

Field scabious blooms along unmown verges



Many young birds are already full-grown, but great crested grebes aren't too old for a piggyback



TINY & WILD ROSS PIPER

Leafminers

Keep an eye out for the telltale scrawl of the leafminers.

In the summer months you've probably noticed squiggles, scrawls and blotches on leaves. These are the signatures of leafminers – fascinating insects that feed on leaves from within. In the UK alone, hundreds of moth, fly, sawfly and beetle species live in this way. Moths and flies are the most diverse leafminers, and probable culprits behind a squiggly leaf.

In all these leafmining insects, the excavations are made by the larvae and, in most cases, they've become superbly adapted to a tunnelling lifestyle. They have reduced legs and eyes and are often flattened to fit in the tight space between the outer layers of the leaf.

Why do they do this, though? It seems like a lot of effort compared with just sitting on the outside of a leaf and scoffing it! Firstly, insect larvae are plump and juicy – very appealing to predators. Tunnelling inside the leaf gives leafminers a degree of protection from these enemies. Secondly, the outer layers of the leaf are often brimming with chemicals that are intended to send leaf-nibblers packing. By tunnelling between the outer layers of the leaf they can access the plant's sap and less well-defended cells. Many leafmining larvae even have wedge-shaped heads to separate the epidermal layers of the leaf.

Even these cunning tricks to avoid the plant's defences are sometimes not enough. Many



Tunnel widens as the larvae grows and progresses through the leaf.

Single line reveals this to be the mark of a golden pygmy moth larva.

plants have latex cells and if a leafminer ruptures these it might be drowned in its tunnel. There are even specialist predators and parasitoids that have adapted to feed on leafmining larvae – either extracting them from their tunnels or, more fiendishly, injecting eggs into them through a needle-like ovipositor.

There's also a waste problem with this way of life. All that succulent leaf tissue means a lot of droppings (frass) and the leafminers either pack them into the tunnel behind them or push them out of 'mine-shafts' they chew to the outside.



Dr Ross Piper is an entomologist, zoologist and explorer. His book, *Animal Earth*, is a cutting-edge introduction to animal diversity. Find out more at rosspiper.net

LEAFMINER IDENTIFICATION

Leafmines are superb subjects for keen naturalists. Each species leaves its own distinctive mark on the host plant. What plant is it on? Squiggle or blotch? What's the pattern of larval droppings in the leafmine? These clues will lead you to the right species. Get some ID help at British Leafminers (leafmines.co.uk). Here are some tips:

- Moth caterpillars typically make full-depth galleries or blotches with single lines of droppings.
- Fly larvae mine either the lower or upper-surface (or a mixture of both). The larvae leave twin trails of droppings.
- Sawfly mines are blotches and the larvae leave lots of dark droppings. Sawfly larvae also have visible legs.
- Beetle larvae make tunnels or blotches and often cut-outs in the leaves.

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This cosy toad abode is the perfect place for amphibians to seek out cool shade in the summer months. Simply place it in a damp, shady spot and wait for toads to arrive. Plus it's an ideal hibernating spot in winter. £21.99



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