



**Prize Winner**

# **Science Writing**

## **Year 7-8**

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## A Whole New World

What a milestone! My retirement party after 47 years of work and it's the year 2050. As I sit in my air chair, ready to celebrate my virtual reality party with friends and family scattered over the globe, Q50 (my robot housekeeper), rolls in with my celebratory dinner. As I wait for everyone to log in, I recall earlier celebrations and am in awe of the simplicity of my childhood. My 13<sup>th</sup> birthday spent with my friends and family splashing in our backyard pool, whilst dad barbequed sausages and ribs. I recall many happy hours spent riding my shiny new bicycle all over the neighbourhood, coming home when the sun began to set and the street lights turned on. Adulthood was spent navigating the advances in technology – from the mobile phone, the ever-evolving computer to self-drive cars. As a scientist, technology allowed us greater clarity into the mysteries of the universe. The simplicity of living and socialising was dealt a blow when the Sars-CoV-2 epidemic shattered the human way of life.

Sars-CoV-2 was first detected in Wuhan, China. Sars-CoV-2 was a part of a family of viruses that caused respiratory infections. It was closely related to SARS (Severe Acute Respiratory Syndrome) and MERS (Middle Eastern Respiratory Syndrome). Sars-CoV-2 is a virus that causes people to contract COVID-19. Sars-CoV-2 had a transmission rate of 0.7- 0.9, meaning that every 10 people that contract COVID 19, will pass the virus on to 7-9 more people. Sars-CoV-2 was a type of RNA virus. RNA viruses are a form of virus that have the ability to mutate over time. As a scientific researcher at BioNtech in Germany, I was part of the research team that developed the Pfizer Covid 19 vaccine which was administered intramuscularly to provide protection against infection by the Sars-CoV-2 virus. It was composed of nucleoside-modified mRNA (modRNA), concealing a mutated form of the spike protein of SARS-CoV-2, which is contained in lipid nanoparticles. Two doses of the vaccine were given, three weeks apart. People experienced mild reactions to the vaccine, from pain and swelling at the injection site to a fever and headache.

The Pfizer vaccine was the first to be authorised for emergency and then regular use by a stringent regulatory authority. Since this pandemic, vaccination for the proliferation of strains of the Sars-CoV virus is commonplace. From an injection, with rigorous storage regimens for the vaccine during the epidemic, to present day, where every person has their own QR code and is provided with a vaccine patch at designated intervals. Vaccine patches are now dispensed over the counter at any medical outlet. There have been no reactions to the patch vaccine and uptake is 100%. The real value of the patch was in poorer countries – where vaccines are scarce, storage facilities are generally inadequate and variants are likely to multiply unchecked and spread around the world. The World Health Organisation (WHO), The World Trade Organisation (WTO) and the International

Monetary Fund (IMF) collaboratively funded research to make the vaccine patch a reality. The accessibility of this vaccine has helped eradicate the Sars-CoV virus. Moreover, the global experience of the SARS-CoV-2 pandemic, has improved trade and travel relationships with most countries, who were forced to work together to rid the world of this virus. China and India are the two most powerful countries now, with their individual GDP ranking them first and second respectively.

The global food shortage, which was a combined result of the SARS-CoV-2 pandemic and the string of natural disasters (due to climate change) resulted in bringing genetically modified foods to the fore. The United Nations estimated that daily global fossil carbon dioxide emissions dropped by 17% during the height of the pandemic in 2020. The United Nations later called climate change the “defining’ crisis of our times”. Genetically modified foods are all the norm and has provided food security to the world’s poorest countries. The advantages of abundant crops, lower costs for the manufacturing of drug and food, decreased demand for pesticides, enhanced nutrient composition and food quality, greater resistance to pests and disease, and medical gains to the world population has made genetically modified foods popular.

The genius of nature was studied at length, resulting in genetically modified foods using these techniques. Mitochondria and chloroplasts are vital for plant growth. They provide energy and a source of carbon to the plant cells, and are also involved in other cell processes. Organ growth is determined by two main cell processes: cell proliferation and cell expansion. Mutation in these processes affect leaf and root development. Genetically modified plants are created by working on these processes. A genetically modified product only reaches the shelf after rigorous testing is conducted to ensure safety for human and animal consumption. It generally takes about 10 years for a single gene mutation to reach the shelf. An example is genetically modified rice, grown in deep water (more than 50 cm). As I chew a spoonful of rice, I reflect on its journey from the ground to my plate. Rice does not need to grow in water. Over time, farmers have realised that keeping the roots of the plants underwater prevents pests and weeds from damaging the crops. The constant wet weather and flooding in South East Asia and North east India (main production sites of rice) has resulted in a new method of growing rice that can thrive in this super wet conditions. This has now become the standard practice for rice production and has contributed greatly towards reducing CO<sub>2</sub> emissions.

As I look out the window, the gray picture clashes violently with the memories of my childhood, of family holidays at the Daintree Rainforest in Queensland, the blinding bursts of vivid colour, the green canopy of looming trees and the cacophony of sound of the residents overhead. There were always rumblings of

the consequences of climate change, but I doubt that anybody could have ever predicted this.

Climate change is a shift in the weather patterns. These shifts have a wide spectrum of observed effects: higher temperatures; increased drought; change in rain and snow patterns; melting glaciers and thawing permafrost to name a few. The main cause of climate change is man's increasing dependency on fossil fuels such as coal, oil and gas to generate electricity. Widespread deforestation has also contributed to climate change. The cutting down of trees, burning and allowing trees to rot due to a change in the use of land has resulted in the release of carbon stored in the tree's trunks into the atmosphere as carbon dioxide. During photosynthesis (chloroplasts found in leaves convert sunlight into energy), the tree takes in carbon dioxide and releases oxygen into the atmosphere. The stored carbon helps the tree to grow. The rain forests have all but disappeared. The thriving ecosystem it helped sustain, the diversity of species that dwelled within have all but become extinct. The little that remains have become endangered. The only way that we can now experience the rainforest is through virtual reality. Immersing oneself in this virtual world is a fantastical five-dimensional experience. Most experiences are virtual reality from going to a concert to celebrating events like parties and weddings. Since the onslaught of the SARS-CoV-2 pandemic, in person interaction is almost non-existent and socialisation has been largely limited to virtual reality. The majority of the population work from home and only the very wealthy can afford to attend school or university in person. Most learning is virtual reality with a drone lecturer.

My mind's wanderings are interrupted by the buzz of the intercom. I watch from the comfort of my air chair as my housekeeper robot collects a gift delivered by the drone company. My daughter, who is currently on an air trip to Mars, has not forgotten my retirement. I look at the holograms of both her and my husband that surround me. I smile as I remember the day we created her at MedX. The genome sequencing took only a few minutes, and we were able to create a masterpiece- the best of a combined genepool, with no genetic weaknesses. I see my husband's excitement as he pays the drone with our savings of cryptocurrency. The aroma of a sizzling steak sneaks into my nostrils. Steak and beer – a rare commodity- and which must have cost my sister a princely sum of money. I leave aside my plate of genetically modified rice and meat substitute and tuck into the steak, very reminiscent of my childhood. The virtual screen before me lights up and I immerse myself in my celebrations.

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