

wild about JULY

Hummingbird hawkmoths hover above flowering shrubs



Bramble flowers attract gorgeous beetles, including longhorns



TINY & WILD ROSS PIPER

Perfectly miniature

Most insects are small. But here's why some are really, really small...

Insects, like few other animals, have embraced miniaturisation – squeezing enormous biological complexity into a tiny space. The champions of miniaturisation have to be the staggeringly varied parasitoid wasps. That full stop could comfortably contain several of the smallest ones. Many of these wasps are much smaller than some single-celled beings, and yet contain some tens of thousands of cells. These animals have tissues, organs and organ systems. Inside their heads is a brain, they have muscles, a complex gut, and much more besides.

To get really small, these insects have simplified some of their organ systems, but a cell can only get so small until more drastic modifications are needed. One way of shrinking cells is to get rid of the nucleus. This happens in the central nervous system and allows more cells to fit in a given space.

It might not be obvious to veritable giants like us, but a

In the species that have been studied, **the brain has 7,400 neurons**. A honeybee brain has 850,000 neurons. Even though these brains are tiny they process information from the senses to control complex behaviours. There's currently a lot of interest in understanding how these tiny brains work as it may help in the development of AI.

small body size has a number of key advantages. Perhaps most importantly, small animals can make use of habitats and niches that are inaccessible to larger animals. Egg parasitoids illustrate

this beautifully, since they evolved from larger ancestors to exploit a bounteous resource. As arthropod eggs have a tough shell and are often laid singly or in concealed places, few animals would have bothered to seek them out. The various forebears

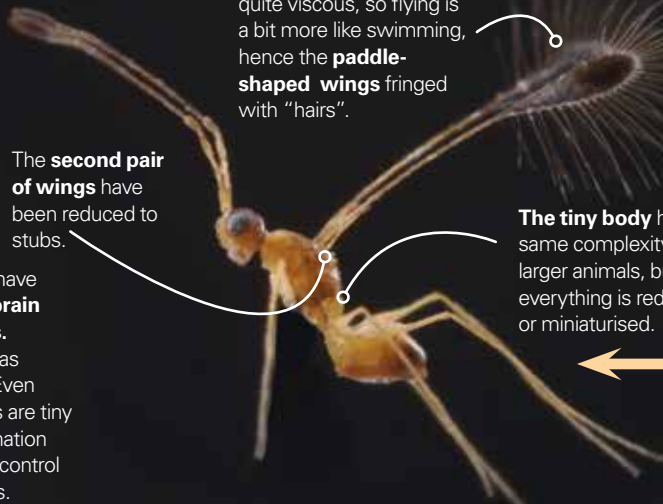


Ormyrus nitidulus

The **second pair of wings** have been reduced to stubs.

At this scale, the air is quite viscous, so flying is a bit more like swimming, hence the **paddle-shaped wings** fringed with "hairs".

The **tiny body** has the same complexity of much larger animals, but everything is reduced or miniaturised.



FAIRY WASP

The smallest wasps of all are commonly known as fairy wasps. This is *Anagrus sp.* These titchy wasps are extremely common and play a crucial role in terrestrial ecosystems because they regulate the populations of other insects.

of the egg parasitoids exploited this niche by shrinking, allowing them to complete their development in these capsules.

Being tiny also has consequences for reproduction. They don't have space for lots of eggs so, in some species, the female wasp lays a single egg in the host egg, which divides again and again to form a huge number of clones – as many as 3,000 in some cases. A proportion of these clones are sterile soldiers that search the host to eliminate the eggs and larvae of other parasitoids that have laid eggs in the same host.

Anagrus sp next to a 1p coin for scale



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

WHAT'S ON JULY

Safari after dark 4 July

Visit Pulborough Brooks, Sussex, at sunset to search for moths, bats and nightjars. £20 adult, £10 child, via rspb.org.uk/pulboroughbrooks

Guided badger watch Mondays and Wednesdays

Watch the renowned badgers from the comfort of the RSPB Haweswater, Cumbria, hide throughout July. See these secretive mammals as they forage and socialise. £12 for members, book via wildhaweswater.co.uk

Nightjar walk 11 July

Join the wardens on an evening walk at RSPB Lake Vyrnwy, Powys, to look and listen for nightjars – mystical and mysterious nocturnal summer visitors. £8 for members, book via rspb.org.uk/lakevyrnwy

Puffin and diving gannet cruises 18, 23 and 26 July

See thousands of seabirds at RSPB Bempton Cliffs, East Yorkshire. Seabirds, including puffins and gannets, reside on the 400-foot chalk cliffs. £24 adult members, £12 child, rspb.org.uk/bemptoncliffs