Giant Wood Moth and witchetty grubs

Fact Sheet

Giant Wood Moth (left). Image: QM, Gary Cranitch. Larva (right). Image: QM, Jeff Wright.

Introduction

Australia is famous for its wood moths of the genus *Endoxyla* in the family Cossidae. Their fame is partly because their caterpillars are the true 'witchetty grubs' of traditional Aboriginal diet, but mostly from the fact that the moths themselves are some of the largest in the world. The largest of all is the Giant Wood Moth (*Endoxyla cinera*). It is common all along the Queensland coast and especially so in suburban Brisbane, where its grubs bore into the trunks of smooth-barked eucalypts in parks and gardens. The female moth has a wingspan of about 25 cm and may weigh up to 30 g (the weight of two finches). Gauged in terms of weight, our local moth is certainly the heaviest in the world. Males are only half the size of females.

Giant Wood Moth

The moths are grey in colour with a dark blotch on their thorax. When resting, their narrow wings fold along the sides of their body. This camouflages them perfectly as they cling to the grey trunk of a gum tree during the day. Moths appear for only a brief time in mid-summer, and are sometimes noticed at street lights on drizzly nights. Great excitement usually occurs when one of these massive creatures comes into house lights. The moth stage of their life cycle is a matter of days and they die soon after mating and laying eggs. They have no functional feeding organs and all energy needs necessary for their brief adult lives comes from fat reserves laid down during their larva stage. In contrast to their brief life as a moth, larvae live for three years.

Hatching caterpillars. Some caterpillars are hanging on threads they have spun. Image: QM, Geoff Monteith.

Eggs

The great weight of the female is due to her swollen abdomen filled with up to 20,000 minute, yellowish eggs. These are deposited in crevices in the bark of living trees and are covered with a glutinous secretion as protection. The eggs hatch into myriads of tiny 1.5 mm caterpillars which lower themselves on fine silken strands. It is thought they are dispersed at random by the wind, riding on their "parachutes" of silk in the same manner as many hatchling spiders.

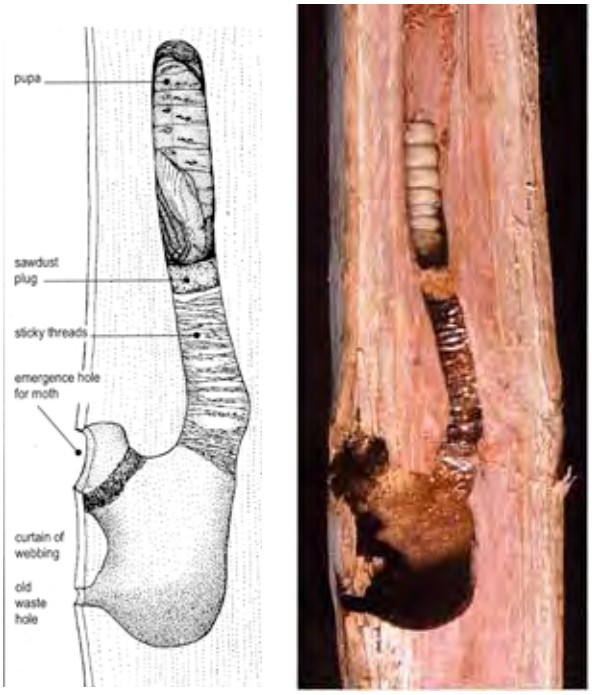
Larvae, Caterpillars or 'Grubs'

It is well known that the later-stage caterpillars of the Giant Wood Moth live in burrows inside the trunks of eucalypts, but where the tiny, newly-hatched larvae feed is still a mystery. They may spend their early life feeding on roots under the ground. This is the habit of some other species of *Endoxyla*, including the Desert Witchetty Grub (*E. leucomochla*) which the Aborigines of the Central Desert dig from the roots of wattles. It is known that when the grubs of the Giant Wood Moth first drill into eucalypt trunks they are already 25 mm long and as thick as a lead pencil. This also occurs in summer so they are presumably already one year-old, having hatched from eggs laid the previous summer. A real scientific riddle will be solved by the first person to discover where the grubs spend their first year!

When the caterpillars first appear on the eucalypt trunks they are boldly banded in purple and white, unlike the pale cream of other wood moth grubs. These markings are apparently warning colouration to protect them from predators during their exposed journey from their early feeding site to the bare bark surface of their chosen tree. After selecting an entry point, the caterpillar spins a circular, tent-like shelter of tough brown silk about 3 cm in diameter. Beneath this, it bores with its strong jaws through the bark and into the sapwood, pushing the sawdust out behind. Within the sapwood the grub excavates a flat, oval chamber large enough for it to turn around. It then seals off the entrance to its tunnel with a hard plug of fine, tightly-compacted sawdust mixed with silk, and flush with the outer bark surface. In the centre of this plug a tiny aperture is kept lightly sealed as an exit point for further sawdust and the grub's own excrement. The silken shelter then falls away from the tree trunk leaving the grub sealed inside its burrow behind a cleverly camouflaged plug. At this stage the caterpillar has successfully accomplished the most difficult phase of its complicated life and is ready to start its main period of feeding and growth.

Second year larva extracted from its burrow and placed next to its entrance hole. Image: QM, Jeff Wright.

As it grows the grub continues to enlarge its burrow, extending it vertically upwards through the timber. The sawdust produced by this activity is not eaten but is ejected through the hole in the entrance plug. This coarse sawdust accumulating on the ground is good evidence of the presence of a wood moth grub inside an otherwise apparently sound tree. Clearly, the wood is not the food of the caterpillar, and it appears that the actual food consists of the soft regenerating growth (callus tissue) which the tree produces at the growth zone (cambium layer) between the bark and the sapwood as it attempts to seal off the grub's burrow. This growth of callus tissue takes place in a chamber beneath the bark which the grub keeps big enough for it to turn around in when it needs to enlarge its main burrow.



Pupa (left) and final stage larva (right) of Giant Wood Moth inside tree trunk. Image: QM.

The caterpillar grows for two years until it reaches 15 cm long and 3 cm in diameter. Grubs destined to become male moths will be much smaller. The grub is then ready to pupate (turn into a chrysalis) from which the adult moth will hatch. Naturally the moth would not be able to squeeze out the tiny hole the caterpillar made when it first entered the trunk, so before pupating, the caterpillar gnaws the top of its turning chamber through to the outer bark. In a couple of days the thin bark over this collapses exposing a circular entrance to the exterior, which is about 3-4 cm in diameter and about 5-8 cm above its original entry hole. Just inside this new aperture the larva spins a curtain of fine silk mixed with sawdust. It then retreats, hind end first, to the far end of its tunnel which may be 20-30 cm long. As it goes it fills the tunnel with a network of sticky threads of silk. Finally it constructs a thick leathery plug of sawdust across the tunnel in front of its head. A fat grub is prime prey for parasitic wasps and these barriers that it builds are attempts to stop enemies from locating it. Often this is in vain because there is a parasitic braconid wasp with a 4 cm egg-laying tube (ovipositor) which can be driven straight through the bark and wood to insert its eggs into the sealed-off grub.

Pupae

In its retreat the grub sheds its skin and becomes a pupa (chrysalis). This pupa is an active creature with circles of spines enabling it to wriggle along its burrow. On its head is a strong, sharp tooth. When the pupa is ready to hatch it rotates in the burrow and uses this tooth to cut around and around the periphery of the plug, much like a tin opener. Finally the plug falls out into the lower part of the burrow's chamber. Then the pupa wriggles down the burrow and partially out through the upper, larger aperture through the bark. In that position the moth emerges, dries its wings and flies away leaving the empty pupal shell protruding from the hole.

Freshly emerged Giant Wood Moth beside its exit hole (bottom). Image: QM, John Sheridan.

After the moth leaves, the tree begins growth to close over the apertures. Within about a year the two holes are completely sealed over leaving behind the characteristic 'double scars'. Trees that are unhealthy suffer more attacks than vigorous ones and may have dozens of present and past moth burrows evident. When the host tree is large the burrows do not appear to cause permanent damage. However in young trees the tunnelling grubs may cause sufficient weakness for strong wind to snap the tree. Severe damage is sometimes caused in eucalypts plantations when Yellow-tailed Black Cockatoos chew into the trunks to get the fat grubs as food.

Other Wood Moths

There are about 60 species of *Endoxyla* in Australia, not all of them large and not all feeding on eucalypts. Another common large one in the Brisbane area is *E. liturata* which bores into trunks of wattles. Many cossid larvae were eaten by Aborigines. Those in tree trunks were laboriously chopped out, with the large, nutritious, fatty grub being a sufficient reward for the effort involved. In Central Australia the true 'witchetty grub' is *E. leucomochla*, whose caterpillars live underground feeding on the roots of the shrubby 'witchetty bush' (*Acacia kempeana*). These grubs are still widely harvested by Aborigines in the Centre, but their digging sticks today are usually pointed steel bars instead of the traditional sharpened wooden stakes.

Further Information

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