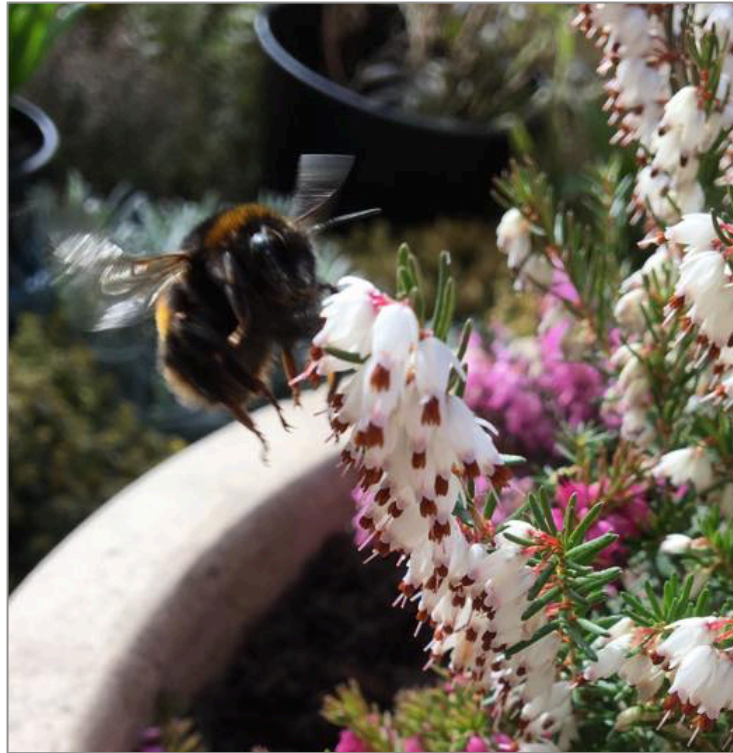


# The Queen's Hitch-hikers...

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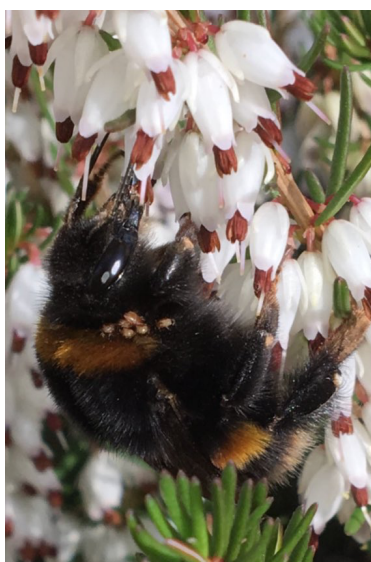
Yesterday at last I spotted this season's first hungry queen bumblebee blundering about without luck in my Bristol front garden, making me feel guilty in the sudden mild weather. And she brought an intriguing surprise.

Always one of the earliest bumblebees to emerge, the queen buff-tailed bumblebee *Bombus terrestris* was hunting haplessly for flowers, craving a feast of protein-rich pollen and sweet nectar after her long harsh winter. But I'd let her down!

Even my seven-year-old was insisting we must do more, so we whizzed to a plant nursery and she helped me plant some of our bee's favourite flowers. Today a bumblebee appeared again, this time happily busy in the early spring sunshine, all over our new blossoms of heather, lungwort and primrose. We felt rewarded just by seeing her.

But looking more closely (see photos below) she was carrying passengers. I didn't wish to disturb her to get a better eye on these mites, but having confirmed with

some helpful bee experts (references below) these are most likely to be one of several fascinating mite species in the genus *Parasitellus*. They are specific to bumblebees and have their own incredible and secretive life stories.



Interestingly, the mites pictured do not feed on the bee, they just hitch-hike. Most bumblebee mite species are not thought to cause direct harm to their host, although we know a heavy parasite-load can weigh down the poor bee and hinder her flight.

Cleverly, these nest squatters have learned to seek out the queen, shunning the workers or males, just before she pops off to over-winter, so they can travel with her to the hibernation burrow and onwards to the next colony. That's probably what I saw going on with this bee, who would have emerged in recent days.

Bumblebee mites have extraordinary symbiotic relationships with bees. It may be a one-way parasitic association in some cases, but it can be a mutualism where both parties gain some benefit.

For example, my queen's mites live in bumblebee nests at all stages of their life cycle. Female mites and some of the nymphs feed on wax and pollen brought in by the bee and eat some of the waste in the nest.

#### INVADERS

At other times, however, these mites prey on harmful parasites that invade the queen's nest. In this way, they provide a mutually beneficial association with their host bee for some of their life cycle.

Our declining bumblebees and honey bees must also contend with a whole range of other parasites and guests - viruses, protozoans, nematodes, bacteria, other mites, fungi and parasitoid wasps. Their influence is fascinating but often little understood.

In 2017, French scientists Tamara Gomez-Moracho, Philipp Heeb and Mathieu Lihoreau highlighted how parasites and other pathogens of bees can even change their host's feeding behaviour, flight, sense of smell, metabolism, learning and memory (see links below).

As a result, infected bees may lose their way more, choose different flowers and even get confused about whether they should be nesting or hibernating. If a bee's intelligence or feeding efficiency is impaired, the consequences may be dramatic for her brood.

Bees rely heavily on their memory and being able to assess information about their surroundings to find food efficiently. It takes complex learning for a bee to find food successfully, using vision, smell, electric fields, communication and good spatial memory.

My chance encounter has got me wondering what other hidden influences these little mites may have on pollination and pollinator decisions. For example, the

*Parasitellus* mites spotted on my garden bumblebee also graze on the outer layer of pollen grains which they plunder from the queen's nest, but otherwise leave the pollen intact. Do the mites prefer certain pollen types, I wonder, and can they influence what the bee collects?

Some years ago - whilst pregnant - I had great fun doing a dissertation on a similar themed topic: how nectar quality and natural yeasts inside the flower influence bee foraging decisions. I didn't have enough scope to dive into pollen as well, but it sparked endless unanswered questions, that could have warranted a PhD, or maybe several.

But life took a different path. Now my daughters in my own brood are counting the bumblebees with pride. And our family's planting decisions are having a small influence on bee foraging choices.

\* *Parasitellus* bumblebee mites occur across North America, Europe, Northern Asia, China, Argentina, Mexico and some neo-tropical areas.

\* Thanks to Professor Dave Goulson at the University of Sussex and Mr David Notton at the Natural History Museum, for further information on bumblebee mites. References to interesting further reading are provided below.

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