De-extinction

A long time ago, before modern society, the earth was filled with wonders. Now, those same wonders are on the verge of extinction or collapse. Take several oceans as an example, go back one hundred years, and those same oceans that are polluted with trash were pristine and clear. Animals that once roamed freely are now having to be preserved or are gone forever. What if we could bring back the woolly mammoth or even go back as far as the dinosaurs? This is called De-extinction. De-extinction is a method developed by scientists to bring back extinct species. Accomplishing this can change the world, and I'd like to be a part of it.

So, what even is extinction? Extinction is when a species on earth is wiped out completely. Many animals such as the dinosaurs are already extinct and many more are on the verge. De-Extinction is the reverse process of extinction. In other words, it's the biological resurrection of an animal or species. Scientists would take DNA samples, use fossils, and even take out nuclei from cells to do so. It's still a modern project as of 2021. I'm not sure what this field of biology will look like when I grow up, but I do know that this is something I want to contribute to.

Now, you may be wondering: why should we even go forth with this? Wouldn't what's in the past be best left there? Well, for some species, which may be true. But some of them can help our ecosystems flourish. Some we may want back for research purposes. Or we're bringing them back because humans were the cause of their extinction, and we want to reverse that. In addition, they can also be key to finding answers to unanswered questions. We can also help species that are endangered, by boosting their population.

The first step to this process is deciding what we want to bring back and what is best left in the past. Things such as the saber-tooth tiger are something that we do not want to bring back. For one, it would be dangerous to us humans. Another thing is, that at this point, the world has evolved and grown over time so that the planet may not be suitable for this certain species anymore. Then there's another thing, we may not even be able to bring a creature from that long ago back from extinction. Fossil tissues (which are used in a method of de-extinction), can only be preserved for a certain amount of time.

Now the second step would be to decide, in what way do we want to go forward with this? There are many different paths we could take. The first one is called back breeding. This is a method that tries to take an existing species that is similar to the extinct one that we want to bring back and try to put the traits back into its DNA. Take a wooly mammoth for example. It's extinct, but the Asian elephant is remarkably similar to it. We would take the traits of a woolly mammoth (like the exceptionally long tusk, and fur) and try to breed it into our Asian elephant. Let's say that first, we try to make it hairier. We would take a slightly hairier elephant and pair it with an elephant with slightly longer tusks. The process would repeat until the desired result is acquired. This method has so many ways it could go wrong. Instead of getting a woolly mammoth, you get

a completely different result. Also, it would take an immense amount of time. If you are willing to take the risk and the time, this way could be for you.

SCNT, or somatic cell nuclear transfer, is a more advanced way of cloning. To fully understand this, you have to look at the structure of a cell. The outer part of the cell is called the cell membrane. The nucleus is a cell's control center, holding the DNA of an individual. The nucleus is in the center of an egg cell. To do this, you have to take the nucleus out of an unfertilized egg. Then, you take a cell that has been preserved in a lab, the cell of the organism to be cloned. Then the egg cell with no nucleus is fused with the lab cell. When this cell begins to develop into an embryo (unhatched offspring), and then the clone is born. This may sound simple, but it is not. Scientists have spent years trying to perfect this process.

To first understand cloning, we have to look at the past. Humans have been trying to clone things since the 1880s. The first living organism that proved that artificial embryo twinning was possible, was a sea urchin. Back in 1885, a sea urchin showed that even when two cells were separated, they had separate genetic codes and could grow into their being. Now, the next step for scientists was to figure out how to do this on invertebrate creatures. For the particular project, they took the salamander as the test specimen. To separate the two cells of the embryo, scientists took a strand of baby hair and tightened it between two different salamander cells, until they were divided. It worked fine, so they tried separating them even more but found that those cells didn't develop as efficiently. The first successful nucleus transfer was in 1952 on a frog. It showed us that transferring early embryo cells has a higher success rate than doing so with a more developed embryo.

After that, the idea progressed much faster. In 1975, the first mammal was cloned: a rabbit. This was a tremendous success because mammals are much harder to clone because their eggs are much smaller than those of other species. Dolly the sheep is commonly known as the first mammal to be fully reproduced using SCNT, in 1984. A decade later, cows were also proven 'cloneable.' Over the years, new animals were cloned as scientists started experimenting. In 2001, the first animal was brought back from extinction. A Spanish mountain goat. Sadly though, it died shortly after birth because of lung failure. Then in 2007, primates were proven cloneable. This was important since it was a big step towards human cloning. Which did happen 6 years later. In 2013, the first human was cloned. The past shows us that SCNT has evolved over the decades and can still go further.

Another way of de-extinction is genome editing. There are many kinds of cloning, such as SCNT- somatic cell nuclear transfer, but the most common is gene editing. In the past years, gene editing has been highly influential in the development of animal resurrection. Only a few decades ago, this approach wasn't that simple and was costly. Now, CRISPR-CAS-9 is a shortcut. There are many different versions of CRISPR gene editing, but CAS-9 is the most common. It costs a lot less and is much simpler. It allows scientists to replace and change parts of the DNA of different animals to their liking. This way, we can put traits back into species just

like back breeding, but more efficiently. This can be used on humans as well as animals. The idea for CRISPR was founded when scientists figured out how bacteria fought against viruses. When viruses invade bacteria and the bacteria fight it off, it takes an extra measure for precaution. What the bacteria does is that it take a sample of the virus's DNA and put it in safe storage. Then, when the virus tries to take over again it puts that sample to action. Since it knows what the virus's DNA looks like, it can successfully eliminate the virus's code from its DNA. Scientists took this method and improvised it to work for DNA editing. It takes out and puts in parts of DNA as instructed. Like the 'find and replace feature. This is an evolutionary technology and helps a lot in the idea of de-extinction.

De-extinction is a wide topic, and there are endless possibilities on how to do such a thing, just as there are many ways, I will change the world. One way I'd like to help the Earth is by lending a helping hand in the massive project of de-extinction. So many animals and plants go extinct every single year, helping reverse that would be truly a moral achievement, as well as a huge scientific advancement. Helping others understand extinct animals and species and the importance of bringing them back is something that means a lot to me. By recognizing how de-extinction could help our planet, as well as us as humans, we take one step closer to bringing back the species that once roamed the earth freely.