



Spiders on the Wing (mirror)

by Geoff Oxford

One of the commonest invertebrates found around our homes and gardens is the Missing-sector orbweb spider *Zygiella x-notata*. Look in the upper corners of door and window frames, or under window sills, at almost any time of year and you are sure to spot its distinctive orb web. You may also see the spider itself lurking in a silken tube retreat, and often with several brownish egg-sacs close by.



Zygiella x-notata,
female



Photo: Fritz Geller-Grimm



The spider itself is easy to recognize. It is the only species associated with houses and gardens which appears silvery. We don't know why being silver is an advantage in this and a few other spiders, but there is a fascinating story here. The silver coloration is produced by stacks of thin plates of a substance called guanine, which lie beneath the skin of the spider's abdomen. These plates reflect light like a mirror. Fish, of course, are also silvery and it turns out that they use exactly the same mechanism – plates of guanine in their scales – to achieve this effect. This is a lovely example of what is known as **convergent evolution**, where unrelated organisms independently evolve the same ways to produce, in this case, silver coloration. Here is a photo of the guanine plates, through an electron microscope:

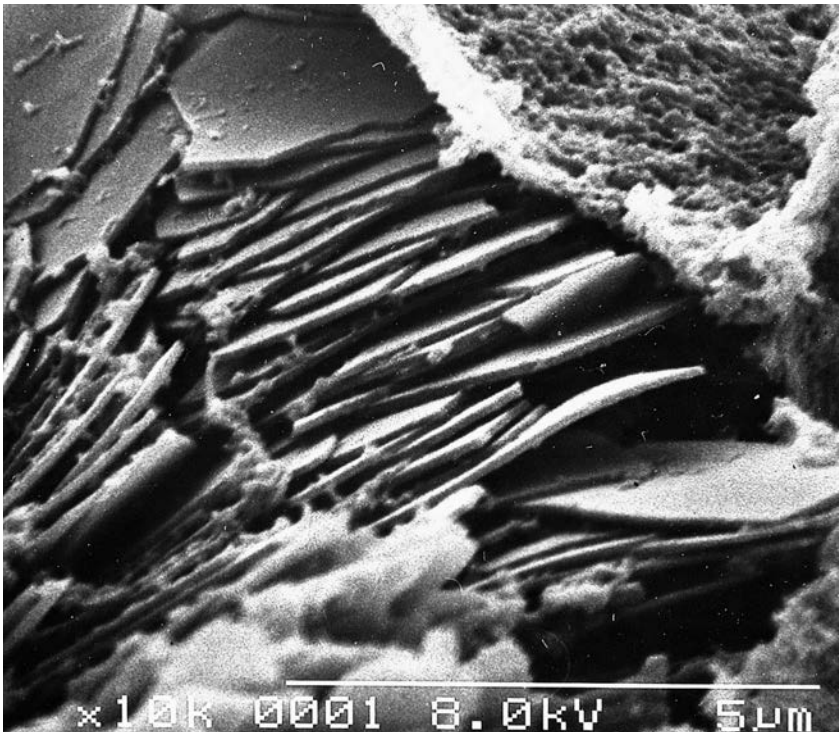


Photo: Harriet Mitchell



The other dead give-away enabling instant recognition is the unique characteristic of *Zygiella* webs – the missing sector. Through this web-free segment runs a single silk strand (the signal line) that connects the centre of the orb-web to the spider's retreat, built in the angle of a window frame, or similar structure. Here they spend the day waiting for prey to arrive; at night they can be found at the hub of the web.



Typical *Zygiella* web, with the missing sector

Photo: T. Paschos

The reason for this particular design is that the spider often builds the web in a confined, vertical space. Without the missing section the spider would have to climb across the web surface when prey arrives. The empty sector and signal line enable the spider not only to detect the arrival of prey in the web from the vibrations in the signal line, but also to reach the web's centre directly and very quickly. Interestingly, when the spider builds in such a way that the signal line is at an angle greater than about 40° to the flat



surface of the web, a full orb is produced. This is something you could check yourself.

***Zygiella* web without the missing sector. Follow the signal line from the middle of the web back to the spider's retreat in the rolled leaf (middle right).**



Photo: Geoff Oxford





As well as occupying houses (inside and out) they occasionally stray onto garden shrubs, and car wing mirrors. Next time you go out in the car, examine the wing mirror for webs. Although *Zygiella* is the usual suspect, money spiders can also set up home there, but they produce a very different type of web. It is remarkable just how strong the silk of the web is, surviving 70 mph trips along a motorway while the spider is hunkered down in the gap behind the mirror.

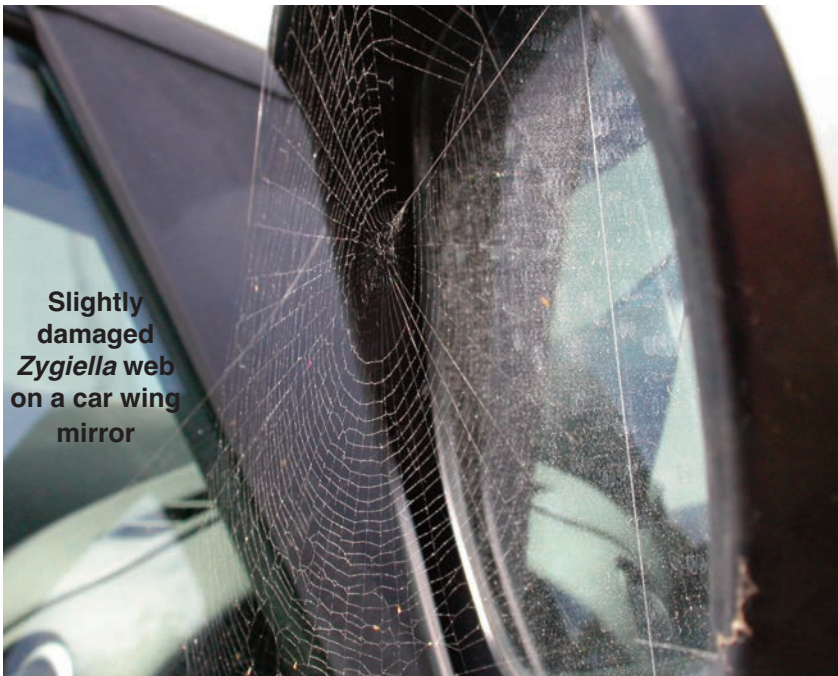


Photo: Geoff Oxford

There are two other closely related species occurring in Britain and both build webs with missing sectors. *Zygiella atrica* is equally common but usually found well away from houses, building its web on bushes such as gorse and blackthorn, signposts and gates in the wider countryside and on coastal cliffs. It very rarely strays into domestic gardens. This species is generally pinker than *Z. x-notata*



and has distinctive red 'shoulder' patches. The third species, *Stroemiellus stroemi* is rare and confined to the trunks of large pine and oak trees in central southern England.



Zygiella atrica –
note the red
'shoulder' patches

Photo: Evan Jones



Zygiella egg-
sacs in the
corner of a
window. Note
the white egg
shells in the
lower sac.

Geoff