

ZOMBIE ANTS & THE MIND CONTROLLING BRAIN PARASITE FUNGUS

DEEP IN THE JUNGLE THERE IS A HIDDEN HORROR, A FOUL FUNGUS THAT WOULDN'T SEEM OUT OF PLACE IN A SCIENCE FICTION MOVIE. HOWEVER, THIS ISN'T 'NIGHT OF THE LIVING DEAD', THESE ANTS ARE VERY MUCH ALIVE AND VERY MUCH REAL. LET'S HAVE A LOOK AT HOW THIS FUNGUS CONTROLS THE MINDS OF ANTS AND THEN EXPLORE IF SOMETHING SIMILAR COULD EVER HAPPEN TO HUMANS...

1



A single fungal spore attaches to the ant and begins to grow **hypha** - the long, finger like strands that make up the normally underground part of a fungus. The hypha drills into the exoskeleton of the ant using a mixture of enzymes and mechanical pressure.

3

The ant experiences severe, full body muscular spasms that cause it to fall from the trees onto the forest floor...



...it will then climb up onto the northern side of a sapling, about 25cm above the soil, where all the conditions are perfect for fungal growth

The fungus can now grow inside the ant and invade its **hemocoel** - the main space in between the organs of the ant where all of the blood is found.

2



THE ANT THEN RAVENOUSLY BITES, AS DEEP AS POSSIBLE, INTO THE UNSUSPECTING SAPLING

4



Once the ant has bitten, the fungus quickly destroys the connection between the brain and muscle, leaving the ant unable to control its own mouth, stuck to the leaf.

This is known as the **DEATH GRIP** as it is the final action an ant will ever take on this earth...

5

As the ant is starving to death the fungus begins to take control of more and more of the body's resources. Once the ant has finally died the fungus shoots out of its head and body as mushroom-like fruiting bodies, ready to rain fungal spores upon the ant's colony below, thus starting the whole deadly process again.



The *Cordyceps* fungus has been so effective at attacking ants that they have evolved a trait to deal with an infection. If the colony notices an ant showing the characteristic muscular spasms they will carry the infected far away to stop the fungus from growing and spreading to the other ants.

With such powerful control over the body of these ants, drug researchers have speculated whether there is a way the fungus could be controlled and used for medical purposes.

In particular the protein **cordycepin** has gained interest as a possible anti-cancer drug. Variants of the fungus that grow on caterpillars have been used for thousands of years in China as a remedy for a huge range of diseases. Only now are researchers starting to appreciate the potential these fungi possess.

COULD A FUNGUS EVER INFECT THE HUMAN MIND?

In the video game 'The Last Of Us' the human race has been almost totally destroyed by a variant of the *Cordyceps* fungus that causes the infected to become blood thirsty cannibals. To those who don't know about the real *Cordyceps* fungus there is no need to worry once you've put down the controller, but should the rest of us start preparing for the zombie apocalypse?

An estimated **60%** of all human diseases are **zoonotic** - this means they started as an animal disease and transmitted over to humans.

Some notable examples: Bird Flu, Swine Flu, Rabies, AIDS, Ebola, Tuberculosis.



75% of all new diseases are thought to be passed from animals.

There are already infections that can alter human behaviour. *Toxoplasma gondii* is a parasite which is found in a large percentage of the population and is usually passed from cats to humans. Individuals infected with the parasite have been found to have worse physical coordination than the uninfected. The parasite also causes an increase in testosterone levels and therefore behavioural changes associated with the hormone.

However there are some saving factors that may act as a barrier to a human *Cordyceps* infection:

- 1) Each *Cordyceps* species can only effectively infect one species of insect. This means the fungus is highly **specialised**. In order to transfer over to humans every aspect would have to suddenly adapt to our own specific bodily functions.
- 2) Some evolutionary biologists think that the main driving factor behind the evolution of warm blooded bodies - as in the case of humans - was the advantage it gave to protecting against fungal infections. *Cordyceps* is very sensitive to temperature and would have to undergo a huge change to tolerate our body temperature.

