Technologies of Genetic Engineering and a Quick History

Genetic engineering has already solved a lot of medical problems and can solve a lot more in the future. Using the DNA structure and history of genetic engineering can further genetic sciences even more. Genetic engineering is the process of changing or altering the genetic makeup of an organism. Genetic engineering has greatly changed science since the 1950s and maybe even before. With genetic engineering the technologies CRISPR (clustered regularly interspaced short palindromic repeats), CRISPR - Cas9 and other important discoveries of technologies have been found or created. Genetic engineering has helped find cures for multiple diseases such as multiple blood diseases,fat metabolism disorder, Hemophilia etc. Genetic engineering has been a great help in history and has helped create medicine or treatments to help cure cancer. Genetic engineering has improved sciences a lot since 1962 and before. Genetic engineering can allow humans to do amazing things and has already done so.

Genetic Engineering History of Animal Modification

Genetic engineering helped solve many problems in human biology, plant biology and animal biology. The focus is genetic engineering on animals. Scientists most commonly use mice and zebrafish as their short life times allow scientists to observe them quickly. Zebrafish are most commonly researched at their larval stage because of their translucent appearance. The first genetically modified animal in 1973 was a mouse. Scientists Herbert Boyer and Stanley Cohen were the scientists who made this breakthrough. In 1981 Thomas Wagner from Ohio university started to genetically modify animals. The first transfer of animal embryos was achieved by Walter Heape in 1891. The first vitro manipulation of mice embryos that was recorded was in the 1940s. Transgenic animals were started with transfer of animal embryos as the base. A while after that scientists and researchers started experimenting with modification of the embryos genetic makeup. They started adding foreign DNA bits into mice embryos and seeing how it reacted to it. The reason that scientists and researchers started to experiment with genetic modification in animals is so that they could test out new drugs, medications and processes to stop certain diseases or viruses.

The Discovery of the Double Helix: The Thing That Set It Off

A double helix is a way to describe the physical structure of a DNA particle. DNA is described as a double helix because of how the DNA strands twist around each other in a helix ladder shape. In the 1950s the double helix was pioneered by James Watson and Francis Crick. While they had pioneered it, Rosalind Franklin was the one who researched the X-ray diffractions of DNA proteins. Rosalind Franklin managed to make X-ray diffractions by using light to see the shadow of DNA. If she hadn't done that then there might not have been the possibility of how advanced genetic engineering technologies are today. Beside that if James Watson and Francis Crick were not given the X-ray images then they might not have explored the possibility of a double helix. Unfortunately for Franklin her partner Maurice Wilkins showed Watson and Crick the X-ray images without her permission.This caused people to not recognize Franklin for her work. Around this time people did not know the properties or how DNA worked.Thanks to these scientists this discovery allowed scientists to build genetic technologies and an understanding of DNA.

Controversial Views

The biggest controversial view on genetic engineering is the ethics used. For some peoples religion and or beliefs genetic engineering goes against it. Apart from that, people also have fears of superbabies who had genetic modifications made by their rich parents. People are also afraid of the inequality of it. We don't know what the side effects of genetically modified babies could be.The ethics of it are questionable and people have big views on this topic. In one instance scientists added human growth genes into a mouse and afterward they discovered that the human growth genes had turned into cancerous cells in the mouse's body. People have very controversial views on genetic engineering in terms of ethics. The ethics are sometimes questionable but if scientists didn't experiment on animals then they would have to create something perfect first time, and if that didn't work then the person they created the cure for might become the test subject. Harming animals is something that many people are against and that is something that might change how scientists try to experiment with different genetic technologies. With the rise of technology scientists might be able to create a virtual creature where no animals would get hurt in the process of testing. This virtual creature would have to be engineered carefully though because it is not an actual creature it might be inaccurate. The virtual creature would probably only be an estimate of what could or might happen because of how unpredictable the outcome could be. But depending on how human technology progresses the outcome is unknown.

Definition of Genetic Engineering

Genetic engineering is a phrase meaning to modify or engineer DNA. It can change organisms by their very DNA or their chemical makeup, and it is also a very versatile and important part of science. Genetic engineering is just the process of altering an organism's chemical makeup. It uses technologies such as CRISPR to remove or modify the organism's chemical makeup. This is done by first having an isolated willing organism then inserting a DNA fragment into the organism using laboratory technologies. Finally you study the organism for however long it takes or how long you want to see it work or not work. Genetic engineering is exactly how it sounds. Just like in engineering you test, modify and change something. In this case you genetically modify an organism by changing its DNA. You can do this by using laboratory technologies that were specifically designed for genetic engineering. Genetic engineering can modify something like a mouse to make it glow. This is possible because of a certain DNA strand that makes things glow under UV light. This is an example of how genetic engineering works to modify something. If you genetically modify an organism to not get sick anymore then you could succeed but then there could be side effects to not being able to get sick.

Scientific Principles of Genetic Engineering

The scientific principles of engineering are to modify, construct or destruct the genetic material of an organism. The principle of genetic engineering also includes adding different DNA chromosomes into organisms using recombinant technology such as CRISPR (clustered regularly interspaced short palindromic repeats) to add the desired chromosome.The scientific principles of genetic engineering also include modification of destruction and replacement of a DNA chromosome.The chromosome can be really anything that could change the subjects appearance, well-being or mental health. Using genetic engineering you could give the subject a third ear or eye possibly. But there are boundaries to genetic engineering. If nothing can fly without wings then you can't really genetically modify something to fly without wings. If something is not possible in nature then it is probably not possible in genetic engineering. You could make something fly without wings but then there could be side effects to it that doesn't allow the organism to live. You could make the organism a flap of skin like a flying squirrel and allow the organism to glide but then that is not flying but gliding. Genetic engineering does have limits and what exists in nature can be done but if it doesn't exist in nature then it is not probable.

Key Concepts of Genetic Engineering

Genetic engineering - the concept of being able to modify or change a subject's genetic information and or change their appearance. Genetic engineering also can help people find a cure for different diseases and sicknesses.

Modifications - One concept of genetic engineering is how you can modify an organism's organs and possibly use the organs in surgeries and others.

Cloning - A concept that is quite scary but might be possible is the possibility of cloning. Cloning might be possible through the genetic modification of an organism. Through this method we could clone most organisms from ants to elephants. Cloning would have to be done by having similar enough organisms with similar DNA to modify to make the organisms the same. The organisms would also have to have similar reactions to DNA strands. For example if we wanted to make all ants fly then we might be able to do that if we exterminated all the other non-flying ants. Or we could create a problem where only flying ants would survive.

The purpose of genetic engineering is to modify or change an organism's genetic structure. You could do minor modifications to an organism's genetic information like changing the color of its outside layer. Or if possible and it doesn't kill the organism you could make the organism's diet change. Aside from that, the concepts of genetic engineering are to modify and or change an organism's genetic information.

Conclusion

To conclude this research on genetic engineering the history of genetic engineering is a long one and should be thanked to Rosalind Franklin for making the images of DNA diffractions, to Maurice Wilkins for showing James watson and Francis Crick Franklin's X- ray images of DNA diffractions. Without Franklin the X-ray diffractions wouldn't have existed and without Wilkins Watson and Crick may not have received these images because of Franklin's shyness. On the other hand, in the future we might be able to clone anything if we have enough information about them.The future is still unknown but a lot of the most recent experiments are still underway.

Also in the present we have been making a lot of discoveries in genetic engineering that will come in handy in the future. Animal genetic engineering might change in the future depending on how many people are okay with it for experimenting on animals. Scientists and researchers seem to be okay with experimenting on animals for genetic modification in the name of science but the public seems to not like the idea of experimenting on animals. Only time will tell and maybe in the future we will know more about the past of genetic engineering. In the future we may also have the technologies to solve cancer or other serious diseases. We may also be able to manually produce animals just for scientific experiments with a faster growth time and more similar DNA to humans. The future will probably be full of surprises and will have many discoveries to come.

What's Going on Right Now in Genetic Engineering

These next few statements will just be skimming a few topics in genetic engineering as I have decided to dive deeper into a different article.

Currently in genetic engineering a new CRISPR technology called pAblo-pCasso is being developed. It is very flexible and precise, so it has set a new high for CRISPR-cas.

Researchers have made a new eco-friendly material out of mushroom, pineapple fibers and spent coffee grounds. Mycelium-based composites (MBC) are a synthetic material that can be decomposed at the end of their life-time. This eco-friendly material is especially useful for companies where being eco-friendly is a big concern.

Engineers have found a new mechanism to do gene transfer in prokaryotes, eukaryotes and single celled organisms. Normally there are only two different types of gene transfer: transfer of genes from parent to offspring (vertical gene transfer) and horizontal gene transfer where prokaryotes share gene information directly. However, recently researchers have found that a couple of species of genes (Clostridium Acetobutylicum and C. Ijungdahlii) used heterologous cell fusion to transfer nutrients, metabolites and cellular materials.

What's Next?

One of the most recent articles (published on September 7, 2023) that I've seen that I was interested in was an article about how researchers of Guangzhou Institutes of Biomedicine and Health have successfully created a chimeric embryo that contains human and pig cells. The reason that this works is because of how similar human and pig bodies are in anatomy. It also is contributed by how much we know about pigs and humans. As well as using CRISPR (clustered regularly interspaced short palindromic repeats) to combine human kidney cells into a pig embryo.This is the first time a human kidney has been successfully grown into a pig. "Rat organs have been produced in mice, and mouse organs have been produced in rats, but previous attempts to grow human organs in pigs have not succeeded," stated by senior author Liangxue of the Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences, and Wuyi University. "Our approach improves the integration of human cells into recipient tissues and allows us to grow human organs in pigs." The steps that Guangzhou Institutes of Biomedicine and Health,Wuyi University and Chinese Academy of Sciences have done are following:

1st: Create a nook in the pig embryo DNA.

2nd: Add the human kidney DNA into the nook in the pig embryo.

3rd: Monitor the chimeric embryo then implant them into the mother pigs.

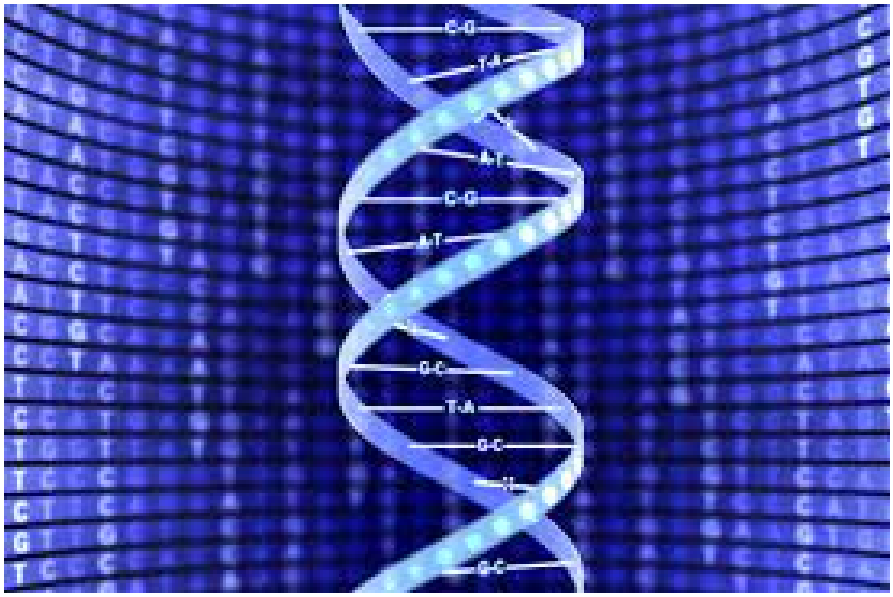
4th: Take the pig embryo out of the mother pig to study then terminate it.

What CRISPR basically is

Zebrafish larvae

Mouse

Double Helix

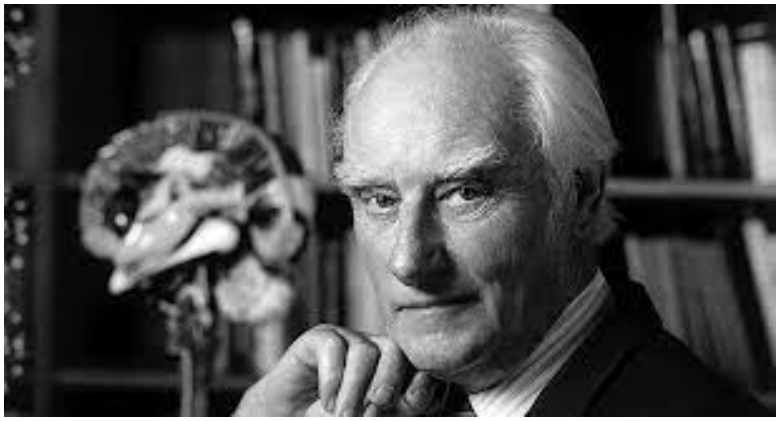


Rosalind Franklin

Maurice Wilkins

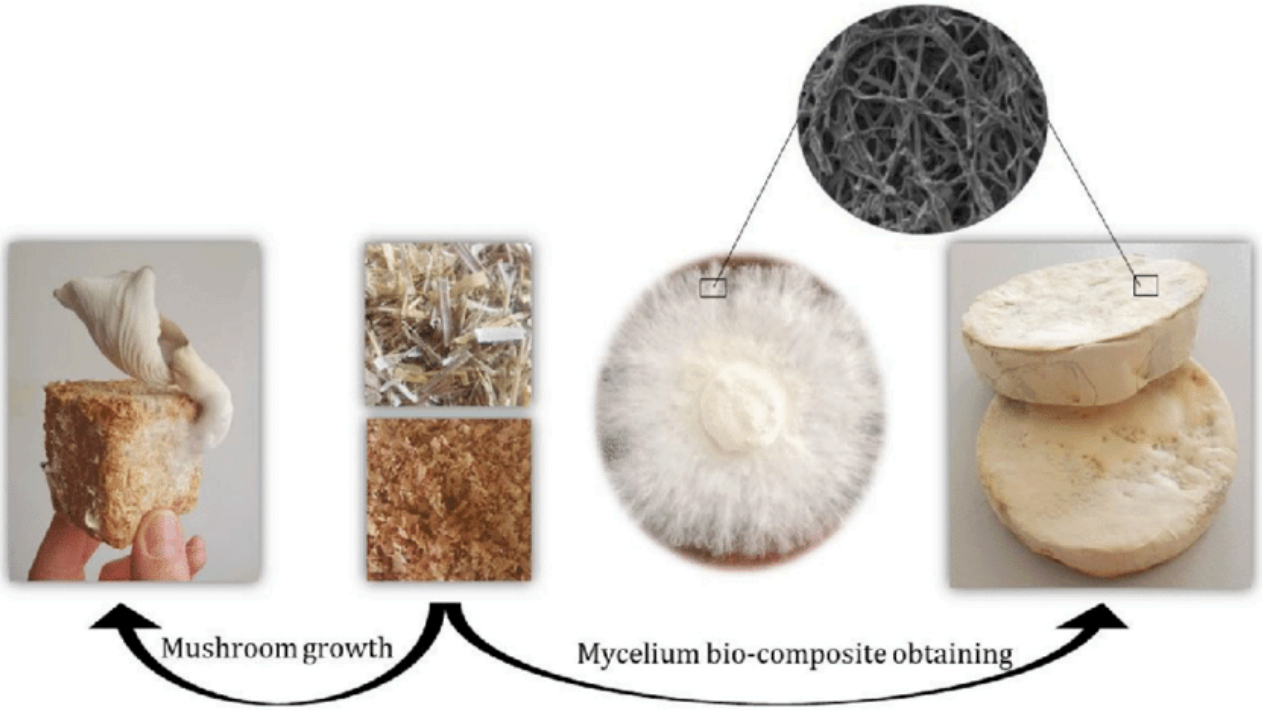
James Watson

Francis Crick

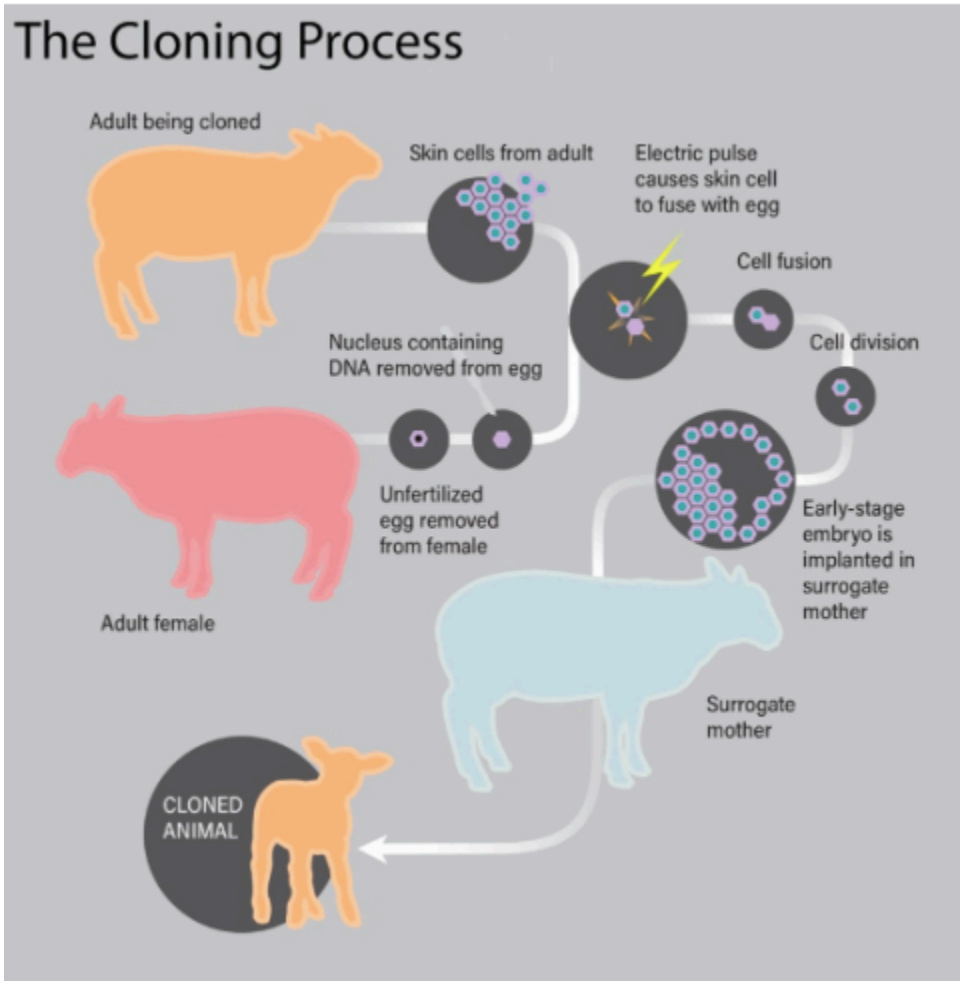


Pig Embryo

Mycelium Composite



Genetically modifying a plant



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