

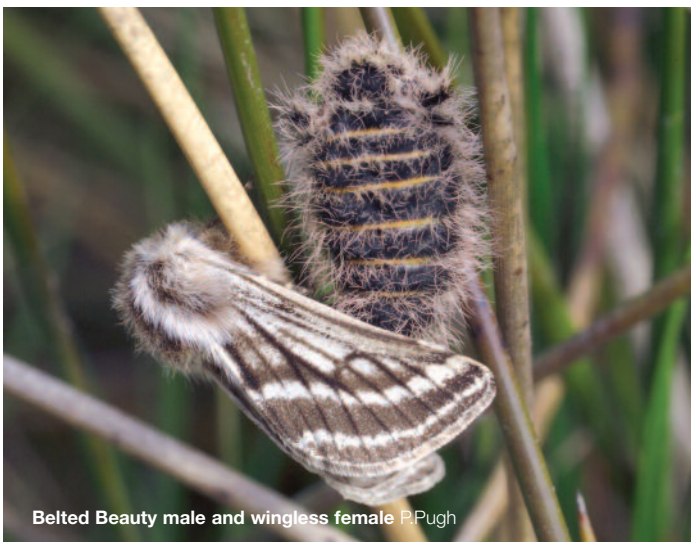
Lives of moths

Life-cycle

Moths lay eggs, each of which hatches into a caterpillar (or larva) which feeds on various types of plant material. The caterpillars of some moths only eat one type of plant, whereas others will eat a much broader range. Usually it is the leaves that are eaten, but some caterpillars eat flowers, fruits, stems or roots. Some feed inside leaves or stems, and some even live underwater! The caterpillar is the only stage of the life-cycle which grows, and as it does so it forms a new soft skin under the old one, which then splits and moults to allow the body to expand.

When the caterpillar has reached full size, which could take from a few weeks to a few years depending on the species, it then pupates to form a pupa. Many caterpillars burrow into soil or hide under dead leaves to pupate, but others do this on plants. Often they first build a cocoon, either from silk which they produce themselves or from pieces of plant material, and then pupate inside. Puss Moth caterpillars use bits of chewed bark to build cocoons on tree trunks, making them not just perfectly camouflaged but also extremely hard!

Inside the pupa, the caterpillar's body is reorganized to become a moth. This can take from a few weeks to a year, depending on the species. When the moth emerges from the pupa its wings are crumpled and need to be expanded before it can fly. Some moths only fly short distances but others travel much further, and a few species migrate long distances, for example from North Africa to Britain. In some species, such as the Belted Beauty, the female moth has no wings at all and does not move far from her pupa case.



Most adult moths live for short periods, from a few days to a few weeks depending on the species, although moths that hibernate through the winter live for months. Many moths feed on nectar just like butterflies, but some species of short-lived moths do not feed at all.

Female moths attract males using scents (pheromones) which the males detect with their antennae. After mating, females lay from about a hundred to about a thousand eggs. Most moths lay eggs on a suitable plant, so that the caterpillars hatch on their food supply, but in some species the caterpillars have to search for the right plant before they can eat.

Moths survive the winter in a variety of ways. In some species eggs laid in one year do not hatch until the following spring, when there is plenty of food. Many more species spend the winter as caterpillars, which remain dormant until spring, although some are able to feed during mild spells. Others, such as hawk-moths, over-winter as pupae, sheltered from the cold under the soil. Finally, some species are adult moths during the winter. Most of these wintering moths hibernate, like the Herald, but others fly and reproduce during the winter, such as the aptly named December Moth and Winter Moth.

The life-cycles of moths are carefully synchronised with those of their food-plants, so that the caterpillars hatch when food is plentiful. Some predators, such as birds which rely on caterpillars as food for their young, also time their breeding to coincide with the moths' life-cycles. There is now concern that climate change could disrupt these delicate relationships. When the timing of the seasons change, plants, moths and their predators are unlikely to all react in the same way (or at the same speed) and so breeding cycles may no longer match food supplies. This could have disastrous consequences for some species.



Puss Moth caterpillar R.Leverton



Mullein caterpillar R.Leverton



Sycamore caterpillar R.Leverton

Staying alive

Moths play an important role in the lives of many plants and animals: as herbivores eating plants, as pollinators of many plants' flowers and as food for a wide range of animals. The latter include parasitic wasps and flies whose larvae feed inside caterpillars, and a huge variety of predators ranging from beetles, earwigs and spiders to amphibians, lizards and small mammals. Many birds eat moths and caterpillars, and especially feed them to their young. These include the Blue Tit, Robin, Wren, Blackbird and most other familiar garden birds, as well as threatened bird species like the Grey Partridge and Stone Curlew.

To try and avoid being eaten by predators, moths have evolved a variety of strategies. Both adults and caterpillars may use camouflage to avoid being noticed, either through subtle colours and patterns which resemble their background, or bold patterns which break up their outline so that their shape is less recognisable. Some have also evolved shapes that disguise them as other objects, for instance some caterpillars resemble twigs and freeze when alarmed to enhance the illusion. The caterpillar of the Blotched Emerald sticks bits of dry leaf onto its body for camouflage.

Other species are brightly coloured and patterned to warn predators that they are distasteful, such as both the adult moth and caterpillar of the Cinnabar and the Mullein caterpillar. Some have eye-spots or bright patches to startle or confuse predators, like the adult Emperor Moth and the caterpillar of the Puss Moth. The latter also has what look like stings on its rear end, as do hawk-moth caterpillars, though these "stings" are actually harmless. Other caterpillars have hair or bristles, which are unpleasant for predators to swallow and may be coloured to warn that they can irritate. It is best not to handle hairy caterpillars!

Moths are a main food source for bats, which find them in the dark using echolocation. To avoid being eaten, some moths have evolved "ears" to detect the echolocation sounds produced by hunting bats. When these moths "hear" bats coming they take evasive action by dropping to the ground, changing direction, or flying in loops and spirals. Other moths can actually make noises themselves to confuse or startle bats, or even to warn them of distastefulness just as other moths use bright colours.

The Death's-head Hawk-moth uses sound in another way: it can produce squeaks which apparently resemble those made by a queen bee, allowing the moth to feed on honey in the hive without being attacked by the bees!

More information on moths is available on the Moths Count website www.mothscount.org and in:

- **Enjoying Moths** R. Leverton, Poyser 2001.
- **Moths** M. Majerus, Harper Collins 2002.
- **The Natural History of Moths** M. Young, Poyser 1997.



Death's-head Hawk-moth L.Hill

www.mothscount.org