

# Installation Instructions



Carefully open one end of each of the two mailing tubes. (You will be reusing the tubes to return the exhibit, so please do not cut into or tear the tubes' cardboard.)



Carefully remove the exhibit stands and cloth carriers from the larger of the tubes.



Save the round cardboard cover to reuse for returning the tubes.



Remove each of the stands and their respective arms from the cloth carriers.



Carefully open the aluminum stand base.



Place the extension arms into the stand base, with the plastic hooks pointing towards the front of the stand (front is two legs, back is one). Repeat for other three stands.



Now carefully open one side of the smaller mailing tube. This also will be reused. There are two art tubes enclosed. Each art tube contains two of the exhibit banners.



To open the tubes, unscrew the plastic caps on the tops of each tube.



After the tube cap is open, you will see the two rolled-up posters within. Be careful removing these, as the grommets in them can catch on the side of the art tubes.



Note the grommets.



Once removed from the tube, place the two rolled-up banners on a clean, dry, surface, and slowly unroll.



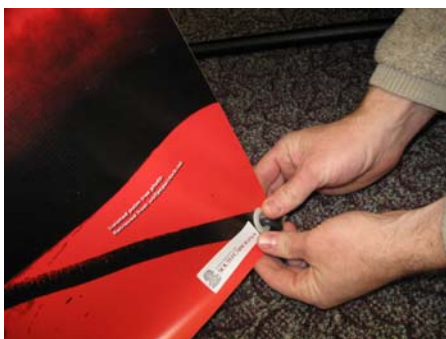
For the next step, go and find someone to help you separate the banners and move into position for hanging.



To avoid bending the banners, use a second person to lift and hang each of the banners on the stands.



Carefully hook the top two grommets over the plastic hooks on the extension arms.



Then carefully do the same for the bottom two grommets. It is easy for the stands to fall over during this step, so have an assistant hold the stand upright while the final two grommets are hooked into place.



Note the grommets hooked over the plastic stand hooks. Once all four grommets are in place on the stand, the exhibit banner should be rigid.



Here you can see the first of the four banners, erected. Repeat these steps for the other three banners and stands.



To return the banners, reverse these steps and securely tape up the mailing tubes prior to using either FedEx Ground Service, or UPS Ground Service with insurance. For the two tubes, the Return Postage with insurance should fall between \$20-40, it is estimated.

# The Science of Zombies:

## DIGGING UP TRUTH ABOUT THE UNDEAD

In 1960, a man missing for 18 years was discovered alive in a village in Haiti. His name was **Clairvius Narcisse**, and he claimed that he had been turned into a zombie. His case received international attention because he had been declared dead at the **Albert Schweitzer Hospital in Deschapelles, Haiti**, by American trained doctors. Researchers at the **Mars and Kline Psychiatric Center** claimed that this was the first medically verifiable case of **zombification**. **Wade Davis**, then a graduate student in **ethnobiology at Harvard**, was sent to investigate whether the "zombie powder" used in the **Narcisse case** might contain a natural drug that could be used in **anesthesia and surgery**.



Photo by Michael Heizer for the book *The Serpent and the Rainbow*. Photo by Michael Heizer for the book *The Serpent and the Rainbow*. Photo by Michael Heizer for the book *The Serpent and the Rainbow*.



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Zombies have long been a part of **Haitian Vodoo, or Vodou, folklore and tradition**. Unlike the modern zombie, which rises from the dead to feed on the living, the Haitian version is raised by a **Vodun sorcerer, a "bokor,"** part of the **Bizango secret society**, and then controlled by him. These zombies are considered dead, consequently buried, dug up, and resurrected by "magical" means. They are then used as **servants and slaves, deprived of will and normal consciousness**.

The discovery of **Narcisse** gave **Wade Davis** reason to believe that there was some truth to the **zombie myth**. During his investigation, **Davis** discovered what he believed to be one of the key ingredients in the "zombie powder," a **tetrodotoxin** derived from the **pufferfish**. This, combined with the **Haitians' traditional belief in the power of the Vodun sorcerer's magic**, may have contributed to the **zombification process**, as **Davis** describes in his popular 1985 book, *The Serpent and the Rainbow*.



Photo by Michael Heizer for the book *The Serpent and the Rainbow*. Photo by Michael Heizer for the book *The Serpent and the Rainbow*. Photo by Michael Heizer for the book *The Serpent and the Rainbow*.

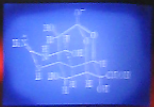


Photo by Michael Heizer for the book *The Serpent and the Rainbow*. Photo by Michael Heizer for the book *The Serpent and the Rainbow*. Photo by Michael Heizer for the book *The Serpent and the Rainbow*.



# The Science of Zombies:

## ZOMBIE BUGS



In nature, there are many examples of insects practicing zombification. Certain bugs and parasitic worms have evolved to behave like miniature Vodun sorcerers, taking control of other species, using them as their own zombies to ensure their survival.

**Emerald Cockroach Wasp (*Ampulex compressa*)**- To lay her eggs, the female wasp finds a cockroach (*Periplaneta americana*) and administers two precise stings. The first sting is to the roach's midsection, causing its front legs to buckle with brief paralysis. The second sting goes directly into the roach's head ganglia, or primitive brain, reaching an area that controls the escape reflex. The wasp then injects a mixture of neurotoxins, disabling the roach's normal escape response. Grabbing one of the roach's antenna, the wasp leads the roach into a burrow and then lays an egg on the larger bug's abdomen. With its metabolism slowed down considerably by the neurotoxins, the roach is now able to live for days without food or water. The egg hatches and the emerging wasp larvae chews into the roach, consuming its organs for about a week until it weaves itself into a cocoon inside the roach carcass. After four more weeks a full-sized wasp emerges.



Emerald Cockroach Wasp (*Ampulex compressa*) - Image by David H. Williams, University of California, Berkeley. Photo taken by David H. Williams, University of California, Berkeley.



An Emerald Cockroach Wasp (*Ampulex compressa*) - Image by David H. Williams, University of California, Berkeley. Photo taken by David H. Williams, University of California, Berkeley.

**Tropical Parasitic Wasp (*Polysphincta gutfreundi*)**- This Costa Rican wasp attaches a tiny egg to the belly or an orb-weaver spider (family Araneidae). After the worm-like wasp larva emerges from the egg, it injects chemicals into the spider, inducing it to weave an unusually shaped web capable of holding and camouflaging a cocoon. Next, after killing the spider and sucking out its internal fluids, the larva pupates in a cocoon for several weeks. Suspended at the center of the web structure, and largely masked by a specialized decoration of silk known as a stabliment, it remains there until it emerges as a fully grown wasp.



Polysphincta gutfreundi larva - Image by David H. Williams, University of California, Berkeley. Photo taken by David H. Williams, University of California, Berkeley.



Polysphincta gutfreundi cocoon - Image by David H. Williams, University of California, Berkeley. Photo taken by David H. Williams, University of California, Berkeley.

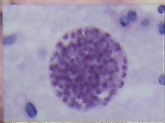
**Lancet Liver Fluke (*Dicrocoelium dendriticum*)**- This parasitic flatworm attacks an ant's nervous system causing it to change its natural behavior. During the evening when temperature drops normally send ants below ground, infected ants will instead climb blades of grass and attach themselves to the tops with their mandibles. Here they stay throughout the night, openly dangling in the air where they can easily be consumed with the grass by sheep or other cattle. Once inside the cattle, the flatworms can then reproduce and start this unusual cycle anew.



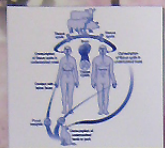
Lancet Liver Fluke (*Dicrocoelium dendriticum*) - Image by David H. Williams, University of California, Berkeley. Photo taken by David H. Williams, University of California, Berkeley.



# The Science of Zombies: UNDEAD PARASITES



Toxoplasma gondii oocyst. The outer layer is the oocyst wall, and the inner granules are the sporozoites. The oocyst is approximately 10 micrometers in diameter.



The life cycle of Toxoplasma gondii. The parasite is excreted in the feces of a cat, which is the definitive host. It is then ingested by a mouse or a human, which are intermediate hosts. The parasite develops in the brain of the mouse and in the brain and other organs of the human.

Some of nature's most powerful mind-altering "sorcerers" may be found on the cellular level in the form of parasites. *Toxoplasma Gondii*, for example, is a single-celled protozoan that infects most warm-blooded vertebrates, including mice and humans, sometimes altering their behavior in remarkable ways.

In a mouse, for example, *T. Gondii* can induce small alterations in the rodent's brain, causing it to become sexually stimulated by the smell of cat urine and to behave in ways that may increase its chances of being caught and consumed by a feline. This behavioral manipulation is purposeful, for only in the epithelial cells of a cat's intestinal walls can *T. Gondii* reproduce sexually, eventually producing millions of cysts, known as oocysts, which are then excreted with the cat's feces. When new mice or other warm-blooded vertebrates come in contact with these oocysts, the cycle begins anew.

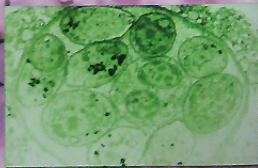
Humans are generally exposed to the parasite by drinking contaminated water, eating raw or undercooked meat, or coming into contact with infected cat feces. While it is still widely believed to cause few obvious symptoms in people, one researcher may have found evidence to the contrary.

Tests by Jaroslav Flegr, an evolutionary biologist at Charles University in Prague, demonstrate that people testing positive for *T. Gondii* may undergo slight changes in personality. For example, males with the parasite may become more introverted, suspicious, and more likely to disregard rules. They also may become less concerned with what others think about them, particularly their appearance. Women show the opposite effects. They are slightly more outgoing and trusting, and more concerned about their appearance than before the infection, as well as more apt to follow rules.



Jaroslav Flegr is an evolutionary biologist at Charles University in Prague. He has studied the effects of Toxoplasma gondii on human behavior and has found that infected individuals show changes in personality traits.

Even more fascinating is the fact that through two major epidemiological studies in the Czech Republic, Flegr discovered that people who tested positive for the parasite are about two and a half times more likely to be involved in traffic accidents than those uninfected. Two separate Turkish studies affirmed these surprising results. Because of these findings and the sheer number of people infected with *T. Gondii* worldwide (according to the *Journal of International Parasitology*, upwards of one-third of the world's population) Flegr believes that several hundred thousand road deaths a year may be directly attributable to *Toxoplasma Gondii*'s mind-altering powers.



Toxoplasma gondii oocysts. The outer layer is the oocyst wall, and the inner granules are the sporozoites. The oocyst is approximately 10 micrometers in diameter.



# The Science of Zombies: A FUTURE APOCALYPSE?

Is a Zombie Apocalypse possible? Based on new research and the fascinating tale of a neurodegenerative disease called Kuru, the answer to that question is more interesting and complicated than you may believe.

In the mid-20th century, among the Fore natives of Papua New Guinea's Eastern Highlands Province, an epidemic broke out that became known as the "shivering disease," or "Kuru" in the Fore language. Over a thousand afflicted tribe members died, but not before deteriorating, both physically and mentally, many with symptoms such as memory loss, excessive limb shaking, personality changes, hallucinations, anxiety, paranoia, spontaneous laughter, and psychosis.



A mourning Fore native covered in white clay. The photograph was taken in 1951 by Dr. Gustave Spillmann while investigating the Kuru epidemic that ravaged the Fore of New Guinea. Photo: Retrieved from PubMed Central.

Researchers realized that Kuru was likely being transmitted through the Fore members' ritualistic "endocannibalism," or the eating of their deceased loved ones as part of their burial rituals. It is now widely believed that what was being transmitted during these rituals were malformed proteins known as prions.



Prions are misfolded proteins that can cause neurodegenerative diseases. Prion protein (PrP<sup>C</sup>) is the normal form, while Prion protein (PrP<sup>Sc</sup>) is the misfolded form. Prions are highly resistant to heat and disinfection. Prions can be transmitted between individuals through contact with contaminated tissue or fluids, or through ritualistic cannibalism. Prions can also be transmitted from animals to humans, such as in the case of BSE (mad cow disease) and vCJD (variant Creutzfeldt-Jakob disease).

Prions are similar to viruses yet contain no nucleic acid, and are thought to be associated with Transmissible Spongiform Encephalopathies, or TSEs. While it was once believed that TSEs could not be transmitted via the air, researchers from Germany and Switzerland proved otherwise in 2011, when they successfully infected mice with an aerosolized TSE known as Chronic Wasting Disease.

Because TSEs may cause classic "zombie-like" traits, and because there is currently no cure for any of the known prion-based diseases, imagine the resulting epidemic that may follow were a TSE to become airborne: millions of delusional humans stumbling around, trembling excessively, behaving erratically, even violently, and all eventually dying. Were such a scenario to occur naturally among any of the prion-based diseases, a future zombie-like apocalypse may prove more possible than originally thought.



Microscopic view of prion protein (PrP<sup>Sc</sup>) aggregates, showing the characteristic beta-sheet structure. Prions are highly resistant to heat and disinfection. Prions can be transmitted between individuals through contact with contaminated tissue or fluids, or through ritualistic cannibalism. Prions can also be transmitted from animals to humans, such as in the case of BSE (mad cow disease) and vCJD (variant Creutzfeldt-Jakob disease).