

A Hitchhiker's Guide to Citizen Science

A beetle sits motionless on a hogweed flower. But what is it?

During a summer's fieldwork searching umbellifers for beetles, finding a species new to me was commonplace. But this one was a complete mystery. No more than 5mm long, with rich brown wing cases reminiscent of old wood furniture, a square cream-coloured head and thorax, and antennae like strings of beads that thickened towards the tip. Back in the laboratory, I stumbled on its identification online before even opening a key. It was of the genus *Antherophagus*, in the family Cryptophagidae. Crypto: even the name of the family has a mysterious air, but with a little more sleuthing I had at least determined that this diminutive hogweed denizen was *Antherophagus pallens*.

A name is often where the trail stops. There are around 4000 species of beetle in Britain, so there's usually little else to know beyond the most basic of life history details. In the case of *Antherophagus*, however, the snippets of information I could find were intriguing. Its larvae are scavengers in the nests of bumblebees, eking out a living on scraps of nesting material and other detritus. The adult females actually lay their eggs directly in the nest. And how do they find the bees' nest in the first place? This is the good part: they hitch a ride.

Unlike most of the beetles I found on hogweed that summer, the *Antherophagus* had not been after pollen but was using flowers as the entomological equivalent of a bus stop. If a bumblebee came close enough, the beetle would grab hold of its proboscis and then cling on for dear life, only letting go when it knew the bee had returned to its nest.

Such inter-species hitchhiking is known as phoresy, and there are many other examples from the invertebrate world. Rarely is a carrion beetle without its cohort of mites, allies of the beetle that help it compete at a carcass by consuming the eggs of blow flies. Pollen-feeding flower mites are another bee passenger, using them to get from bloom to bloom, and tiny pseudoscorpions – which themselves feed on mites – can be found riding along with a variety of flying insects, fastening themselves on with a pincer.

Among the most famous insect hitchhikers are oil beetles, nest parasites of solitary bees. Each impressively swollen female lays hundreds of eggs in burrows close to where solitary bees are also nesting. Once hatched, the specialised, highly mobile larvae behave much like an adult *Antherophagus*, crawling up onto flowers where they might encounter a foraging bee. They complete their life cycle within the solitary bee's nest, consuming eggs as well as stored nectar and pollen.

Returning to *Antherophagus pallens*, now that I knew its name I could submit details online through iRecord, which connects with the National Biodiversity Network database. Taken together with other records, reports of a single beetle at a single location yield valuable information about distribution, phenology and habitat associations, and given enough data it is also possible to study changes in abundance over time. But what that doesn't capture is how the beetle interacts with the ecosystem that supports it.

Much of what we do know was worked out by simply watching animals and seeing what they did. Has basic natural history of this sort gone out of fashion? Certainly most of the notes I can find on the ecology of *Antherophagus* date back almost 100 years. I admire the patience and dedication of those who first unraveled the intricate life cycle of an oil beetle, or rifled through enough bumblebee nests to figure out that *Antherophagus* clinging to bees' tongues was not simply a freak occurrence.

Now that we're increasingly aware of how important interactions between species can be to conservation, from groundbreaking work on the large blue butterfly to recent high-profile research on ecological networks, perhaps we need to recapture something of the spirit of those old-fashioned naturalist-scientists. There are certainly plans underway to capture species interactions in biological record data, which may be a step towards recasting citizen scientists as citizen natural historians, more than mere data drones for the 'proper' scientists in research institutions.

Who knows, perhaps some hitherto unknown aspect of the locomotive interaction between *Antherophagus* beetles and bumblebees may prove useful for the conservation of one or the other. If it doesn't, wouldn't it simply be satisfying to know more? After all, whilst I have endeavoured to spin a serious point from a single observation, I only recall it so well because I was charmed by the animal, and delighted by the thought of it flying through the sky whilst dangling from the tongue of a bee.

Antherophagus pallens sits motionless on a hogweed flower. But what is it doing there?