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Research Paper

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Genetic Engineering

History and Social Impact

For years society has faced different problems and it seems that there are no other

solutions. One of the main problems that we are facing has to do with heath. There are current

health problems that are impacting the world such as the Coronavirus. If you were in charge to

help cure the disease what would you use? One of the most helpful tools in our current state is to

use the technology that is available to make a medicine to cure the disease. One of the tools that

can help solve these issues is by using a scientific method called genetic engineering. Genetic

engineering is important to society because it allows scientists to come up with solutions to

problems that would have otherwise been impossible to resolve. A prime example of using

genetic engineering would be the invention of antivenom. According to the article "What can be

learned in the snake antivenom field from the developments in human plasma derived

products?", the author mentions how scientists have used the plasma of horses to see the impacts

of the genes which help create the antivenom. Furthermore, when someone gets bitten by a

venomous snake, the blood slowly turns into a solid which prevents blood from flowing and

causes the infected person to die. Without genetic engineering, there would have been no other method available to cure the negative impacts of being bitten by a snake.

The history of genetic engineering is complex because it requires other discoveries to be made. One of the main discoveries that had to be found before genetic engineering was introduced was the concept of DNA. DNA was discovered in the late 1950s and is made up of four different codes which can be abbreviated to the letter "A", "T", "G", and "C". Combining those four letters in a long set of code makes up every living thing on this earth! The code acts as a blueprint which is able to build everything. As a result, scientists began learning more about what else is within the DNA and its structure. Every living thing has something called DNA which acts as the blueprint of every living thing. Fast forward a couple years ahead and then scientists discovered that there are enzymes in the DNA which then led to the discovery of genomes. We can think of genomes as a group of code that is specific to a part of a living thing. For example, there can be a genome that determines the color of our eyes, hair, and skin. Every part in our body has a gene that was already given to us.

After scientists learned more about the DNA there were two American biochemists called Stanley N. Cohen and Herbert W. Boyer thought of the idea of selecting a piece of code that determines something and combining it to something else who would end up well-known people who worked in this field because of their discovery. This was the first time the scientific field has done genetic engineering. Genetic engineering is being able to choose something you like in one species and putting it in another species that would normally not have it. For example, due to climate change some areas get hotter than usual which can cause droughts. This can have a negative impact on farmers because they would not be able to grow their crops. If there is a

plant that can grow in bad weather such as during a drought, it must have a gene that allows it to grow in harsh conditions. As soon as scientists find that gene, they can cut it and paste it inside the code of another plant that could not have grown in a drought. As a result, genetic engineering allows farmers to grow their crops in harsh conditions which otherwise would have not been possible.

Discourse Community

There are many discourse communities that are connected to the genetic engineering field such as science, medicine, agriculture, environmental, technological, and research. The main discourse community that is connected to genetic engineering would be the science, medical, agricultural, and environmental field. The goals of all of these discourse communities that are connected to the genetic engineering field is to help advance the individual field and help humankind. For example, the science field wants to learn more about genetic engineering, and see the different uses it has to solve current problems that were unsolvable without the technology.

The different methods of communication within the community are by speaking to the scientist themselves in person, attending events that explain what is going on within the field, reading articles/books that are published, and watching videos that are online whether it be on Youtube of Netflix. Due to having different outlets that showcase all the information, it is very accessible for people to learn more about the field if they are interested. The primary form of communication is through online sources because most people have access to the internet and it is easier to share information rather than being in person. When there are new things that are

discovered or ideas that want to be implemented, the discourse community has to communicate it to the outside world.

One of the main ways the discourse community communicates with the outside world is by having events where citizens are able to discuss their views on the technology and the potential impacts it might have if they are implemented. It is a good way for people to share their views as scientists gain a different perspective on their ideas and try to find a different solution where everyone feels safe. When joining the discourse community the language used is usually casual because it allows new people getting involved to understand the events that are going on. However, there are a few scientific terms and concepts that a person would need to learn especially when learning more about genetic engineering. Typically the vocabulary would be words that have to do with biology. There is not just one way of joining the discourse community. If you are trying to learn more about the field and be more involved, it is good to be a person that works on genetic engineering such as a scientist. The most common way of joining is just to be curious about the field and wanting to learn more by going to the events or researching more about the topics.

One of the other discourse communities that was mentioned briefly was the medical, agricultural, and environmental field. For the medical field, there are many different medicines that was invented to help humankind. In our current society, there are many health issues. One of the main issues people face has to deal with blood sugar. This is where a person's body can no longer produce the hormones by itself to deal with the sugar in our blood. As a result, a medical scientist called Frederick Grant Banting decided to look further into the issue to find a solution to this problem. What he invented might be one of the most important discoveries in the medical

field. He discovered insulin which is one of the most prescribed drugs in the world. In the Youtube video "GCSE Biology- Genetic Engineering Insulin" it mentions the different stages as to how insulin was genetically engineered. The first stage is to find the desired gene that will be used, then cut the selected gene by using a restriction enzyme. Thirdly, one must cut off the bacteria using the same enzyme and insert the gene to its desired place. Lastly insert the newly genetically engineered bacteria into a bacterium. As a result, the bacteria will start dividing and produce insulin.

The other two discourse communities, agricultural and environmental fields, are also impacted by genetic engineering. Stated before, farmers are impacted by the environment which prevents them from growing crops unless genetic engineering is used. However, climate is not the only problem that they face. In New Zealand farmers face a problem with mice. Mice are able to reproduce at a fast rate and have an abundant amount of offspring. As a result, when farmers grow crops such as rice the mice will end up eating the crops. Farmers have a difficult time catching the mice and the spots where they have their offspring. As a result, scientists have thought of an idea that may solve this problem to help the farmers. The idea that was proposed was to genetically engineer one mouse, where the mice would have a gene where it would kill off the animal and pass the same traits to their offspring as well as passing a male gene. As a result, the offspring that a genetically engineered rat will carry the gene that will kill them off and the offspring will always be a male which will prevent rats from mating at a rapid pace as stated in the article " Heritable Multiplex Genetic Engineering in Rates Using CRISPR/Cas9". However, using genetic engineering would solve the problem farmers are facing there are other impacts that may occur than may outweigh the benefits. One of the drawbacks is that it would

impact the environment. When watching a documentary about genetic engineering, there was an event where citizens were talking about their views on the idea of genetically engineering animals in the hope of solving one issue. Many believe that if the issue was solved more problems would arrive. For example, the mice would have a mutation where it would make the problems worse. In the documentary, the main issue is that the mice ended up killing a bird species that is typically at the top of the food chain. As a result, the birds started to migrate because they are not used to being hunted since they are typically the top predator. Another issue that was discussed is that the animal would no longer be able to evolve normally like other species. As a result, we change an animal biologically, it would be nearly impossible to make any changes after releasing genetically modified animals. Some scientists believe that that concept would be very useful to an animal such as mosquitoes because it is the deadliest animal on the Earth, giving millions malaria and other diseases.

Rules and Message

When focusing more into the genetic engineering field, the rules become more tricky. Since scientists are able to essentially make new species, not everyone is on board with that solution. Evolution is a natural process and people are getting in the way and acting as the new creators. The main message of the examples that I have chosen is showcasing some positive effects of using genetic engineering. However, there can also be some drawbacks and should be discussed to see what we should do with the technology. The information that will be used does have the same kind of message as in there are many uses for genetic engineering. The authors of the examples are people that are within the discourse community that explain the different things that can positively effect society but can see the negative impacts. The message of the example is

to show that the technology is advancing rapidly and might be the only solution we have to solve the problems we have. The intended audience are people that are part of the discourse community.

<u>Focused Analysis</u>

The author of the examples that were used are part of the discourse community. The message of the example is to inform readers about the different uses and how it might impact society. The technology is extremely powerful and must be used wisely. The intended audience are the people. We all share the same Earth and want the best. If there are some disagreement with its uses, there will be a discussion for everyone to understand each other's point and to come to an agreement.This is important to society because it can change every species as we know it. Some people claim we should not edit the genes of animals because we do not know the impacts it would have and if there are massive mistakes there is no way to go back. The most important term that was mentioned in the last example would be gene drive, where an animal has a code that can edit its gene and pass the edited code to its offspring. In conclusion, there are many ways genetic engineering can help us. Some of the prime examples it can help us in is in the medical field with vaccines and insulin, agricultural field with helping crops grow in an environment where it would not normally grow and environmentally preventing species from passing diseases. With all the benefits there are also some drawbacks that need to be addressed before we implement these technologies. Is using genetic engineering the thing we should do to solve current issues we face such as the Coronavirus?

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