

A Fatal Fungus

by Jeffrey Cheng

Deep within the Amazon Rainforest, shielded from the sunlight by the twisted mass of vegetation that makes up the canopy, a female carpenter ant ambles along the forest floor. In search of food, she crawls up a tree trunk, comforted by the feeling of rough bark beneath her six slender legs. She moves further up the tree, inches along a branch, and comes across a harrowing sight.

It's a dead ant, impaled by a bright orange fungus. It's a male ant, although that is barely discernible; his wings, the defining characteristic of males, are fragmented as if he had been hit by a car. He lies shriveled and lifeless; it looks like the fungus has sucked his life out via some twisted, vampiric process. The fungus has utilized his vitality to grow an orange Q-tip-shaped appendage that elongates out from his body like some sort of hideous, poisonous snake.

The female ant approaches her dead comrade, twitching her antennae and brushing them against him. There's nothing of interest; he's completely dead, and the fungus doesn't appear edible. Giving it no more than a moment's thought, she moves on, setting her sights on a juicy looking leaf extending from the end of the branch.

The female ant doesn't know it yet, but she's already dead.

Over the next couple of days, she experiences multiple strange sensations. First, she becomes erratic and aggressive, prone to sudden movements and twitches. Soon after, against her will, her body develops an all-consuming desire to bite down on a leaf. The ant's body takes control, forcing her into a zombie-like stupor towards her target. She chomps down on the vegetation, sealing her fate. Try as she might, the ant is unable to unclench her frozen mandibles. She lies there without the ability to control her own muscles, paralyzed in submission to a body that has seemingly developed a life of its own. She's doomed. It's a cruel fate; food is right there in her jaws, but she is unable to eat due to the mysterious force that has consumed her. The ant dies a slow, gruesome death.

It's the silent killer. It's the grim reaper. It's *Ophiocordyceps unilateralis*, or cordyceps for short. The orange fungus was behind the murder from the beginning.

Cordyceps is a fungus that lives primarily in tropical rainforests and is characterized by its unique form of reproduction; when its spores contact an ant, they release fungal cells that slither inside the ant and settle between muscle tissues. Once in place, the fungal cells secrete a potent combination of over 56 microscopic molecules called metabolites—two of which are guanobutyric acid and sphingosine, substances known to be correlated with neurological disorders—that destroy the ant's neurons, making it unable to control its body. The fungal cells connect to one another via tubes, creating a network that wraps around the ant's muscles. This network releases nerve toxins that cause the ant's muscles to contract, giving cordyceps complete control of the ant. We know what happens after that: cordyceps leads the ant to a leaf and slaughters it. When the ant dies, the fungus uses its nutrients to grow. Cordyceps' killing power

is immense; cordyceps can wipe out entire ant colonies, creating dead zones 20-30 meters in radius that biologists refer to as “graveyards”.

Let’s return to the ant, as this tragic tale is not complete.

Cordyceps sucks the nutrients out of the female ant, inducing shocking changes in her appearance. Her shiny black exoskeleton, once sturdy enough to let her lift objects 10 times its own weight, becomes dull and crumpled. Her beady eyes sink back into her head.

As the ant withers, cordyceps comes to life. It tears into the ant’s flesh like a piranha. A characteristic orange fiber—dubbed a “fruiting body” for its ability to create new spores—breaks through the ant’s neck and reaches towards the sunlight peeking through the canopy.

Once cordyceps has exhausted the ant’s nutrients, it’s time for the next phase of its malicious plot. It releases spores from the fruiting body, spreading them into the wind to infect more unsuspecting ants. Of course, any ant foolish enough to approach the fungus will be afflicted as well. The female ant lies dead, crumpled like a ball of paper, impaled on cordyceps’ spike just like her male counterpart before her. In a short while, she decomposes and scatters into the wind. Nothing remains of the ant. It’s the perfect crime.

And cordyceps moves on, its spores floating on the wind in search of its next victim.