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Back from Extinction - The Dire Wolf & Woolly Mammoth

Colossal is a bioscience company that labels themselves “as the world’s first and only de-extinction company”. Their stated mission is the de-extinction of extinct animals to the point that they resemble their extinct ancestors. They indicate that they are not trying to create a carbon copy of the extinct animal, because its natural environment no longer exists. Instead, they want to create a look alike that also has gained the biodiversity to be able to survive in our modern world.

Their approach to de-extinction involves animal cloning in conjunction with genetic editing. Both processes are used together to recreate the visual characteristics of the extinct animal. To begin their process, they need the genetic code of the extinct creature. To get the genetic code of the Dire Wolf they literally took a page from the movie Jurassic Park. They searched and acquired two ancient fossils; a 13,000-year-old tooth and a 72,000-year-old ear bone. Just like in the movie they extracted as much DNA as possible. Then again like the movie they used genetic tools to piece the code they found together using the DNA of a living animal that was an ancestral match to the animal they were trying to create.

Imagine a number of puzzle boxes that at one time contained every piece of the same puzzle. Now each box is missing significant pieces and you have the job of combining pieces from each box to recreate the full picture before parts were lost. In this case they had the Grey Wolf full genome to help them match where the Dire Wolf assembled genetic pieces needed to go.

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The grey wolf and the Dire wolf genome only differed by one percent.

They used genetic editing tools including CRISPR/Cas9 to switch key genes that would change the Grey Wolf so it would look like the Dire Wolf. Within the Grey Wolf genome, they rewrote 14 key genes in the cell's nucleus. These 14 genes promised to express 20 traits of the Dire Wolf. The visible difference between the Dire Wolf and the Grey Wolf included physical size, skull shape, leg length, snout shape, and most importantly fur color and texture.

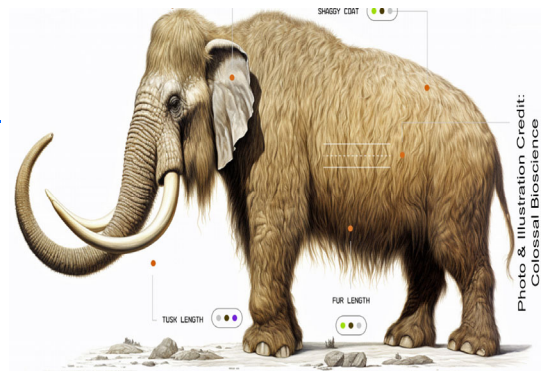
With their corrected genome complete they infused what they created into harvested Grey Wolf eggs. Once the replacement nuclei were fused with each donor egg, they were ready to function like normal fertilized egg cells. The final step was implanting these fertilized eggs into Grey Wolf surrogates. On April 7, 2025 they announced to the world that they had brought back from extinction three Dire Wolf pups. Two males, Romulus and Remus, that at the time of the announcement were six months old and one female Khaleesi who was two months old. See photo.



Although press reports have often announced that they successfully brought back from extinction the Dire Wolf, the truth is they created an animal clone that resembles the Dire Wolf. This is in keeping with their stated mission which is “generating an organism that both resembles and is genetically similar to an extinct species by resurrecting its lost lineage of core genes of extinct animals to the point that they resemble their extinct ancestors”.

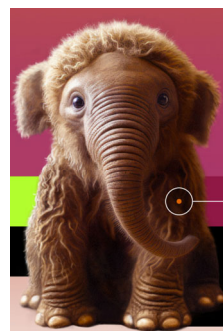
The really amazing de-extinction that they are trying to pull off is

the Woolly Mammoth. See illustrations. They already have the full genetic code because during the ice



age some were quick frozen in Siberia and Alaska. The freezing of these full animals was so fast that hair, skin, flesh, and bone were preserved as fresh as meat in your home’s deep freezer.

They have already selected the closest living relative of the Woolly Mammoth which is the Asian Elephant with a DNA match of 99.6%. They report on their website (<https://colossal.com>) that they already have sequenced both genomes and determined the core genes that are lacking in the elephant which would make it look like a Woolly Mammoth. Specifically, long hair, curvy tusks, small ears and a dome shaped head. The procedure is the same and it looks like they are now up to the final step of implanting fertilized eggs into elephant surrogates. It takes 18 to 22 months from fertilization for an Asian



Elephant to give birth. Interesting to note they indicate they expect to have elephant calves in 2027. They predict the calf will look like this.

Taking it a Step Further

1. Is the Dire Wolf or Woolly Mammoth an exact clone of the animals that went extinct? Why or why not?
2. Do you feel that this technology could be used to bring back dinosaurs? Why or why not?
3. If you were asked to set up a committee of five to ten people (real people like presidents, scientists, and priests) to work on guidelines for cloning research, who would you place on this committee?