

Scientists discover a 'third state' of Zombie-ism beyond life and death - in breakthrough that proves Zombies are a reality

- 'Third state' sees cells gaining new capabilities that they didn't have in death
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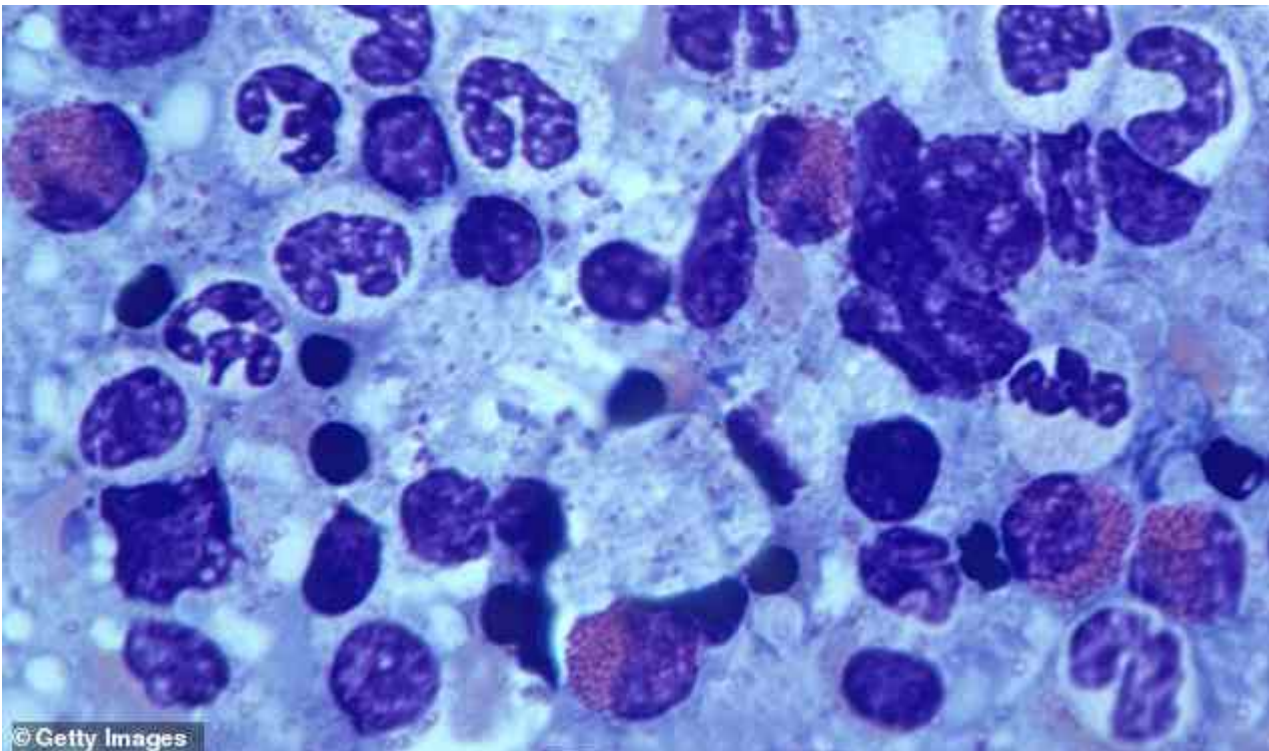
In videos such as 'Frankenstein', 'Walking Dead' and 'Re-Animator', human bodies are brought back to life, existing in a freakish condition between life and death.

While this sounds like the stuff of fantasy, a new study says a 'third state' of existence really does exist in modern biology.

According to the researchers, the third state is where the cells of a dead organism continue to function after the organism's death.

Amazingly, after the organism's demise, its cells are gaining new capabilities that they did not possess in life, the biologists say.

If more experiments with the cells from dead animals – including humans – show they can enter the third state, they could 'redefine legal death'.



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After an organism has died, cells are gaining new capabilities that they did not possess in life, the researchers say. Different cell types have different capacities for survival (file photo)

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In sci-fi films such as 'Frankenstein' and 'Re-Animator', human bodies are brought back to life, existing in a freakish condition between life and death

What is the 'third state' beyond life or death?

The third state is an emerging state of existence in biology, neither life nor death.

This third state consists of cells of dead organisms that can continue to function even after the organism's demise.

After an organism has died, cells are gaining new capabilities that they did not possess in life, the researchers say.

Different cell types have different capacities for survival, including white blood cells in humans.

The new study in [Physiology](#) has been led by Professor Peter Noble at the University of Washington in Seattle and Alex Pozhitkov at City of Hope National Medical Center, Duarte California.

'Life and death are traditionally viewed as opposites,' they say in a new piece for [The Conversation](#).

'But the emergence of new multicellular life-forms from the cells of a dead organism introduces a 'third state' that lies beyond the traditional boundaries of life and death.

'Certain cells – when provided with nutrients, oxygen, bioelectricity or biochemical cues – have the capacity to transform into multicellular organisms with new functions after death.'

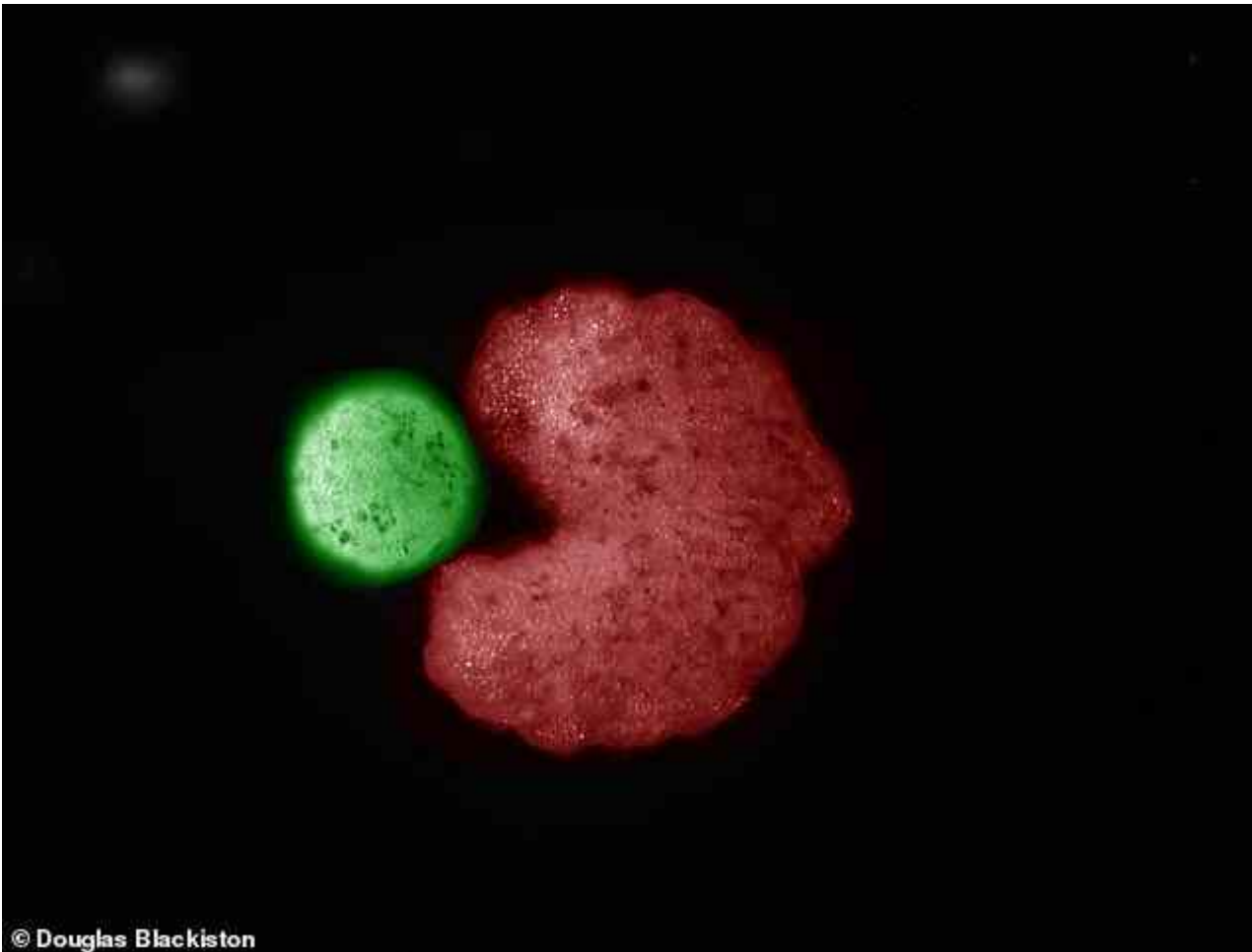
The team conducted a review of recent studies that investigated the remarkable capability of cells to exist in new forms after an organism has died.

In 2021, researchers in the US found that skin cells from dead frogs were able to adapt to a petri dish in a lab, spontaneously reorganizing into multicellular organisms [called 'xenobots'](#).

These organisms showed behaviours beyond their original biological roles – by using their cilia – small, hair-like structures – to move through surroundings.



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In the classic 1980s film 'Re-Animator', a medical student discovers how to bring human tissue back to life



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Pictured, computer-designed organisms that gather single cells inside a Pac-Man-shaped 'mouth' and release 'babies' (green)

Other scientists also found that human lung cells can self-assemble into miniature multicellular organisms that can move around – dubbed 'anthrobots'.

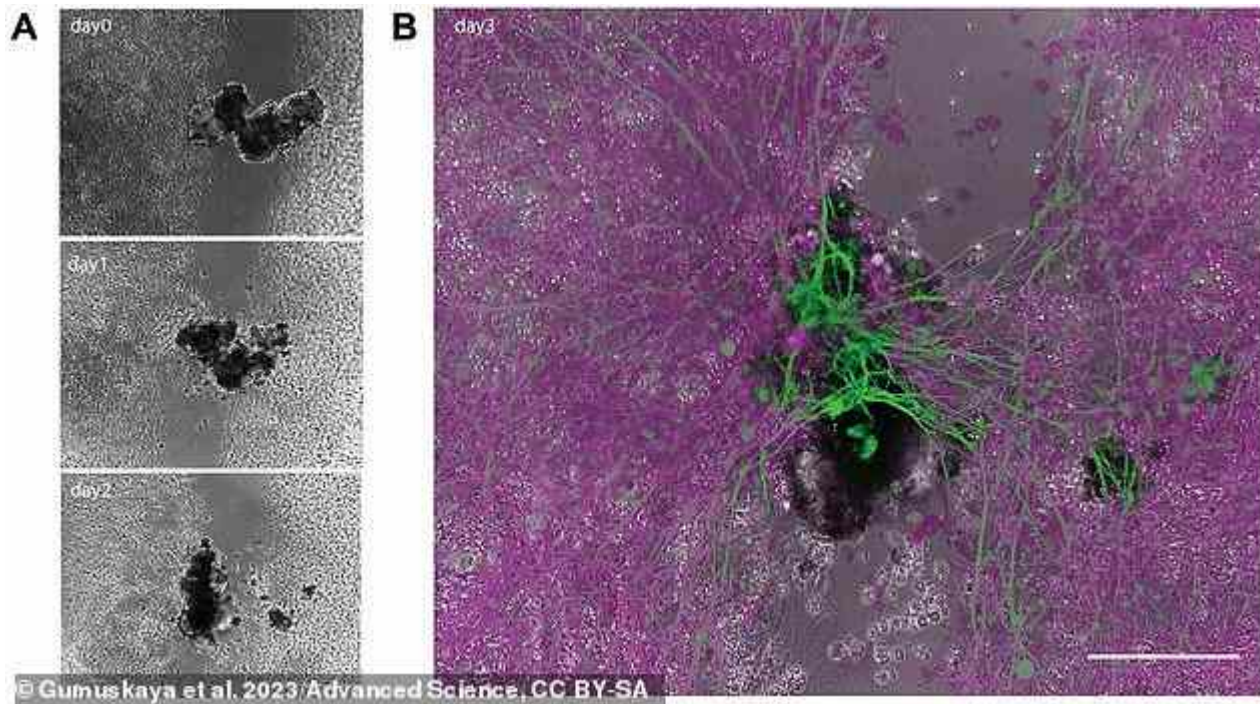
These anthrobots not only can navigate their surroundings but also repair both themselves and injured nerve cells nearby.

The team say these are examples of new cell functions that don't exist in life, 'showing change in ways that are not predetermined'.

How certain cells function in the third state after an organism dies remains unclear, but one potential Frankenstein-style explanation is a hidden system of 'electrical circuits' that reanimate the cells.

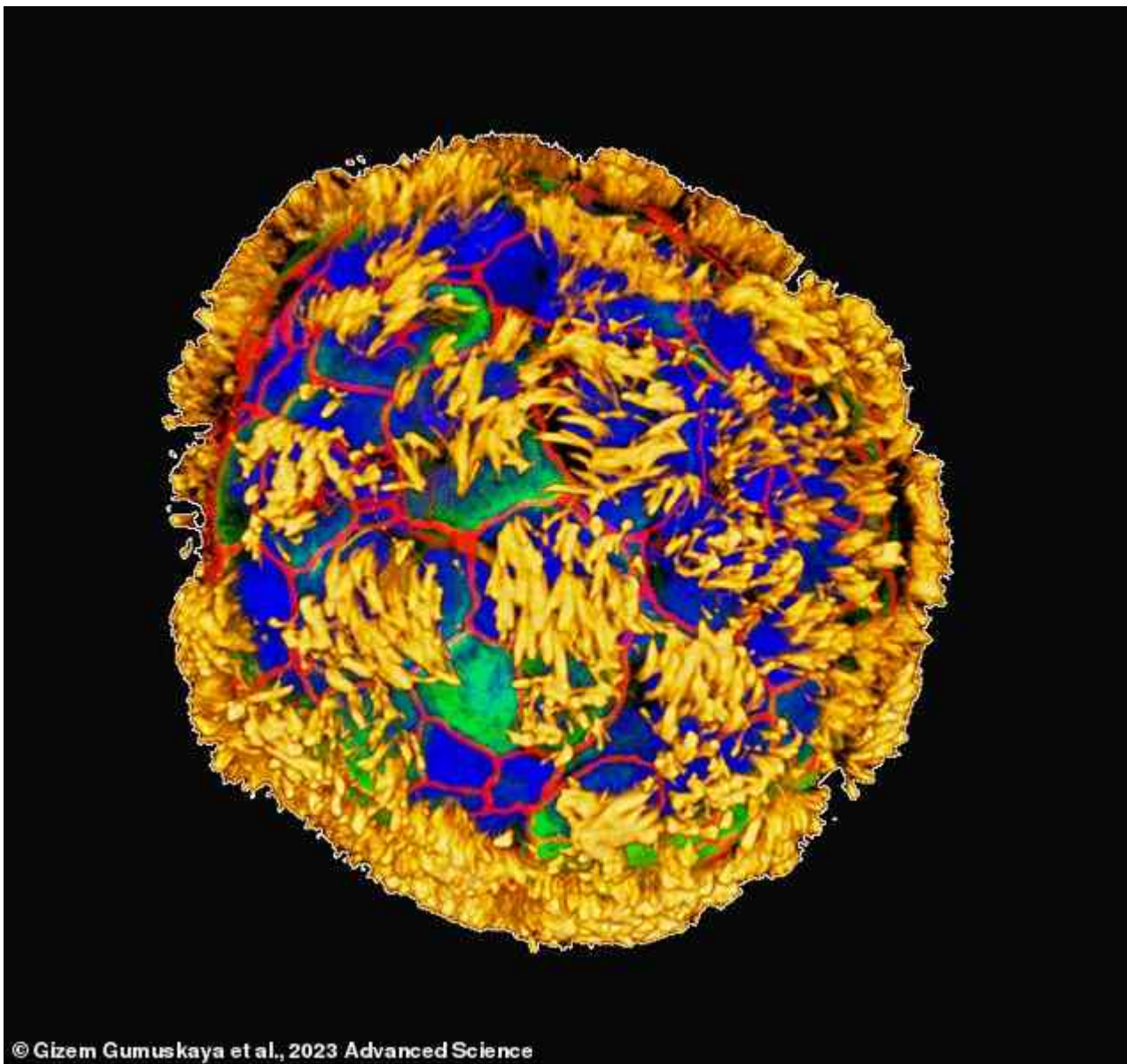
The team say: 'One hypothesis is specialized channels and pumps embedded in the outer membranes of cells serve as intricate electrical circuits.'

Do YOU believe in a 'third state' of existence?



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Diagram A shows an anthrobot building a bridge across a scratched nerve cell over the course of three days. Diagram B highlights the 'stitch' in green at the end of day three



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This anthrobot was made from human lung cells, coaxed into a new shape that can crawl around and repair damaged tissue



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Xenobots can gather hundreds of single cells, compress them and assemble them into 'babies' released from their Pac-Man-shaped mouths

'These channels and pumps generate electrical signals that allow cells to communicate with each other and execute specific functions such as growth and movement, shaping the structure of the organism they form.'

Several factors may influence whether the cells have this capability, including environmental conditions (such as temperature) and energy sources (whether they have access to fuel and can metabolize).

'Metabolic activity plays an important role in whether cells can continue to survive and function,' the research team add.

Factors such as age, health, sex and type of species also 'shape the postmortem landscape' – in other words, whether they can exist in the third state.

Ultimately, the research hints at 'unexplored frontiers' that could bring animal cells into the third state – although whether it one day resembles the likes of 'Re-Animator' remains to be seen.

In the classic 1980s film, a medical student discovers how to bring human tissue back to life – with violent consequences.

'This research has the potential to transform regenerative medicine, redefine legal death, and provide insights into life's physiological limits, paralleling inquiries in embryogenesis,' the study authors conclude.

Infection and pandemics have never been more relevant globally, and zombies have long been used to express this fascination in pop culture. Given the interest in zombies in American popular culture, Elizabeth Fusco connects zombies to a scientific context with this piece. -ML

From horror movies to children's toys, zombies are a staple in American pop culture. The word zombie arises from sugar cane plantations in Haiti, where [the word zombi describes one's soul](#). [The slaves on these plantations believed a sorcerer could cast a spell to turn a person into a zombie](#). One of the substances used in these spells is [tetrodotoxin](#), a deadly neurotoxin most famously found in pufferfish. Tetrodotoxin induces zombie-like symptoms, such as difficulty walking and mental impairment. [Clarivius Narcisse is a famous case of zombie-fication by tetrodotoxin poisoning](#). He was admitted to the hospital and pronounced dead, only for his sister to identify him at a village market 18 years later! Once reunited with his family, he recounted what it was like to enter a zombie-like state.

From Haiti to Hollywood

Tales of zombies made their ways from Haiti to Hollywood, and zombie films began to arise in the mid-1900s, with the most notable early zombie film being *Night of the Living Dead*. In this movie, [radiation from a space explosion](#) emanated toward Earth, reanimating the dead and giving them an appetite for human brains. In addition, zombie viruses are also a commonly used mode of infection, and these viruses cause zombie outbreaks in many popular shows and movies, such as [The Walking Dead](#) and *World War Z*. More recently, the video game and television show *The Last of Us* shines a new light on the zombie trope, exploring a zombie pandemic induced by an infectious fungus.

After the onset of the COVID-19 pandemic, many wonder what the next global health emergency will be. While *The Last of Us* video game was developed before the pandemic, the television show was written during it, and the writers did an amazing job using elements of the COVID-19 pandemic to make *The Last of Us* universe feel realistic and applicable. For example, one of the opening scenes of *The Last of Us* focuses on two scientists on a talk show in the 1960s. They are discussing pandemics and what would most likely cause the next pandemic.

The first scientist gives an expected answer, to fear viruses. The second offers a more unconventional idea and states we should be fearful of a fungi-induced pandemic. While the audience laughs, he warns that we have no effective fungicides and that fungus is more likely to mutate as the Earth warms, allowing it to infect warm-blooded humans, leaving us as [“billions of puppets with poisoned minds.”](#) In *The Last of Us* universe, his fears come true, and 40 years later, fungi mutate to infect humans. The inspiration for this pandemic comes from a real-life fungal species: cordyceps.

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-Elizabeth Fusco on [The Last of Us](#)' impact

Cordyceps in Context

Overall, the show makes the cordyceps infection in humans seem realistic, and you can tell that they consulted with [scientists who study fungi](#) when creating it. Cordyceps are also known as the ‘zombie ant fungus’ due to their ability to infect ants and control their minds. After infection, the fungus grows within the ant and [eventually controls the ant's brain](#). The control method of the cordyceps in *The Last of Us* mimics how cordyceps control ants, where once infected, the cordyceps command the victim to infect as many other people as possible to spread the fungus. In *The Last of Us*, the cordyceps also take root and spread throughout the infected being's body. The show even highlights this in a scene where Ellie cuts the flesh of a dead infected, and cordyceps tendrils come spilling out.

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In *The Last of Us* universe, cordyceps infection begins when an infected individual bites a victim. Then, depending on how far the bite is from the brain, it takes variable amounts of time for the fungus to take control. While bites do not cause fungal infections, this route of infection is how the disease [rabies](#) is spread, which may be the inspiration for this aspect of infection in *The Last of Us*. In our universe, cordyceps spread through airborne spores rather than a bite. In the video game form of *The Last of Us*, the characters wear gas masks to protect themselves from infectious, airborne spores. Still, this concept was scrapped in the television show so that audiences could better [see the actors' faces](#).

How Real is *The Last of Us* Really?

Nevertheless, a few aspects of *The Last of Us* do not mirror reality. First, [there is still no known case of cordyceps infecting humans](#). Surprisingly, many people actually take cordyceps as a supplement, and research has shown that cordyceps can [strengthen the immune system and may even have some cancer-fighting properties](#). In the show, Tess states, “[You step on a patch of cordyceps in one place, you can wake a dozen infected somewhere else](#),” indicating that the infected are all connected through a root-like system. However, [this is not observed in cordyceps-infected ants](#). However, [trees in a forest can communicate with one another through underground fungal networks connected to their root systems](#), which could be the inspiration behind the connection of the infected in *The Last of Us*.

The Last of Us gives us a unique take on the zombie apocalypse. Although the show is fictional, many aspects are based on scientific truth, and it has exposed its viewers to the beautiful world of fungi. Hopefully, this show has also piqued the public's interest in learning more about the world and the amazing microbes that inhabit it.