

No bones about it: our local invertebrates

Ants and aphids

If we met aliens from another planet, we'd be thrilled with how exotic they are. We'd study and marvel at their bizarre life cycles – how they feed, how they mate, how they compete and co-operate.

I have good news: we have aliens in our back yards. They're just as wondrous, and there's no reason to ignore them just because their distance is measured in feet rather than light-years. I'm going to share a close encounter that's as marvelous as any alien.

Several years ago, when I was just getting into this fascinating hobby, I was in the backyard when I noticed some ants on a tree. When I took a photo, however, it turned out the ants weren't alone.



The stem was filled with lots of tiny aphids right next to the ants. What was going on? Let's back up a bit.

Aphids belong to the order Hemiptera, often called true bugs. Members of this order typically have mouthparts made for sucking fluids. Some hemipterans use this for attack: sucking the fluids out of their prey. Aphids, as every gardener knows, use their mouthparts for sucking sap from various plants.

In fact, they find a phloem vessel on the plant, and puncture it with their proboscis. Then, they simply wait. The pressure of the sap automatically fills up their bellies. It's like drinking from a firehose.

This sounds like an easy lifestyle, the equivalent of sipping cocktails at the beach, but there are many problems. For one, it's not easy to defend yourself whilst stopped in one spot, sucking on the sap. Aphids are prey to many different creatures, such as ladybug larvae, lacewing larvae, and the charmingly named rat-tailed maggots (Syrphid fly larvae; don't scorn them, they're critical pollinators and an important part of the ecosystem).

There's another problem: sap just isn't that good for you. It has lots of sugar, but not much of anything else. In order to get enough nutrients, aphids have to go through enormous quantities of the stuff. Ingesting all of it would make them balloon up, which would make them even more easy to pick off. What's an aphid to do?

Aphids solve these challenges in various ways. First of all, there are bacterial endosymbionts in their guts that are able to use their diet and synthesize amino acids, which they share with the aphids.

The other solution they use is ingenious: it combine the two dangers and uses them to solve each other. And this brings us to our little tree in our little town.

Since the aphids have to process so much sap, they discard some of it. No need to waste it though: the ants have evolved to collect it and take it back to their colonies. It might not have much by way of nutrients, but the sugar provides plenty of energy.

In return, the ants protect the aphids from the various predators that we listed. Ants are fairly well respected in the insect world: there's a reason that so many insects have evolved to imitate them.

In this photo, you can see an aphid secreting a drop of so-called honeydew (which sounds heavenly, but remember that it's expelled from the anus), and the ant collecting it.



It's useful to realize that this is a pretty sophisticated transaction, not a simple exchange. For example, the aphid knows not to produce the honeydew until the ant strokes it with her antenna. Additionally, aphids that are part of a mutualism with ants actually produce honeydew of a different character than if they weren't part of this relationship, with more amino acids. It's amazing what millions of years of evolution can come up with!

Take a minute to think about this process: plant sap, ingested by bugs, processed by bacteria, shared with ants in exchange for protection. It's happening in your backyard.

[The wikipedia aphid article was referred to for some of the details in this article.]