

"De-extinction" of the Woolly Mammoth

Background: I first developed an interest in the extinct Woolly Mammoth while on a hike with my dog in a local Pennsylvania State Park (please see my Forum Discussion post [HERE](#)) . In researching the history of the last glacier, I found that Woolly Mammoths were indigenous to North America and very well may have occupied the same land that my dog and I were visiting as shown on the pictures. I also found that there were humans **actually** living among these massive animals, that included the Giant Sloth. Human hunting is hypothesized to be a probable cause for the extinction of many of these large animals. I was curious to explore this topic from the point of view of a student. So, I did a You Tube search and found this video: [Ref: Woolly Mammoth: The Autopsy click HERE](#)

Woolly Mammoth Specimens: The scientist attending the autopsy of the Woolly Mammoth looked like children in a sandbox snatching pieces of tissue and blood from this amazing specimen dating back more than 40,000 years ago. Thomas Jefferson too was so fascinated by this animal that he fully expected to find Woolly Mammoths roaming the Western plains of the United States. In this essay, I will discuss the ethical issues in actually realizing Jefferson's dream through a mammoth cloning project.

Nearest Living Relative: The extinct Woolly Mammoth (*Mammuthus primigenius*) has living relatives, specifically the Asian Elephant (*Elephas maximuse*), which would be the most likely surrogate in a mammoth cloning project. Woolly Mammoths are cold-adapted animals that include Artic foxes, polar bears, and reindeer. The unique hemoglobin of the Woolly Mammoth enables the animal to survive at low temperatures in order to not freeze especially in the lower legs. Other unique characteristics of the Woolly Mammoth includes thick furry coat as well as subcutaneous fat. In fact, the Woolly Mammoth and elephants may have significantly contributed to maintaining the herbivore pasture ecosystems that occupied most of the planet 15,000 years ago. That changed 14,500 years ago when the Ice Age was over resulting in sharp climate warming. Experienced and well-armed humans penetrated into America meeting herds of untamed animals. Humans hunters soon caused their own food sources to vanish with the eventual extinction of over 60 species.

Can A Woolly Mammoth Save the World?: See Ted Talk by Luke Griswold-Tergis [HERE](#). One of the main arguments for the De-Extinction of the Woolly Mammoth is presented in this Ted Talk video. It has been estimated that there are 1600 gigatons of carbon locked into the permafrost compared to the 750 gigatons of carbon in tropical forests on the remainder of the planet. If the permafrost soils thaw due to global warming, microbes previously frozen for milleniia will activate and decompose soil organics producing carbon dioxide and methane greenhouse gases which will further warm the planet. It is hypothesized that pasture ecosystems can eventually stop the process of permafrost degradation.

Risks and Benefits of Woolly Mammoth De-extinction

Benefits: As described in the video by Luke Griswold-Tergis, a very large animal, such as the Woolly Mammoth, could serve the function of a tank trampling and clearing the ground for other herbivores in order to preserve the Siberian permafrost. The suitable animals could be a genetically-enhanced Asian elephant such as that under development by George Church, Ph.D. at Harvard University (described at 28.28 minutes in the Autopsy video).

Risks: As for the risks, the use of the Asian Elephant is the most often cited criticism as described by Dr. Tori Herridge of the Natural History Museum in London (18.54 min in the Autopsy video). Dr. Pasqualino Loi wonders about the "many futile attempts to transfer embryos to surrogate mothers" since "elephants are not laboratory mice and no place around the world maintains a large enough number of elephants for this purpose." Furthermore, there are currently no protocols for in vitro transfer of elephant oocytes and embryos. (See Loi paper [HERE](#))

Resolution: The probable resolution of the above concerns will be the development of entirely in vitro embryo maturation **without** the use of a surrogate elephants. Although such Sci-Fi technology will take many decades to accomplish, it may be worth the wait.