Wonderfully Woven Webs by Katty Baird

Ask a friend to draw a spider's web and they will most likely draw a picture of radiating spokes joined by concentric wavy circles, perhaps adding a menacing-looking spider at the centre. This type of web, common

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in Hallowe'en decorations (and on Spiderman's face), is known as an orb web. Although lots of spiders do spin webs like this to catch their prey, there are many other web designs, and some spiders catch prey without using a web at all. Orb webs are quite easy to spot in the autumn and it's fascinating to watch one being built. However, first it's useful to know a little bit about spider silk.

Silk: strong, stretchy or sticky?

Spider silk is one of the strongest materials known. It is made of proteins and produced as a liquid in silk glands in the spider's abdomen. Take a look at a spider (a large Tegenaria house spider is a good choice) and you should see three pairs of short tubes at the end of the abdomen. These are the **spinnerets**. The liquid silk is passed from the silk glands through these spinnerets to the outside, where it takes on the familiar fine thread-like form. The silk thread produced from each pair of spinnerets is slightly different: some is particularly stretchy, others are stickier or stronger. These different silks are used for different purposes e.g. protection of eggs, wrapping prey, safety lines when jumping and, of course, web construction. In



fact, orb webs are usually made with different types of silk in different parts of the web.



A garden spider's orb web. Image: Mary Sykes

Spinning the orb

One of Britain's most widespread spiders, the Garden Spider (*Araneus diadematus*), spins orb webs in gardens and parkland. These are great spiders to watch web building in action. Adults mature in the autumn and the webs, often containing a plump female full of eggs, are easiest to spot at this time of year – look on fences or around window frames, or between the branches of garden shrubs.

It is best if you can find a convenient web to watch outdoors, but if not you can introduce a spider to a large tank with some sticks propped up in it to act as web supports. Make sure you keep the environment moist by putting some damp tissue paper or moss in the tank and keep your spider safe by putting a lid on top. (When you have finished studying it, remember to release your spider back in the wild where you found it.)



Araneus diadematus, the Garden Spider

Garden spider webs tend to be replaced each morning, the spider eating the old used web and spinning a fresh one which is more effective at catching prey. So get up early to start your observations! Here is a very brief outline



of the process; watch your own web closely to add the details and see how each step is actually achieved.

1) First a line of silk is laid between two supports (a). This may be strengthened with several strands. A second crossline is added (b).

2) Next a line is made from the middle of this second line to a lower support or the ground, forming a Y-shape (c).

3) Then an outside frame and additional radial strands (or 'spokes') are added until the web looks like a bit like a bicycle wheel (d).



4) Now the spider spins a temporary, widely spaced spiral, starting in the centre and finishing at the outside edge (e). Using this spiral as a guide, the spider works back towards the centre, eating the guide spiral and laying down a more closely spaced spiral of sticky silk (f).

5) In the very centre the Garden spider constructs a 'strengthening zone' using non-sticky silk.

If you watch carefully you may notice the spider using its hind legs as a sort of ruler to measure the spacing between the spirals. This keeps the lines of the spiral equally spaced – imagine how the web might turn out if it didn't do this! It also means that the spacing between the spiral lines gets larger as the spider grows.

Experiment!

Once you have watched a web being made, you can investigate further. There are lots of things even experienced arachnologists have yet to discover about web construction. Here are a few ideas to get you started:

• Gently touch a blade of grass to different strands of the web. Can you tell which the sticky, prey-catching strands are?

• If you carefully cut a section out of a completed web with scissors, does the spider patch it up?

• How long does it take a spider to build its web? Is it the same every time it builds a new web? Are some spiders quicker than others?