Heavy defoliation of Norway spruce (Picea abies) stands in the Czech Republic by the nun moth

On conifer host trees, young larvae feed on the foliage of newly expanded shoots whereas older larvae are able to feed on more mature foliage but still prefer new needles. They can be wasteful feeders, eating only the base of a needle which results in partially uneaten needles falling to the ground. Defoliated trees exhibit thinned crowns and are reddish-brown in colour (Kimoto and Duthie-Holt, 2006). During outbreaks, over 50 percent of the foliage can be defoliated and successive years of severe defoliation can cause tree mortality (Kimoto and Duthie-Holt, 2006). On broadleaved host trees, larval feeding initially creates holes in the leaves. As feeding progresses, however, entire leaves are consumed except for the middle vein (Kimoto and Duthie-Holt, 2006).

DISPERSAL AND INTRODUCTION PATHWAYS

Adults are strong fliers and can spread fair distances, males have been known to disperse up to 3.5 km, and young larvae can balloon from tree tops. Eggs may also be transported on logs, ships or vehicles. Since egg masses are typically deposited in bark crevices of host trees, long distance transport of this species could be facilitated by the movement of unprocessed logs and crates, pallets or dunnage containing large strips of bark.

CONTROL MEASURES

Nun moth has a number of natural enemies including parasitoids, predators and disease (Wallner, 2000b). Birds have been known to help control egg and larval stages and a baculovirus has also been implicated in population collapses and has been cultured and applied for control (Wallner, 2000b).

Pheromone trapping can be used both for detection purposes and as a means of disrupting mating (Humphreys and Allen, 2002). Direct control with biological insecticides, such as *Bacillus thuringiensis*, can be effective over large areas.