

The fungus zombies in 'The Last of Us' are fictional, but real fungi are becoming more resistant

February 24 2023, by Gerry Wright



In the HBO series 'The Last of Us,' the parasitic fungus cordyceps mutates, and jumps from insects to humans and quickly spreads around the world, rendering its victims helpless to control their thoughts and actions. Credit: HBO

Many of the people watching ["The Last of Us"](#) are likely there for the zombies.

I love the zombies too, but I'm really there for the [fungus](#).

I've been studying fungi since my Ph.D. work in the 1980s, and I grow more fascinated by these amazing organisms with every passing year.

In the HBO series and the [video game that inspired it](#), a [parasitic fungus](#)—a fictitious mutation of the [very real cordyceps](#)—jumps from insects to humans and quickly spreads around the world, rendering its victims helpless to control their thoughts and actions. Far-fetched fungal fear-mongering? It's definitely fictional, but maybe not as preposterous as it might seem.

Fascinating fungi

From microscopic mold spores to [kilometers-long mycelium](#) under the [forest floor](#), members of this distinct biological kingdom—neither plant nor animal—are incredible, and highly worthy of more attention.

Most of us may not think about them beyond the mushroom slices on our pizza, but fungi figure prominently in our everyday lives. Do you eat bread? Thank [the fungus we call yeast](#). Do you enjoy beer, wine or whisky? Raise a glass to your [fungal friends responsible for the fermentation](#) that brings them to life.



Credit: AI-generated image ([disclaimer](#))

Every time a round of antibiotics helps you recover from some form of [infection](#), remember that [a mold gave us the compounds that became penicillin](#) and its many derivatives.

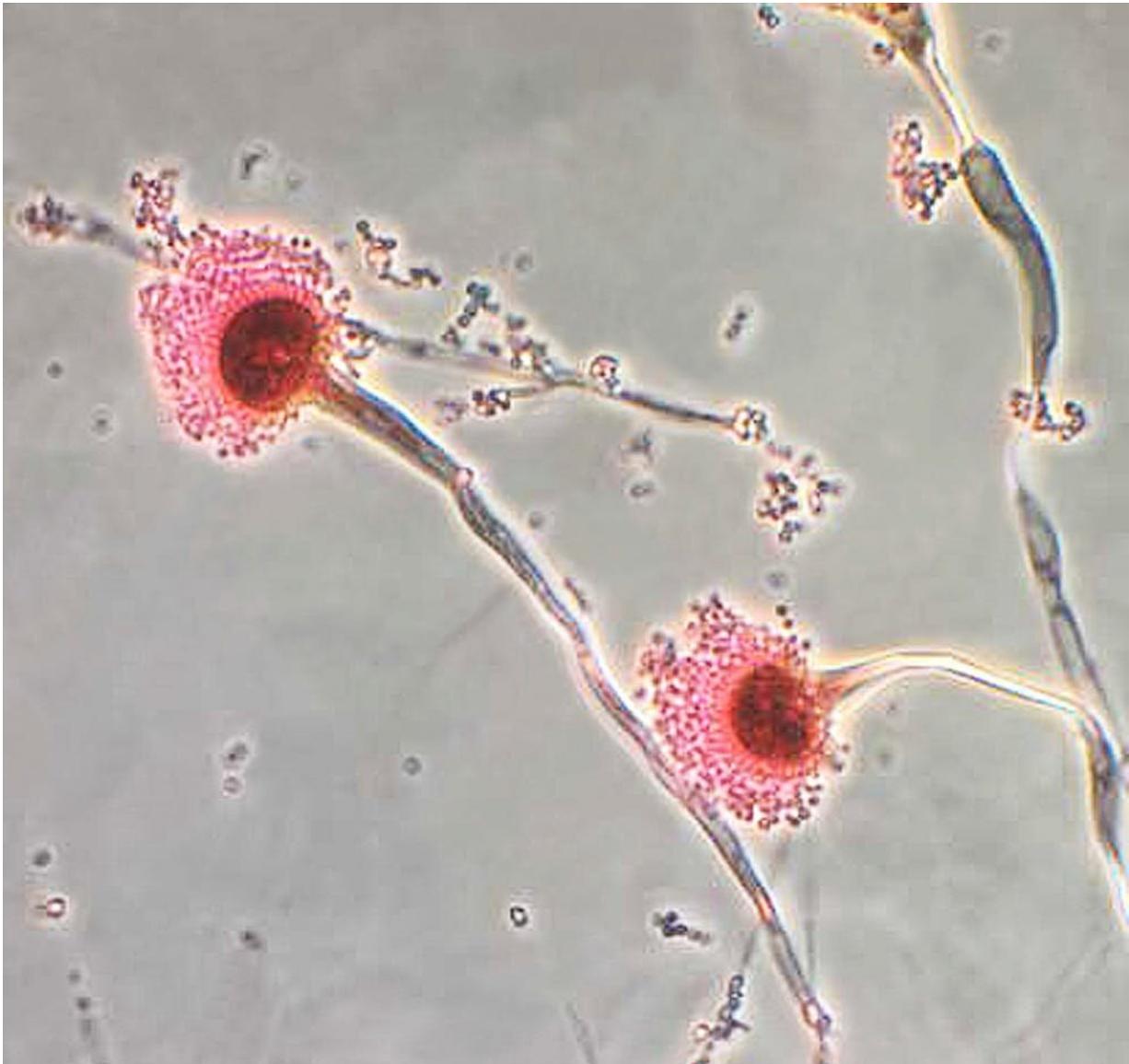
Fungi are incredible chemists. They make many compounds that humans cannot easily replicate in the lab. Some make compounds that can affect behavior.

Look at [lysergic acid diethylamide](#), commonly known as LSD, or "acid." Its well-known psychedelic effects originate from a grain mold. Similarly, "magic" mushrooms are the source of [psilocybin](#). LSD and magic mushrooms are both illegal recreational drugs but are also under study for their therapeutic value.

Fungal infections

Fungi also have an aggressive side. Apart from breaking down dead plants and animals, some forms attack living creatures, including humans. Whole pharmacy shelves are stocked with remedies for [athlete's foot](#), [yeast infections](#) and [jock itch](#), all of them nasty fungal infections. Even [dandruff is caused by a fungus](#).

Yet while we can access an array of medications to cure bacterial infections such as pneumonia and [strep throat](#), there are only [four known compounds](#) available to rid ourselves of fungal infections. Three are available in the various over-the-counter powders, sprays and ointments we use to treat common fungal infections.



Microscopic image of the fungus *Aspergillus fumigatus*. Credit: CDC

The fourth and newest class, echinocandins, is reserved for hospital settings, where the consequences of fungal infections can be deadly.

[My team's research lab](#) at McMaster is part of the university's broader [Global Nexus for Pandemics and Biological Threats](#), and also works with

the global research organization CIFAR's [Fungal Kingdom: Threats and Opportunities](#) program.

We are working to find ways to limit the potential harm humans face from fungal infections. We also seek to understand how we can use their abundant and as-yet barely tapped potential to make new antibiotics before we lose the waning power of penicillin and its derivatives.

Fungi adapt and evolve

I was first attracted to fungus research as a student about to begin my Ph.D. studies about 35 years ago. At that time, [HIV-AIDS was still emerging](#), shutting down the immune systems of otherwise healthy people, leaving them vulnerable to opportunistic infections, [including fungal infections](#).

I wanted to understand more about how fungi worked.



Microscopic image of the fungal organism, *Epidermophyton floccosum*, which is a cause of infections such as athlete's foot and jock itch. Credit: CDC/Libero Ajello

Like bacteria and viruses, fungi are always evolving and adapting, [finding ways to survive under hostile conditions](#). We are seeing many forms of fungi adapting to live at ever-higher temperatures, including body temperature, which has long been humans' first line of defense.

We are also seeing growing antimicrobial resistance among some causes of fungal infection, yeasts such as [Candida auris](#) and molds such as [Aspergillus](#), both of which can be causes of in-hospital infections.

Potential for a fungal pandemic

While "The Last of Us" is a strictly dramatic projection of what might happen in a deadly fungal outbreak, it is at least based, if not in reality, in logic.

Fungi are able to influence perceptions and behavior through chemistry. Are they getting closer? You bet. Do they make zombies? Not that we know of, but the thought is darkly entertaining, and that keeps me watching.

The show does do an excellent service by reminding us that we need to adapt to stay ahead of the possibility of a fungal pandemic.

In the same way the movie [All The President's Men](#) once inspired a generation of journalists, and [The Paper Chase](#) later channeled many eager students toward law school, I am hopeful that "The Last of Us" may trigger new interest in studying fungi.

The more minds we can focus on unlocking the true magic in mushrooms, the better off we'll all be.

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