

Synthetic Biology

It started from the complete study of genomes. After mapping the entire human genome, knowing the complete genetic code for humans, scientists came up with surprising results. Detailed knowledge of the genetic map became the foundation of a new way of thinking for scientists.

Synthetic Biology is where science and engineering is entwined. It is the creation or modification of a subject's DNA in order to enhance/create more of its abilities and characteristics. The possibilities of experimenting in synthetic biology are endless. It has the ability to give non-living things in the world life and even store unlimited knowledge within the human or animal brain in the future. These advancements seem possibly favourable, funky aspects; however synthetic biology can also do absurd changes like giving a human the capability to camouflage or even poison! The alterations like such have the ability to change our world in the future completely and to a great extent, both positively and negatively.

The most promising advancement

The most promising advancement is the development of the new semi-synthetic organism "Synthia" by the Craig Ventner Institute in 2010. This was the first time in human history that scientists created a completely synthetic genome. In past experiences scientists were able to manipulate existing life; however this was the creation of an entirely new organism. This new life form had its' DNA built from scratch, and brought to life by humans! This marked a new era for science opening a vast range of possibilities. Scientists could transition and manipulating existing biological concepts to design synthetic life. In the future, due to this advancement scientists will be able to create various applications that would have a profound impact on our lives in the decades to come and the possibilities to create new life form because of this advancement is endless.

Advantages and Disadvantages

Synthetic Biology has the aptitude to revolutionise a number of fields including medicine and energy production. Scientists could use it to detect and remove impurities from the air and water which could eradicate a number of health problems. Poorer countries could benefit from advancements of Synthetic Biology by having fresher water to drink and food with more protein. Synthetic Biology can also contribute in the farming industry by modifying crops to grow faster and healthier. It could also be the reason for building-integrated agriculture to work! Synthetic biology applications could also be applied to diagnose and monitor diseases in humans and animals and develop new drugs and vaccines that would be more effective. Also because Cancer is a disease that occurs within the cells of our body, it is possible that the cure for it lies within Synthetic Biology! Synthetic Biology can also be applied to find alternatives to fuel such as the bio-fuels. Bio-fuels can work more efficiently by tweaking it with the use Synthetic Biology.

Since it is all about manipulating/creating DNA, a little 'slip of a hand' or error can create the monstrous things or if you are lucky then can result in serendipity. The fear of having an apocalypse or a world where robots rule the world could turn into reality through Synthetic Biology. Apart from this, there are other projects that might seem perfect to work on with Synthetic Biology but in reality can cause harm. An example of this is 'Revive and Restore'. This involves bringing extinct species back to life. The idea of having the rarest and extinct species alive again sounds worthy however it could be harmful in many aspects. Synthetic Biology is also said to be wrong since it can be used in very harmful ways. This includes creating drugs, weapons and construction on microorganisms that are lethal to humans.

Developments

There are various recent Synthetic Biology developments that are made to improve living standards and solve problems that exist now. Some of these developments include Pigeon D'or, Spider-goat, Vaccines and the Synthetic version of Artemisinin.

- Pigeon D'or involves designing a special bacterium that is as harmless to pigeons, when fed to them; it turns their faeces into detergent. The point of this is to have cleaner cities. Pigeons travel a lot and can reach places in the cities where humans might not be able to reach efficiently and might not visit a lot. Synthetic Biology is used in this project by creating the bacteria that modifies the metabolism of pigeons.
- Spider silk is an incredibly strong, valuable material that can be used to make an array of products but it isn't possible to collect large quantities from spiders. This is why the spider dragline silk gene has been transplanted into a goat 'Freckles' which produces large quantities of spider silk. This "silk milk" could then be used to manufacture a web-like material called Biosteel.
- Genetically engineered fruits and vegetables such as banana, potato and lettuce are full of virus proteins. When they are consumed, people's immune system builds up antibodies to fight the disease. These fruit and vegetables act like traditional vaccines, they have the ability to cure diseases like hepatitis B.

The above developments are just the beginning. As knowledge on Synthetic Biology continues to advance, so does the technology that goes with it. The manipulation of DNA marks great importance within the field. As mentioned before, it has the ability to give characteristics to things that do not already possess enough or all of it. However, the most promising advancement had to be the development of "Synthia". Because of this advancement, DNA can be built from scratch. Things that can't be transferred can be built. This is a huge advancement since it can change our world completely. The creation of the new semi-synthetic organism is definitely empowering and a helpful advancement.