Background Guide

UN Educational, Scientific and Cultural Organization

Genetic Engineering

JACKRABBIT MUN VI

L.B. Poly - May 25th, 2024

TABLE OF CONTENTS

CO-HEAD CHAIR LETTERS

Hello Delegates!

I'm Soli Nickerson, your Co-Chair for this comittee. I'm a sophomore and this is my second year in Model UN and first Jackrabbit MUN! Other than Model UN, I'm in choir, swim, and our musical theatre program here at Poly. Model UN is one of my favorite activities, and one of the best things about it is how many like-minded people you get to interact with, as well as the great debate you get to engage in that's often about topic seemingly so much bigger than you. Whether you're super excited about this experience or nervous, or experienced or completely new delegate, I encourage you to go in with an open mind. What you give in is what you get out of this, and I assure you that if you talk with your fellow delegates and really try Model UN out, you'll have fun. Now go get researching and Go Jackrabbits!

Sincerely,

Soli Nickerson

UNESCO| Co-Head Chair

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CO-HEAD CHAIR LETTERS

Hello delegates!

My name is Taylor Chay and I am honored to be your vice chair for this committee! I am 15 years old and I am currently a freshman at Poly. I joined MUN in eighth grade to challenge my comfort zone since I was very shy, so I know that MUN can be intimidating. But I am positive that you will all succeed in committee by researching, collaborating, and being confident, even if you have to fake it! Outside of school, I love to travel, play golf, and hang out with my friends. Through MUN I have learned valuable life skills such as teamwork, leadership, and communication. I am thrilled to meet you all and hope for a fun and engaging committee!

Sincerely,

Taylor Chay

UNESCO | Co-Head Chair

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How to Mun

So, you're probably wondering: How do I prepare for debate? Well, here are some starting points to begin your country research!

1. Read through this background guide
    a. find your country in Bloc Positions (pg. 17) and read that paragraph
2. Look for information on your country in the CIA World Factbook and BBC Country Profiles, linked here:
    a. https://www.cia.gov/the-world-factbook/countries/
    b. http://news.bbc.co.uk/1/hi/world/europe/country_profiles/default.stm
3. Look at the Questions to Consider (pg. 19) and try to answer them (do some research on the internet!)
4. Do more research on the internet for:
    a. Previous country actions
    b. Previous policies and United Nations actions
    c. Possible solutions

During the committee, all delegates will present an "opening statement." This is a short introductory speech and will only last about 30 seconds to 1 minute—nothing too bad! You can practice and time your speech using a timer.
These opening statements are written beforehand. They don't have to be memorized, either. You can print or write your speech, then read off the paper.

Your opening statement should include:

1. Your country's position on the issue at hand
2. What your country has done in the past
3. Possible solutions that align with your country's position

This is what you will discuss in the main part of the committee! Including this in your opening statement is a great way to let other delegates know where you stand.

COMMITTEE DESCRIPTION

UNESCO is the United Nations Educational, Scientific and Cultural Organization. It contributes to peace and security by promoting international cooperation in education, sciences, culture, communication and information. UNESCO promotes knowledge sharing and the free flow of ideas to accelerate mutual understanding and a more perfect knowledge of each other's lives. UNESCO's programmes contribute to the achievement of the Sustainable Development Goals defined in the 2030 Agenda, adopted by the UN General Assembly in 2015.

TOPIC SYNOPSIS

Delegates will discuss the intricate topic of genetic engineering on agriculture, livestock, and humans and come to a deeper understanding of country policy and community needs in relation to this scientific development. We will adequately address the concerns and possibilities of these advancements, and understand the extent to which they should be introduced. This room will thoroughly tackle the social, economic, and environmental effects of introducing this technology into our world.

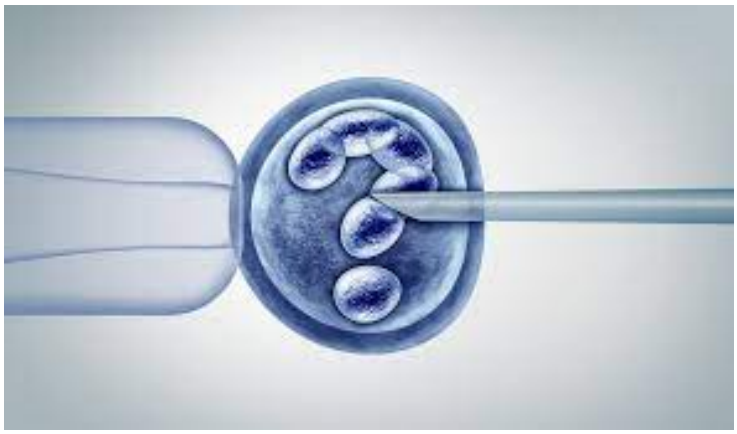
BACKGROUND

HUMAN GENETIC ENGINEERING

Human genetic engineering began in the late 1900s and has grown as a scientific resource. It is a lab-based technology used to alter DNA makeup, involving changing base pairs, deleting a region's DNA, or adding segments. CRISPR-Cas9 is the most popular human genetic engineering technology and has the ability to disable certain viruses, with possibilities of eradicating life-threatening illnesses. Human engineering can occur on both somatic cells, which are any cell not containing reproductive cells and germline cells, which contain egg and sperm. Currently, human genetic engineering on somatic cells is used to edit disease-causing DNA within the body's non-reproductive cells. Editing of germline cells can change inheritable traits. In vitro editing can also be performed, modifying an embryo. The modified embryo is then transferred to a uterus, which results in the birth of a child with a modified genome.

A possible treatment for HIV is being researched using gene editing, and it is thought to have the potential to completely eliminate the virus from most or all bodily cells. There is also research on introducing new modified genes into cells that are resistant to HIV, which would also eradicate the virus. Genetic engineering has also been researched to treat sickle cell anemia, using an FDA-approved gene therapy treatment called Casegvy. This drug can make an edit in a particular gene to reactivate the production of fetal hemoglobin,

which then dilutes the faulty red blood cells caused by sickle cell. Cancer treatments are currently being researched, and evidence points to the use of CRISPR-based gene editing technology to target and manipulate specific mutations that drive the growth and spread of tumors. Medical treatments using genetic engineering are expected to grow with greater scientific developments occurring, the only setback is country policy towards the editing of embryonic cells.



Genetic engineering has the possibilities to cosmetically edit embryos as well. The common term “designer babies” has been used to describe babies edited for aesthetic purposes such as intelligence, strength, or appearance. The use of preimplantation genetic diagnosis during in vitro fertilization allows parents to view the genetic makeup of their children, and it is theorized that this will grow in popularity and allow parents to select which embryo to implant based on its genetic makeup. Specific editing for traits such as intelligence and strength has yet to be developed, since a 100% guarantee for such traits cannot currently be made. Ethical consideration and regulations have made this unavailable to most people as well. The United Kingdom uses the Human Fertilisation and Embryological Authority to regulate modification and do further research. China has used CRISPR-Cas9 to modify non-viable embryos to test the principle, but results were mixed. Most countries have not yet legislated on the use of genetic engineering, but all those that have banned it. The use of

CRISPR-Cas9 for reproduction is largely rejected on principle by medical research communities.

AGRICULTURE AND LIVESTOCK GENETIC ENGINEERING

Agriculture and livestock engineering began 10,000 years ago through selective breeding and has grown to lab-based technology. The engineering of plants focuses on producing crops with desirable characteristics such as enhanced yields, quality and tolerance. While traditional methods of modifying crops like selective breeding and crossbreeding generally work, modern methods are much more reliable and depend on scientists copying a favorable gene from one plant and inputting it in another. This science has been around since the 1970s and continues to advance. The newest method of genetic engineering is genome editing, which allows scientists to precisely develop new crop varieties.

Genetic modification of animals has grown in recent years. The primary technology used was transgenesis, which is the transfer of genetic material from one animal to another. Recently, technology has advanced to allow genes already present to be deleted or manipulated, which has led to more thorough guidelines regarding what is considered a modified animal. The Canadian Council on Animal Care has deemed that any animal which has undergone induced mutations or cloning is considered genetically engineered, due to the intervention and planning needed to create these animals. Cloning is the replication of “parent” cells, certain cells, or part of DNA to

produce a desirable trait. The three types of cloning include DNA cloning, therapeutic cloning, and reproductive cloning. The most talked about form of cloning is reproductive cloning due to animal welfare issues, as this form uses somatic cell nuclear transfer to create an animal with the same nuclear DNA as another. The use of genetic modification in animals can include companion, wild, and farm, but the majority of modified animals are still in the research phase.

Companion animals are created through the use of genetic material that edits animals for human use, such as GloFish in the United States, which used sea anemone and jellyfish genes inserted into zebrafish to express fluorescent proteins.

Cloned animals have also been created, such as “CC” the cloned cat in 2002 and “Snuppy” the cloned dog a few years later. Wild animal modification is typically used to bring back endangered or extinct populations, but there is also evidence that cloning can help genetic diversity in small populations.

Lastly, farm animal genetic modification is used to improve productivity, food quality, and disease resistance. Enhanced food quality mutations have been used in pigs to express the fatty acid desaturase gene for higher levels of omega-3, and in goats to express human lysozyme in their milk. Some genetic engineering has been used to decrease environmental pollution like the Enviropig, which is genetically modified to produce an enzyme that

breaks down dietary phosphorus, which limits the amount of phosphorus released in manure. The public has resisted genetically modified animals for food production, but the commercialization of modified salmon is expected to result in the growth of animals in commercial production.

Concerns for the welfare of animals during the genetic engineering process have been brought to light. The invasiveness of the procedures leads to the sacrifice of some animals. This happens in most procedures but is required for all genetic mutations. To undergo genetic modification, large numbers of animals are required, and many embryos do not survive and those that do may not carry the desired gene alteration. The technology is continuing to be refined but current engineering processes have been inefficient, leading to a surplus of animals being exposed to harmful procedures. Little data has been collected on the welfare impacts to genetically engineering animals and those required to create them, but techniques have been described as unpredictable which leads to unanticipated welfare concerns. As scientific developments increase, better research will be conducted to mitigate welfare concerns.

UNITED NATIONS INVOLVEMENT

Within the UN (United Nations), GMOS are seen as a calculated risk. UNESCO (United Nations Educational, Scientific and Cultural Organization) specifically, has published numerous articles as well as declarations informing the public about both the skeptism and possible benefits of both implementing GMOS within agriculture as well as human gene editing as early as 1996, where they published “Food, plant biotechnology and ethics". Within this article they state that their role within exploring the effects of GMOs is to share information with the public about GMOs as .There is a need for education of the public, experts and government officials, of the benefits and risks of biotechnology.” This they have certainly done, publishing articles exploring the risks and benefits as well as funding studies and reports to further our understanding of these new technologies, including the IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development) study and the “Modern food biotechnology, human health and development” report. These results, though have been in GMOs, claiming it has a lot of benefits increasing crop production, they also let us know GMOS may not be this “miracle worker” many claim it to be, but rather being just part of the solution to fight food scarcity. The UN is also concerned about making sure there are regulations surrounding the implantation of newer GMO products. The Aarthus convention (a agreement to allow citizens to access information about the environment) for example, adopted a GMO amendment in 2005, which will go into effect once 27/32 countries who originally adopted the bill ratify it, which calls for, “Parties to provide for early and effective information and public participation in decisions on the deliberate release into the environment and placing on the market of GMOs.” When it comes to human gene editing however, The

UN is mainly concerned about the ethics and possible implications of Human Gene editing, stating in UNESCO's " Universal Decleration on Human Gene Editing" that every human gene tells its story, so editing these genes are editing these stories, so its important to do it with care. Specifically, this document prohibits cloning of human beings, discrimination based on genetic characteristics and in general, unethical research practices. Though this document points out the use of gene editing in medical situation, it emphaises the risk, as well as making sure the client knows the risks. Along with this document, the "International Declaration on Human Genetic Data," written in 2003, outlines the 4 uses human genome editing or collection can be used for, that being diagnosis for diseases and research, but only with participants' consent, legal proceeding and purposes that align with other documents about Genetic modification. These documents demonstrate the importance of consent in regards to collecting or using people's genetic data, and overall aim to make sure any genetic info is treated ethically to preserve human dignity.

BLOC POSITIONS

African Bloc:

Africa is one of the continents that could benefit the most from wide scale implementation due to their hunger issues. Though many Africans are all for GMO implementation, many really are not knowledgeable enough on the subject to make accurate calls, and are rather influenced by propaganda they see. All of these campaigns have caused a lot of distrust from people about GMO's, making them reluctant to implement it.

Asia-Pacific Bloc:

There are various perspectives and policies for GMOS in the Asia-Pacific Bloc. Some countries have imported large amounts of GMO crops while others have implemented strict regulations or bans. Many countries such as China and India have concerns about the environmental impact of GMOs. However, GMOs have gained popularity in Southeast Asia, with the Philipines being the first country to have a regulatory system. Countries in Southeast Asia tend to support GMOs with the potential to address food insecurity.

Western European Bloc:

Many Europeans feel skeptical toward GMOS, as many of their most trusted leaders have been Anti-GMO. Similar to many countries, a lot of Europeans feel they do not know enough about GMOS to trust them. The European Union has implemented strict policies and labeling requirements for GMO products to ensure consumers are cautious and informed. The European Union has also executed many scientific

assessments and public consultations on GMOS. Even some countries like Germany and France have taken drastic measures by banning the cultivation of GMO crops.

Middle Eastern Bloc:

Islamic values do not support genetic modification. The only exceptions genetic modification has in Islamic values are medicines and other substances to reduce suffering and illness. However, the topic of GMOS is still controversial amongst many people in Middle East countries. Israel, Jordan, and Saudi Arabia have expressed interests with GMOS and using GMOS to address food insecurity and environmental stressors. On the other hand, Algeria, Egypt, and Iraq have expressed concerns with GMOS and have implemented policies to regulate them.

Latin American and Caribbean Bloc:

Uses for agriculture and livestock is fundamental in Latin America and the Caribbean's economy. Around 60% of the world's biodiversity lies in the Latin American and Caribbean region, which is using GMOS to preserve biodiversity is a great consideration. Brazil and Argentina are the world's second and third-largest producers of GMOS and have both been leaders in advancing genetic engineering procedures.

QUESTIONS TO CONSIDER

1. Genetic engineering can be very expensive, especially if there are excessive regulations on it. How would your solution be funded, and how would it be accessible to countries that may not have a lot of expendable funding?
2. How will your solution be accessible to all countries, regardless of their development status?
3. How does your solution deal with the environmental impact created by the use or lack of use of GMOs?
4. How does your solution address new developments that may come about when it comes to genetic engineering?
5. How does your solution deal with ethical issues regarding the morals of using GMOS, if it addresses them at all?

WORKS CITED

More on gene therapy and genetic engineering here.
More on human genome editing here.
More on what genetic engineering is here.
More on genetic research here.
More on human germline editing and CRISPR-Cas9 here.
More on gene editing in relation to HIV here.
More on gene editing in relation to sickle cell here.
More on gene editing in relation to cancer treatment here.
More on CRISPR technology used on babies here.
More on designer babies here.
More on types of modification to agriculture here.
More on genetic engineering of animals here.
More on the perspectives of gene editing here.
More on regulation of gene editing here.
More on EU's genetic modification policies here.
More on the Asia-Pacific bloc stance on GMOs here.
More on the IAASTD report the UN has done regarding GMOs here.
More on the report on Modern Food Biotech the UN has done here.