



# NEWSLETTER

February 2024, Edition 3



With the participation of the students from Marymount schools in: Barranquilla, Bogotá, Cuernavaca, Medellín, New York, Paris, Rome

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# SCIENCE AND TECH



## ARE GMOS THE SOLUTION? HERE ARE TWO EXAMPLES TO TAKE INTO ACCOUNT

*Sarah Gómez, Colombia*

Apples are red. Bananas are yellow. These are some of the first things children learn and the images that stick with most people throughout their lives. If you were to think about how apples and bananas look, the images that appear are shiny, bright colors and smooth exteriors, with an improved taste and texture. Well, these are, in some manner, genetically modified. Genetically Modified Organisms, mainly called GMOs, are genetically altered in a manner that does not occur naturally; this happens when specific genes are selected and transferred from one organism to another. Often, GMOs are used for aesthetic appearances, to enhance the fruit to satisfy the customer; other times, they are used for more practical purposes, such as making them immune to diseases or pesticides or adding some properties such as vitamins into the food.

For companies that supply large quantities of food, GMOs are usually an excellent solution for producing food that looks and tastes better while doing it quickly and much more cheaply than with organic crops. However, the fact that such companies are in control of such a large percentage of the world's food supply has added to the general uneasiness consumers feel about GMOs and the economic monopoly they would be playing in the world's food supply. In the case of farmers, it could ultimately be better to maintain their crops using GMO seeds, even though they are more expensive because the crops they could grow would be resistant to herbicides, pesticides, and other diseases that usually result in the death of the whole crop.

On the other hand, they risk cross-pollination between genetically modified crops and their wild, untampered relatives, lack of variety in our food, and even some economic concerns regarding how farmers will get paid and treated if they were only to use GMO seeds or least use them for the majority of their crops. Nonetheless, this eventually relies on the consumer and their willingness to accept GMOs in their daily lives. Factors such as meeting the demands of a growing population, products with better appearance and taste, in significant quantities, and much more effectively than the 'normal' way of producing food are created.

Nonetheless, the relative newness of GMOs, accompanied by misinformation and the natural fear of the unknown, has led to substantial hesitation in consuming GMO food. This contrast of arguments has led to a debate that has been discussed ever since GMOs were first introduced in 1973 by Herbert Boyer and Stanley Cohen.



As time has gone by, society, even unconsciously, has become accustomed, if not dependent to some degree, to genetically modified crops. They are what we eat daily, what we find in most supermarkets, and even the image we present to children, and as happens with inventions, they evolve as humanity evolves and needs different things. Therefore, here are some of the best GMO creations that have aided humanity or have the potential to do so.

#### **The Key to the Banana Problem?**

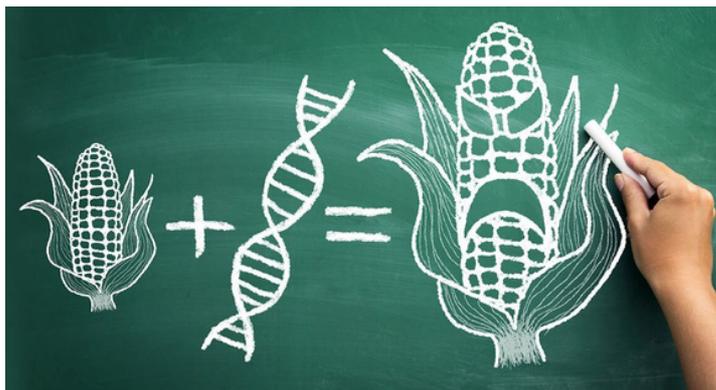
In 1876, a fungal disease entered the world of bananas: TR1. This tropical phenomenon nearly eradicated a variety of bananas called Gros Michel, the primary type sold then in seventy-four years. As a result, Cavendish bananas, now sold in supermarkets and with which we are most acquainted, were introduced to the market. These were created through selective breeding, obtaining the desired characteristics without gene manipulation.

Since then, the Cavendish banana has accounted for about half of the commercial growth worldwide, despite the other varieties, which are approximately 300 and 1,000 globally. Nonetheless, a new mutation of the disease has appeared in banana crops: TR4 (Tropical Disease 4). As Professor James Dale of the Queensland University of Technology said, "Eighty-five percent of the world's export bananas come from south and central America, and the other 15% come from the Philippines.



The Philippines is already dramatically affected by TR4... Once it got to Colombia, Peru, and now Venezuela, the big exporters suddenly realized that this is very serious."

Encouraged by such a threat, Australia submitted the first genetically modified banana for revision in May 2023. This new banana, OCAV-4, is modified to be highly resistant to TR4 and has proven safe for consumption. Other solutions are being developed, such as grafting at the University of Cambridge, a process that consists of grafting one tissue from one plant onto another, which can alter specific characteristics. Some say that Cavendish bananas should be left to die and may serve as a cautionary tale of what happens when humanity relies so much upon a single variety of organisms.



Such options and arguments lead to a single question: are GMOs the solution to this crisis?

Is replacing the banana variety completely with a genetically modified variety more than a short-term solution for a disease that could continue to adapt and return? Should the possibility that future generations will only know of bananas, bright yellow and sweet, as ghost stories told by their elders? Or as other researchers such as Dan Koeppel, author of 'Banana: The Fate of the Fruit That Changed the World,' suggest, the only true answer can be variety, for reasons such as the dangers of monoculture and dependence on one single type of banana. Monoculture, the extensive cultivation of a single crop, is one of the main problems when discussing whether GMOs should be used to produce a single and leading variety of organisms. This farming practice increases vulnerability to pests and diseases, as the crop's lack of diversity allows pathogens to grow freely. Soil degradation and nutrient imbalances result from continuous cultivation of the same crop, contributing to erosion and breakdown of soil structure, and often require substantial water resources. Monocultures are deeply affected by any environmental change, meaning that a single change may affect the whole crop. Farmers may face economic risks due to market fluctuations by relying on a single crop.

Such prominent questions to answer, and the ethical debate continues while the clock is ticking faster than ever.

### **Golden Rice**

According to the World Health Organization (WHO), VAD (Vitamin A Deficiency) afflicts 250 million people worldwide, most of whom are preschool children (190 million) and pregnant women (19 million). Therefore, Golden Rice was created for countries where VAD is one of the significant health issues the population faces.

Golden Rice lacks nutritional properties, such as vitamins; GMOs can make up for that deficiency, as happened with Golden Rice, which was created with more Vitamin A for communities dying of a mass of Vitamin A deficiency. Discovered by Ingo Potrykus and Peter Beyer in the late 1990s, Golden Rice provides beta carotene (provitamin A, a plant pigment that the body converts into vitamin A as needed), a compound not found in regular rice, and made possible by the addition of two new enzymes. Therefore, another kind of rice with more nutritional value but with equal effectiveness and simplicity to grow as other grains were introduced into the world.

### **What is Golden Rice?**

It is a kind of rice that has been genetically modified with three newly expressed proteins (meaning that they have been encoded into proteins through genetic engineering)—zmP S1 from maize, CRTI from the *Pantoea ananatis* bacterium, and PMI from the *Escherichia coli* bacterium. Apart from having beta carotene, the composition of Golden Rice is equal to that of regular rice, as can be seen with taste, as it is not so different from its organic counterpart since beta carotene is a nature-derived color additive, meaning that although the color changes, the taste does not.

### **Should Golden Rice be considered as a nutritional asset?**

As with all genetically modified food with enhanced nutritional properties, the target community must be considered when considering a product such as Golden Rice. It was meant to be used as a complementary, food-based solution to avoid vitamin A deficiency for communities whose primary source of nutrition is rice. Some of the leading communities expected to benefit from this include the Philippines and Bangladesh, which have already taken action to introduce Golden Rice in their communities.



The Philippines is the first country to have approved of this GMO. On July 23, 2023, Filipino farmers were the first to cultivate this variety of rice after receiving the green light from regulators in DA-PhilRice. This biofortified food has not only promised to create such a difference in nutrition, but it is also a sustainable breeding product, meaning that when crossbred with local varieties preferred by the local consumers in the countries as mentioned earlier, it is passed on from generation to generation while maintaining its genetic structure.

"The last-mile delivery of Golden Rice is just one component of a food systems approach to nutrition, which also includes community outreach and extension services, and improved market access for farmers," said Dr. Ajay Kohli, IRRI Director for Research. "By improving rice varieties that address farmer, consumer, and environment needs, precision breeding innovations such as genetic engineering and gene editing can open up pathways for more inclusive participation in the food system."



### **So, Are GMOs the Future?**

Golden Rice, a Vitamin A-enhanced food, and new bananas could save them and preserve the idea of the most consumed fruit in the world (according to the Food and Agriculture Organization). It all adds up to GMOs. These genetically modified products present a future that might have once been unthinkable, especially for a world that faces global warming and the detriment of several organisms that may be found nowadays. However, accepting GMOs to aid in both situations (the fight against VAD and TR4) poses two significant challenges that create considerable skepticism: uncertainty and regulatory methods. Both are relatively new ideas, and society will always respond with apprehension to what they are not familiar with.

Nevertheless, several official governmental tests have confirmed that the new proteins that give them their unique properties are neither toxic nor allergenic, and more evaluations are still taking place. Regulations continue to be created and adapted to keep up with the changes in the world. Still, with the approval of Golden Rice by governmental institutions such as the US Food and Drug Administration (FDA), arrangements are soon to come. Despite such setbacks and other environmental, economic, industrial, and social concerns, GMOs bring forth an opportunity that should be considered.



### ***How Much Are Regulations Doing?***

The minimum requirement for food is to be proven safe for consumption and, in recent years, sustainable. Who would purchase a tomato labeled 'DANGEROUS FOR CONSUMPTION, KILLS ENVIRONMENT. MAYBE DEADLY'? No one. Therefore, several institutions have set parameters and regulations to determine if food is safe for eating. Some examples of such institutions may be both international, like FAO (Food and Agriculture Organization) and WHO (World Health Organization), and those found in several countries like the USA, FDA (Food and Drug Administration), Europe, EFSA (European Food Safety Authority), Australia, New Zealand, FSANZ (Food Standards Australia, New Zealand), and even Colombia, INVIMA (National Institute for Food and Drug Surveillance). With the ongoing debate about genetically modified organisms (GMOs), one of the major concerns is what regulations would look like, considering all possible consequences they may have as they become more embedded in the world's food supply. Although GMOs have been proven to be safe, there are still many who wonder at other aspects that should have such parameters so that a balance may be found to ensure that, for example, 'big companies' do not monopolize all food supplies or to assure that GMOs are completely safe and sustainable.

So, are regulatory frameworks adequately safeguarding our ecosystems and well-being in the face of advancing biotechnological innovations? Are regulations enough for such a potential breakthrough in technology and agriculture?

Government parameters, guidelines, and steps are regulations for each step of the food supply chain, including suppliers, producers, distributors, and consumers. It influences everything from how and which food can be made to how it is presented to customers. Such legislative acts are primarily independent of each country. Still, they all allow for preventing any health hazard, promoting and ensuring food security, setting the stage for safe food trade, preventing deceptive practices, and managing food costs, primarily industrially.

GM foods (genetically modified foods) undergo a rigorous evaluation process to be deemed safe to be offered to the public. GMO products undergo more testing and oversight than any other agricultural product: allergenicity tests, toxicity tests, teratogenicity tests, etc.

They are evaluated for potential impacts on other organisms when introduced into an ecosystem, including soil and water impacts, biodiversity impacts, crossbreeding risks, and how they are to be managed once released into the environment. The economic implications for other producers and all consumers are other factors considered when creating the regulations for GMO products, which may dictate how companies can license or sell their patented GMO technologies to other entities, such as farmers or other agricultural businesses. Some licensing agreements often involve terms related to fees, royalties, and usage restrictions or encourage or mandate technology transfer agreements between developers of GMOs and local entities; this is particularly relevant for developing countries, where there may be a need for the transfer of technology to benefit local agriculture.

For one, the nutritional tables on the back of most products are an example of such regulations. They depict calories, fats, sugars, carbohydrates, ingredients, and the like so the consumer knows what they eat. Such transparency allows for the prevention of allergic reactions and creates trust between provider and buyer. For genetically modified foods, several countries, such as the USA, Australia, the European Union, Brazil, and China, require labels on GMO foods to indicate their nature. Some companies comply with such regulations; others do not, in fear of the public reaction to GMO products.



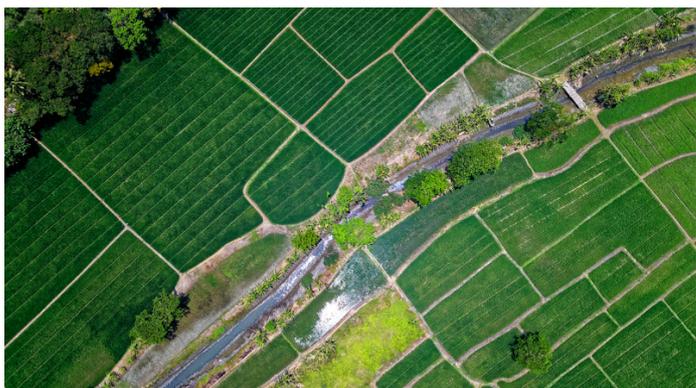
Dr. SunAh Kim, a lecturer in the School of Marketing at UNSW Sydney, researched the different ways of labeling across several countries and how scientific and public opinions diverge when deciding if GMOs should be trusted. How far should transparency be taken as a priority rather than the potential benefits of GMOs for a prejudiced society? Misinformation produces mistrust despite any amount of research or reassurance. Most consumers would look at a GMO label and turn away from it because it means something unknown and new. Several studies prove GMOs are as safe as any other food, but are they enough?

Concerns like that make companies hesitant to label their GMO products and create a domino effect between scientific, government, industry, and public trust. If the government mandates that food must be labeled, for it has gone through several stages of testing and was deemed safe by scientists, but this means public rejection, they are most likely not to label the food.

So public suspicion arises stronger than ever. Are our regulatory frameworks enough for a world of GMOs and biotechnological advances? GMOs undergo rigorous evaluation for safety, environmental impact, and economic considerations. The labeling issue arises, testing transparency against public opinion. Dr. SunAh Kim's research questions the extent of transparency in a skeptical society. Balancing innovation, evidence, and public trust becomes the central challenge in this evolving regulatory landscape.

### **The Ethics of It**

Any scientific discovery or innovation must first address ethical concerns, which cover all potential consequences and impacts, before releasing it to the world. Economic, environmental, political, and social aspects must be considered, paving the way for regulations and apprehensions that fit into each discipline. For GMOs, some of the main concerns are related to their impacts on the environment once released into an ecosystem, future repercussions in industrial monopolization of resources, especially when considering companies such as Monsanto, and social perceptions. Here are some of the main aspects to consider.



### **Environment & Agriculture**

Global warming, pollution, and sustainability are some of the main aspects society is working towards improving to save the Earth. As the population increases, there are more mouths to feed than food production can keep up with. Therefore, there are more factories, livestock farming, burning of fossil fuels, and increased use of chemicals such as pesticides and herbicides pollutants. To contend with these requirements, there are two types of farming: Conventional farming (GMO farm) and non-GMO crops.

### **Non-GMO Crops Vs. GMO Crops**

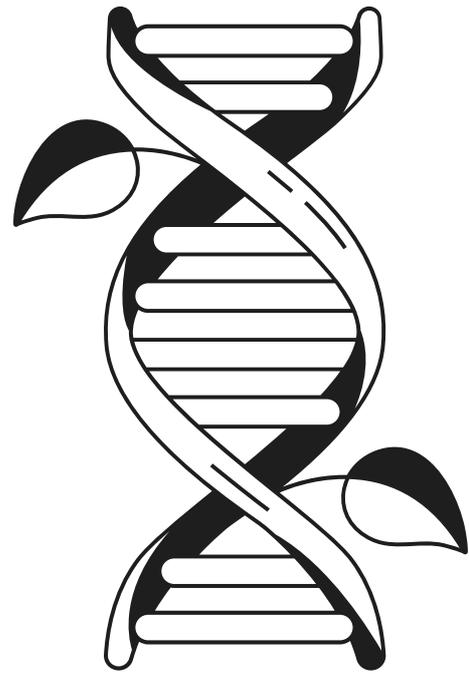
As the name suggests, non-GMO crops are plantations that do not use genetically modified seeds. Customers usually prefer these, attributed to the skepticism about GMO foods, and use natural breeding methods and traditional heirloom varieties of plants, which helps avoid monocultures to preserve biodiversity.

However, producing large quantities of food requires more time and land, which creates concerns when ensuring global food security. Additionally, by not having the desired or needed qualities modified in GMOs, non-GMO crops rely on pesticides and herbicides to avoid pests or diseases. They cannot adapt efficiently to the constant changes in the environment.

On the other hand, GMO crops present other opportunities and setbacks concerning the environment. First and foremost, GMOs are quick and cheap to produce, for they are genetically modified to be naturally resistant to pests, viruses, bacteria, and the like; plus, they have much higher crop yields. They have a high tolerance to atmospheric changes, meaning they are less likely to be ruined if temperature or resources change and can be grown in any climate (if they are modified for it). Nonetheless, one of the major concerns is that genetically modified genes can flow to wild relatives through cross-pollination, which can impact the ecosystem; this could also make the offspring resistant to herbicides and pesticides and increase their vulnerability to pests or diseases. Having interactions with non-target organisms, such as bees and other non-pest insects, with consequences to biodiversity and soil ecosystem with consequent biogeochemical effects, such as the development of "super weeds," resistant to herbicides used with GE crops, mirrors the antibiotic resistance in microbes, posing a threat to the long-term efficacy of herbicides. Monocropping, a result of limited biological diversity in GE crops, can diminish natural habitats and heighten the possibility of crop failure, as exemplified by the Irish Potato Famine in the mid-19th century.

### **Corporate Monopoly**

As technology advances and there is a greater need for quick food that meets customer demands, corporate monopolies have begun to wield significant influence over the global food supply chain. Seed patents (single DNA sequences developed by a single person which define a plant or seed, and that plant or seed can be copyrighted.) Since no one else can produce or market the protected seed while someone holds the patent, the patent shields innovators and is in the hands of a select few large corporations, such as Monsanto, now part of Bayer.





These entities dictate seed usage terms, restricting farmers' traditional practice of seed saving and raising questions about the autonomy of agricultural producers. It must be noted that companies like Monsanto are some of the main factors responsible for ruining a part of GMO reputation. Monsanto promotes more pesticides, monocultures, and expensive personal profits to make off farmers, mainly by selling their seeds at extreme prices and enforcing their seed patents to a harrowing degree. The company has pursued legal action against farmers for alleged patent infringement, even in cases of unintentional cross-pollination. They set a precedent for all other companies selling genetically modified crops, creating more tension between the public and other providers.

The impact of this concentration of power also implies that small-scale farmers, in particular, face economic dependencies on these corporate giants for genetically modified seeds, fertilizers, and other technologies. The need for more diversity in the seed market, another consequence of this corporate control, raises concerns about the resilience of our global food supply. With a narrow selection of genetically modified crops dominating the agricultural landscape, there is a heightened vulnerability to pests, diseases, and environmental changes. This scenario poses risks to global food security and challenges the principles of equitable resource distribution and farmers' rights. Moreover, the ethical implications of corporate influence over research agendas and regulatory processes create discomfort and strain on consumer acceptance of GM foods.

Lack of transparency, usually in fear of customer hesitancy and aversion, also allows this strain to continue growing. Despite several tests performed by entities such as the FDA and WHO, in which GMOs are guaranteed to be as safe as non-GMO products, public skepticism continues to promote the ongoing debate. When companies refuse to label GMO products, consumers distrust what they eat, even if it is safe and approved. Humans will always be suspicious of the unknown, and there is a long way to go before society accepts and trusts GMOs.



# HOW CLIMATE CHANGE IS CONNECTED TO COLD FRONTS

Lea Brine and Olivia Mercado, U.S.

Winter temperature averages are rising, but record-breaking cold spells are occurring all over the world. Confused? You're not alone, because the fact that global warming is bringing cold fronts to hot states like Texas doesn't make much sense. Scientists have been discussing and debating the causes of this phenomenon for over a decade, and, though there are many different theories, most of them connect to the same core ideas.

In 2012, Jennifer Francis published her ideas surrounding this area of debate and brought this conversation to the forefront of science. Francis argues that the warming in the Arctic is blurring the lines between the polar and tropical climates, thus disturbing the jet streams and allowing the weaker streams to dip into southern areas or be knocked off course.

In 2021, scientist Judah Cohen published research positioning the polar vortex as the cause of the bursts of cold air. The polar vortex is a large area of low-pressure and cold air that surrounds the Arctic. When the stability of the polar vortex is not controlled and contained in the high north around the Arctic, it flexes, bends, and dips into more southern areas of the world.

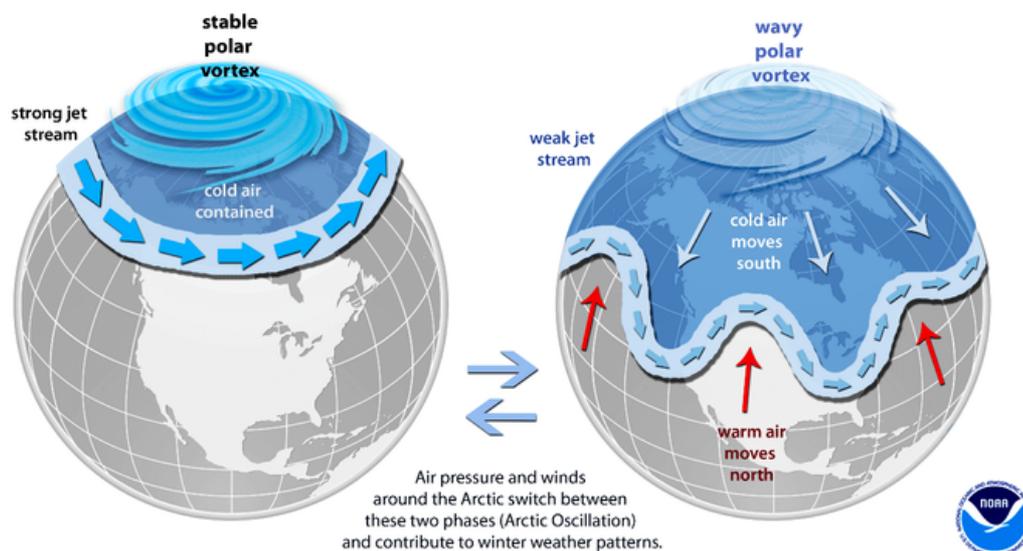
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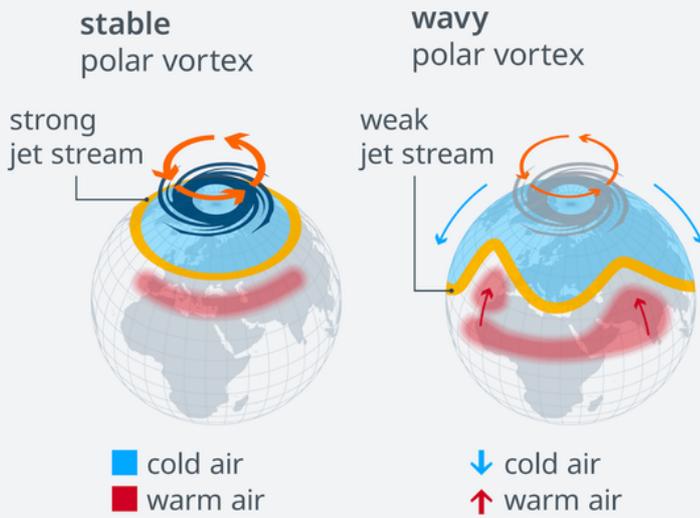
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## The Science Behind the Polar Vortex



## How the polar vortex affects our weather



Source: NOAA, NED

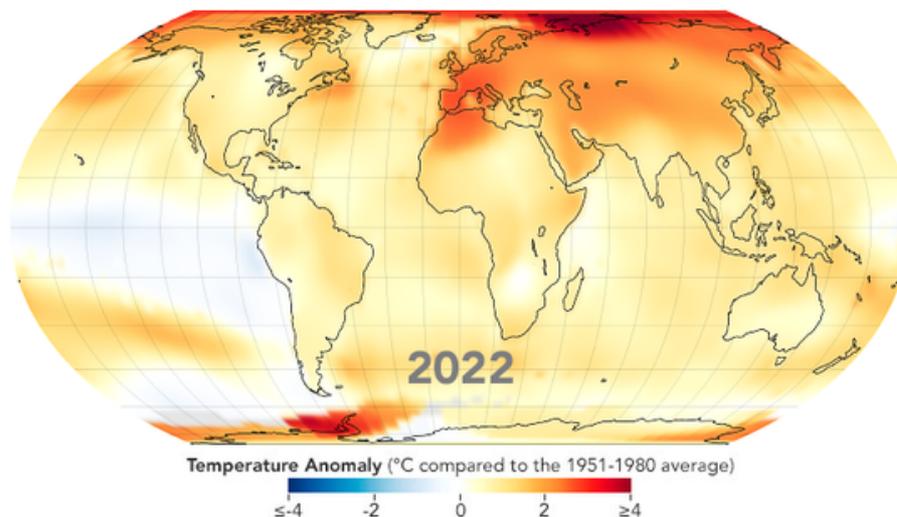
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"The Science behind the Polar Vortex." Severe Weather Europe, [www.severe-weather.eu/global-weather/polar-vortex-2022-dramatic-arctic-cold-season-return-united-states-canada-mk/](http://www.severe-weather.eu/global-weather/polar-vortex-2022-dramatic-arctic-cold-season-return-united-states-canada-mk/). Accessed 4 Feb. 2024. Chart.

One example of the polar vortex losing stability was the cold storm in Texas in 2021, when many people lost power and were in extreme weather conditions that resulted in 246 deaths, an event now generally referred to as the Great Texas Freeze. In an interview with CNN, Cohen made it clear that his paper is "not arguing that it is getting colder overall" because winters are still becoming warmer. In fact, the Arctic is warming four times faster than any other place on the planet, so many scientists connect it to abnormal weather patterns such as cold spells.

Climate change continues to affect different aspects of weather, life, and the future. Weather extremities caused by climate change do not include cold blasts but also floods, fires, droughts, and heat waves. Many people try to use the fact that we have been receiving cold storms as reason to believe that climate change is a hoax, which makes the work and research that scientists continue to do all the more important. Although these topics can be difficult to grasp, scientists' research continues to give us a better understanding of how climate change is affecting our planet.





# THE RELEASE OF THE NEWEST PHOTO OF BLACK HOLE M87, AND WHY IT IS IMPORTANT

*Evelyn Myattn, U.S.*

Almost six years ago, on April 11, 2017, astronomers captured their first photo of a black hole. Earlier this year, scientists released a new image of the black hole M87. M87 is gigantic, being around 6.5 billion times the mass of Earth's sun, and occupies the Virgo galaxy cluster. It is 55 million light-years away; thus, it is arguably irrelevant to everyday life. Then why was the original photo of M87 such a big deal, and why is the new one just as important?

The original image was significant for two reasons: It was the first time humans were able to capture a black hole, and it looked like how scientists predicted it would. For example, the original photo features a black-hole shadow, meaning a dark area surrounded by a glowing ring of matter. The interesting part about this is that scientists expected this even before the photo was taken.

## SOURCES:

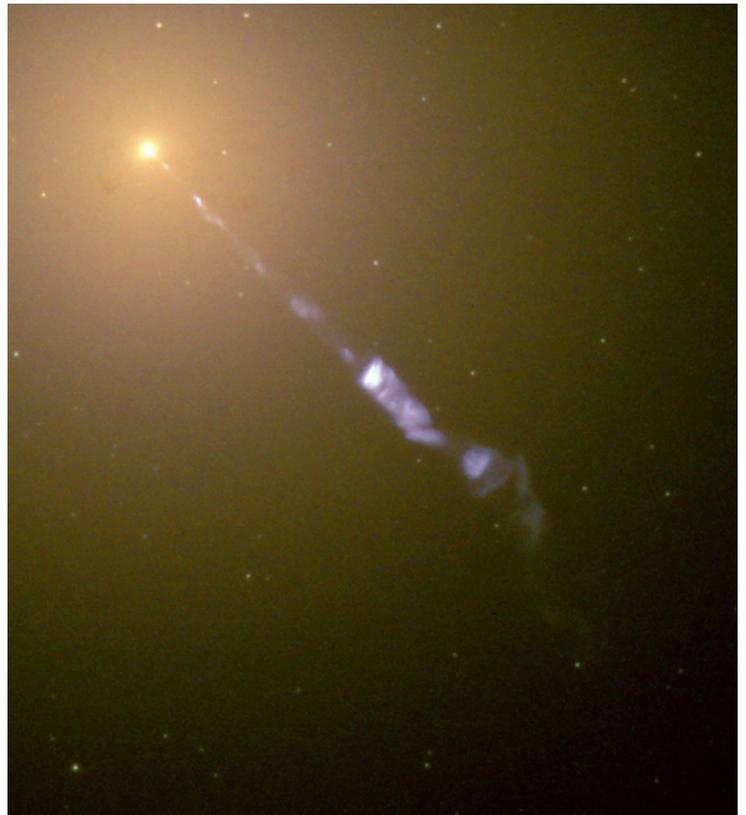
Mann, Adam. "Astronomers Have Snapped a New Photo of the Black Hole in Galaxy M87." *Science News*, 18 Jan. 2024. Society for Science and the Public, [www.sciencenews.org/article/supermassive-black-hole-photo-galaxy-eht](http://www.sciencenews.org/article/supermassive-black-hole-photo-galaxy-eht). Accessed 4 Feb. 2024.

Velasco, Emily. "New Data, Same Great Appearance for M87\*." *Caltech News*, California Institute of Technology, 22 Jan. 2024, [www.caltech.edu/about/news/new-data-same-great-appearance-for-m87](http://www.caltech.edu/about/news/new-data-same-great-appearance-for-m87). Accessed 4 Feb. 2024.

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The reasoning behind the prediction of the dark region was that it was created as the result of M87's colossal gravitational field, as it was so strong that light could not escape. Scientists also predicted the ring of light around the black hole, as it was thought that the black hole also bent light that was going past it, creating a bright loop around the dark region. These details in the photo were important, as they confirmed the predictions of astronomers while giving humans visual evidence of what a black hole looks like. The predictions of M87 were backed by Einstein's theory of general relativity. The image is strong evidence that the astronomers' understanding of general relativity and the physics of black holes are correct.

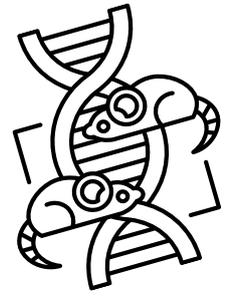
The first-ever photo of a black hole was a significant scientific achievement. But this is not to say that the newest image of M87 is unimportant. The new photo is a more accurate depiction than its predecessor.



Not only did it use new data, but it also used an improved version of the telescope that took the original image of M87, the Event Horizon Telescope, or EHT. So while the small details of the photo differed from the original, the main components of M87 stayed the same, including the ring of hot matter surrounding a dark region, further proving scientists' current understanding of astronomy and general relativity. In the words of Katherin Bouman, the co-lead of the EHT imaging team and coordinator of the Imaging Working Group, "it's a totally different thing to have a new dataset taken a different year and to come to the same conclusions. Reproducibility with independent data is a big deal, too."

# READ THIS IF YOU DON'T WANT TO DIE

Isabella Zambrano, Colombia

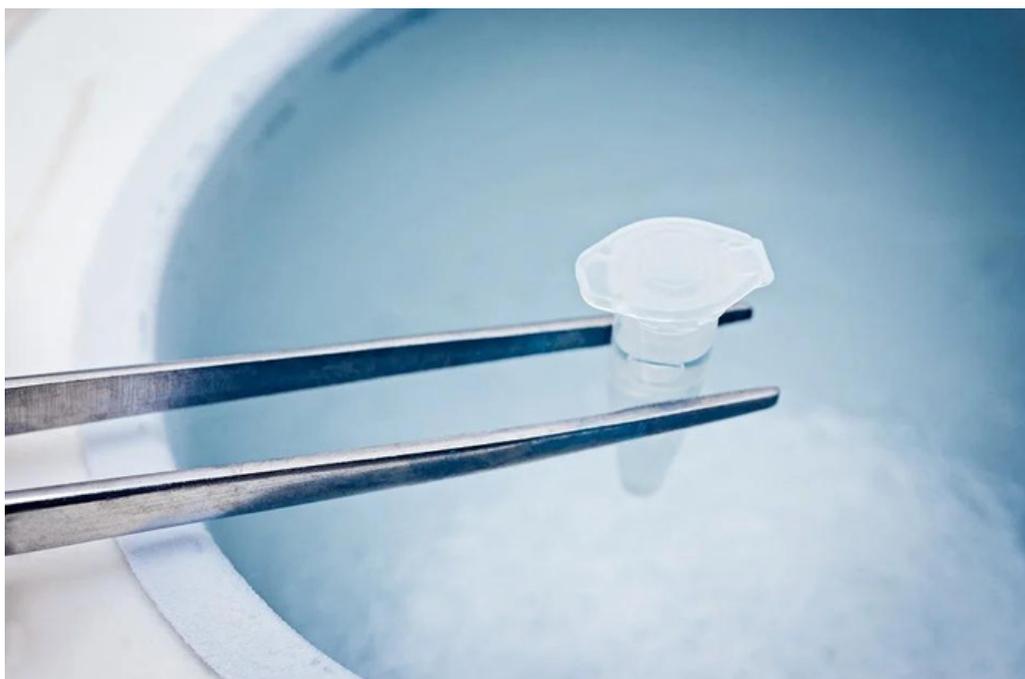


**"For everything, there's a solution, except death."** We've all heard this saying escape the savage lips of our grandmothers, harpooning into the air to pierce our ardent complaints. Thanks to modern technology, however, they might just have been proven wrong. The score? 1 to 10,000. Let's keep *that* a secret. But stay tuned—**for the truth.**

Immortality can mean many different things. It can mean creating a great work of fiction or poetry so that our mark on Earth remains — a steady fire in the south of time. It can mean securing the continuation of our genes through procreation or spending \$3,000 on Botox. **"Everyone is searching for a magic pill that will cure aging,"** proclaims Richard Siow — head of aging research at London's King's College. Just as surely as we ache for immortality, however, it's always seemed like the one thing that will truly remain undying is the certainty of death. And that scares us, pushing us to find solutions and pushing us to make a *cosmic leap* beyond our limits. In this article, we will explore two of the latest solutions to immortality: genetic cloning and cryogenic freezing.

**"Cloning, in my opinion, is the only way to make a dramatic leap in life extension and turn longevity into an engineering problem."** This is Alex Zhavoronkov, president of Hong Kong-based biotech company Insilico Medicine. Through his company, he's led research on cloning to increase life longevity.

However, before we delve any further, here is a definition: Genetic cloning involves extracting and duplicating DNA segments, cells, or whole organisms, resulting in an identical copy. The most common types are reproductive cloning (generating exact copies of entire organisms) and therapeutic cloning, which involves generating exact copies of tissues or organs that can then be transplanted.



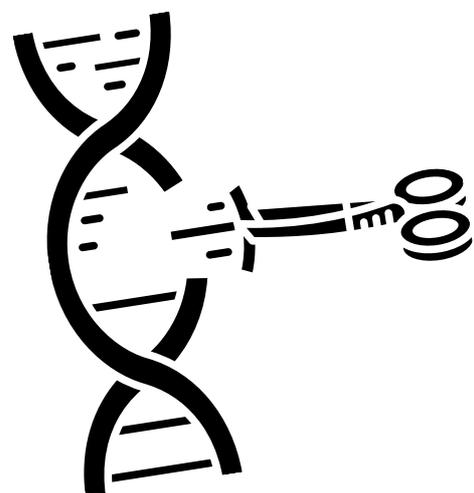
The first successful attempts at reproductive cloning date back to 1996, when, after 300 attempts, researchers at the Roslin Institute successfully cloned the cells of a six-year-old sheep, naming its copy Dolly.

Insilico Medicine's solution involves:

- Genetically cloning humans.
- Retrieving their vital organs and ultimately.
- Transplanting them into their original copies to offset the effects of aging and illness.

As emphasized by Dr. Zhavoronkov: **"Transplantology has already advanced to the extent that you can transplant virtually anything. If there is no rejection, since it is a perfect clone, you can have a perfect body and just focus on the longevity of your brain."**

Despite near efforts to replicate vital organs such as the lungs and pancreas, genetic cloning as a pathway to eternal life faces setbacks — beginning with the brain. Admittedly, cloning the brain and its unique neural structure whilst preserving its "consciousness" is a more difficult task compared to replicating simple organs — the lungs or heart. In the same vein, the concept carries controversies: is it really moral to create an exact copy of a human being only to harvest its organs? Would they simply be used for the benefit of their original copy — with no respect for their personal freedoms? Novels such as "Never Let Me Go" by Kazuo Ishiguro explore this idea. In the dystopian novel, genetic clones are sent to school and sheltered until they become organ donors. The work reveals the dehumanization of these clones — regular human beings who are grappling with their identities — establishing that no life should come at the expense of another.





According to Dr. Zhavoronkov, there will be promising advancements in longevity research in the coming decade. Furthermore, raising the first adult clone may take anywhere between 15 and 20 years. The question then becomes: will we reflect on the implications of our cloning research at the rate of its progress?

**Could there be more promising prospects in the field of cryogenics?**

For Stephen Valentine — director of the Timeship Project — the answer is 'yes'... and a fortress for frozen people. Namely, the structure functions through cryogenics, which involves cooling and preserving bodies at extremely low temperatures through vitrification (the process of rapidly freezing cells to prevent ice crystal formation and damage).



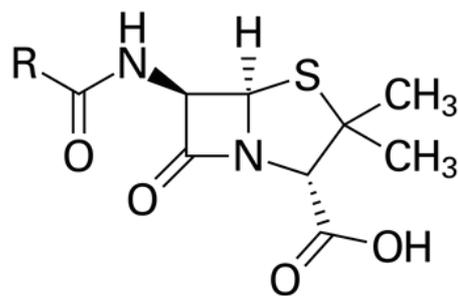
The project's underlying idea is that future technological advancements might be so advanced that they enable revivals.

According to BBC's Science Focus, "[Valentine] spent five years finding and designing the site while studying pyramids, ancient tombs, bank vaults and medieval fortresses...He has even consulted experts on how to protect frozen time-travelers from the effects of a nearby two-megaton nuclear bomb." The result is a spaceship-like castle storing thousands of storage pods with anything from frozen people to precious biological samples of endangered species—all — under intense security. Cryogenics suspends you in time while everything around you—your family, friends, and resources vanish. But for many, including 14-year-old British cancer patient JS, this prospect is better—more promising—than death.

Death. It is in our blood to fear it. It is the ultimate depersonalization, as Ortega reminds us, and a worry that, for many, religion struggles to placate. These are some of our ongoing solutions towards immortality. In the coming decade, they are set to achieve significant milestones with their ethical implications meekly monitored. But for now, sentences have to be finished. And this article has to end with a period.

# THE DISCOVERY OF PENICILLIN

*Leonardo Gabrielli, Italy*



The discovery of penicillin is the most compelling establishment of the last century, in both pharmaceutical and scientific sectors. Without it, we would have not been able to overcome illnesses including pneumonia, meningitis, skin infections, which can affect bones, joints, stomach, blood and heart valves. Besides that, penicillin proclaimed the dawn of the antibiotics era. However, before talking about the history behind this vital accomplishment, one must get the idea of what an antibiotic is.

Compounds containing bacteria and fungi are often acknowledged as antibiotics. They have the ability to kill and obstruct harmful microbial species. As a result, one can consider Alexander Fleming as the father of the antibiotics era. Indeed, on September 3, 1928, the prominent scientist witnessed an interesting aspect in one of the petri dishes containing *Staphylococcus* colonies. Eventually he detected that the dish was covered with colonies except for an area occupied by a fleck of mold. Furthermore, the zone immediately around it—then analyzed as a sporadic trace of *Penicillium notatum*—was in pristine condition. Subsequently a hypothesis emerged: what if the mold had emanated something capable of hindering the growth of the bacteria? Thereupon this hypothesis turned out to be correct.

It was incredible news for the Scottish scientist to discover that the mold had the ability to kill streptococcus, meningococcus, and diphtheria bacillus. Later, with the support of his assistants, he tried to isolate penicillin from that juice, although it seemed to be in a very precarious state. In the following year, Fleming announced his findings in the *British Journal of Experimental Pathology*, he also included a comment on the potential of penicillin in the therapeutic sector. Despite this, the production of this life-saving drug is not affiliated with Alexander Fleming.

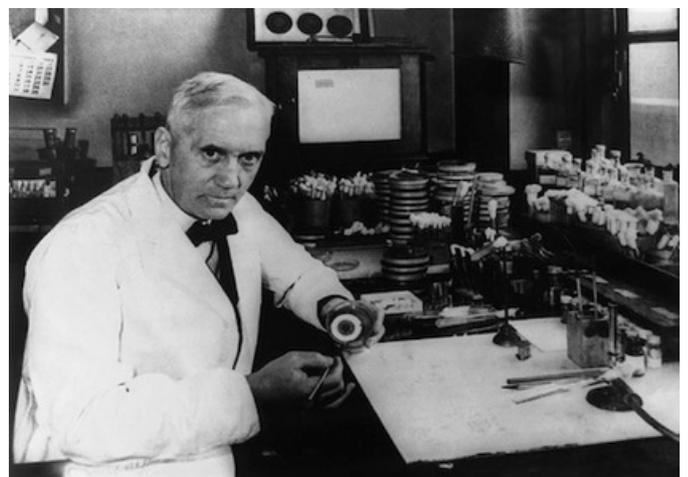


In fact, this has been attributed to Howard Florey, Ernst Chain and their collaborators at the Sir William Dunn School of Pathology, at Oxford University. The Oxford lab was slowly becoming a penicillin factory, where to pursue animal experiments and clinical trials, the squad had to process up to a weekly quantity of 500 liters of mold filtrate. Notwithstanding the misfortunes in which the group had to work in, the plan was proceeding audaciously.

The biochemist Norman Heatley was tasked with extracting penicillin from the filtrate, while Edward Abraham, another biochemistry professor, managed to purify the drug before clinical trials. Hereafter, in 1940, Florey conducted multiple experiments, with the exultant result that this antibiotic could cure mice from the deadly Streptococci. Thereafter, 2 years later, penicillin was tested on humans for the first time when the 43- years old policeman Albert Alexander abraded a side of his mouth while shearing roses. This led to the treacherous consequence of a malignant infection acting in his eyes, lungs and face. With an immediate injection of this mysterious drug, he had an outstanding recovery, although the supplies of medicine ran out, leading him to a horrendous death. The studies on penicillin have made formidable steps since that day.

Indeed, numerous proposals of making it available for British troops in the trenches were made. Following the war-times in which the rise of this antibiotic occurred, some enterprises took up the challenge of its production. Since WWII the world has had enormous improvement thanks to penicillin, leading to a prosperous progress.

Since that frigid and crucial 3rd of September, penicillin has become the most essential antibiotic, and opened the doors to boundless medicinal research. The world is advancing into an untold future as are our battles and expansions.



# GEOPOLITICS

## THE ITALIAN DEMOGRAPHIC CRISIS

*Michele Cirino, Italy*

People are vital to nations' growth and prosperity. For lacking sufficient individuals causes catastrophe, demographic decline has become a foremost matter in Italy's politics. By analyzing this crisis' origins however, the Italian government can implement social and economic reforms to mitigate its effects.

Statistics on Italy's demography are concerning. Its fertility rate, below the sustainable value of two since 1977, is currently 1.25. Therefore, population has been declining since 2014 and is projected to drop to 52 million by 2050. This signifies Italy's dependent population, presently 38%, will surge, exerting pressure on public services, especially pensions. Additionally, lacking funds will aggravate public debt and stagnant growth as future governments may not be able to stimulate struggling sectors. Ergo, understanding this crippling emergency's source is essential for devising solutions.

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Italy's demographic issues originate within politics. As the country is politically unstable, legislators address short-term affairs rather than policies' lasting effects, leading to scarce pronatalism. A recent survey shows 82% of Italians perturbed, identifying lack of child services as one of this calamity's roots. For instance, Italy provides nursery schools for 27% of children aged 0-3, low compared to the EU's sustainable standard, 45%.



Moreover, cultural norms and legislation effectively impose childcare on mothers; thence women choose whether to embrace career or family, with many opting for the former. While women are entitled to five months of paid compulsory maternity leave, men receive ten days, hindering fathers from assisting in childcare. Another determining factor is insufficient incentivisation. The Italian government provides stimuli, albeit too small to have significant impacts. Although Italy's current administration vows to reverse demographic decline, contradictory acts persist, namely banning surrogacy and incrementing deportation centers.

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For this contractive cycle may engender collapse, immediate action is paramount. Firstly, augmenting nurseries to allow families to simultaneously care for children and work is indispensable. The government is investing €4.6 billion provided by the RRF in creating 264,480 new preschool places, thus surpassing the European target of 33% coverage for children aged 0-6. Nonetheless, this will not suffice; male contribution in childcare must also be promoted through the provision of equal paid maternity and paternity leave. Indeed, according to Kolk, researcher at Stockholm University Demography Unit, "the relationship between gender equality and fertility is U-shaped". Observing Scandinavian nations, it is clear that with improved gender equality, couples are not forced to decide between working and raising children. Furthermore, significant gradually increasing tax breaks must be granted. For example, France spends around 0.8% of GDP on providing impost exemptions to families, while Italy's value is just 0.4%. This contributes to France's higher 0.3% population growth rate compared to Italy's -0.4%. The government should also extend babysitter bonuses, which currently aid households with incomes below €35,000, to families with higher wages. Lastly, Italy must integrate immigrants through *ius soli* and naturalization as foreigners can provide labor and offset decreasing births. Although 83,000 work visas were granted in 2023, sustained efforts are required given the 280,000 employer requests for foreign workers.

In final analysis, if left unchecked, Italy's demographic decline will drive it to ruin. Nevertheless, if pronatal policies are swiftly and successfully implemented, increasing gender equality, immigration, and birth rates, the country will avert further issues and return to economic development and demographic growth.





# WHY OPERATION ASPIS IS ESSENTIAL FOR EUROPE AND ITS ECONOMIES

*Federico Leone, Italy*

The Houthis are part of a socio-religious and political movement, born in Yemen and founded by Hussein Badreddin al-Houthi. Iran is accused of financing and providing the Houthis with weapons for religious reasons and to expand their regional power.

In the last weeks, this movement has been causing very serious problems in the Red Sea, attacking various cargo ships with missiles; the consequence will be devastating, especially for Europe. For a cargo ship to transport products to the Mediterranean Sea avoiding Houthi attacks, it must circumnavigate the whole African continent, and it takes approximately two weeks, ten days more than usual. The number of ships crossing the Red Sea has halved and the price of transportation of a container from Asia to Europe has almost doubled. The industrial sector in Europe, especially in Italy, France and Germany is going to have a hard time if diplomacy doesn't provide a safe solution for international trade.



However the answer to this problem may not be diplomacy. This time, the major players in Europe have opted for a more hardline approach. Operation “Aspis” (translated from Greek “Shield”), is a military defensive operation with the aim of knocking down any missile or drone attack towards commercial ships. Rome, Paris and Berlin have received the approval of the European Union to secure the Red Sea and prevent the ships from being hit by missiles or drone attacks. There are two different options for carrying out this operation: the first is to escort every single boat, but it would require too many military vessels, the second is to operate on a more vast radius and to patrol larger areas. The mission was born as a defensive operation, but it can integrate and cooperate with the offensive mission started by the United States and the United Kingdom. The problem for now is that except for Rome, Paris and Berlin, only Belgium has made its navy available for the operation. We are not sure about who's taking the lead of the operation, but it is contested between Italy (representing Europe) and some major Middle Eastern powers. It is sure that it will be an example of European military and political coordination. The leading countries affirm that Aspis will remain a strictly defensive operation, although the European navies will have the possibilities to “shoot to defend” and in rare cases to board suspect ships.

A resolution to this extremely unstable situation is necessary to bring back stability in the Middle East, and to assure the European industries that their production can keep moving forward.



# THE LOSSES AND GAINS OF ACTIVE POLITICS

*Margherita Aprile, Italy*

“A man who is not interested in the State, is not to be considered harmless, but useless’ . The following words were pronounced by the Athenian military general Pericles during the Peloponnesian wars, perhaps one of the darkest and most difficult times in Greek history. The relationship between individuals and state has been a source of thoughts and arguments for centuries; since ancient times individuals have been asking themselves where the state should draw the lines in limiting its influence on the private lives of citizens and what is, on behalf of individuals, the correct attitude to take up when participating in the political dynamics of any form of collective organization, ranging from the most elementary and basic communities to the administration of a national government. The means and customs of partaking in a political organization, in any of its forms, are profoundly influenced by the historical period that one finds themselves in, therefore the matter of active participation in politics cannot be further discussed without taking into account our historical and socio-cultural background. Being citizens of the Western world has inevitably shaped our mentality and way of thought: we tend to blindly confide in the political practices of our ancestors without ever effectively questioning whether these are the most sustainable ways of living in the present. In a way, our great past, being the direct heirs of those who invented democracy and those who developed the greatest empire of all times, is what makes us blindly accept our fate and is what creates a newfound sense of moral inertia which makes citizens settle for the bare minimum out of mere necessity, without taking into account the power of dialogue and collective, peaceful protesting. The following analysis of the socio-political factors behind citizenship and participation in government will take into profound consideration the concepts of judgment and debate.



Being members of an hierarchical society, oftentimes individuals feel discouraged from partaking into politics, or they simply think that their single, weak voice will not be considered enough to concretely advocate for change. From a modern perspective it is extremely unlikely that states that live in general, overall states of well-being and economic prosperity will overthrow their governments and establish new legislative or judicial branches, therefore as individuals we must eventually adhere to the condition of living in a hierarchical society, as other forms of government would be somewhat abstract and utopist. Our state of members of organized societies automatically implies that along the path of our lives we will always come across somebody more persuasive, powerful or merely physically stronger. The thought of being just one voice advocating against an unjust or corrupt practice is profoundly discouraging to individuals; yet it is in that rage and in that exhaustion of feeling silenced for too long that one should find the impetuous strength of participating in politics and not blindly accepting fate. It is inevitable that, as distinct thinking and feeling individuals, some will perceive different levels of interest towards the field of politics, yet it is of vital importance to concretely understand the difference between a statesman and a rightful citizen. A statesman is somebody who feels a particular vocation for the field, just like a physician who feels



naturally inclined to save their patients or a soldier who senses the duty of protecting his nation. The kind of person who concretely drafts proposals, comes up with resolutions and overall engages in more solemnly institutional practices will inevitably have a more impactful role on the decision-making process, this could be a national president, a mayor or simply the chief of an organization. However the importance of “common” citizens is not to be underestimated. As citizens it is our rightful duty to not place blind trust in those who take up the apparently most valuable roles in political societal norms, but instead to painstakingly analyze and comprehend the systemic dynamics behind a functioning state and to eventually recognize the possibility of wrongfulness of those who administer and lead.

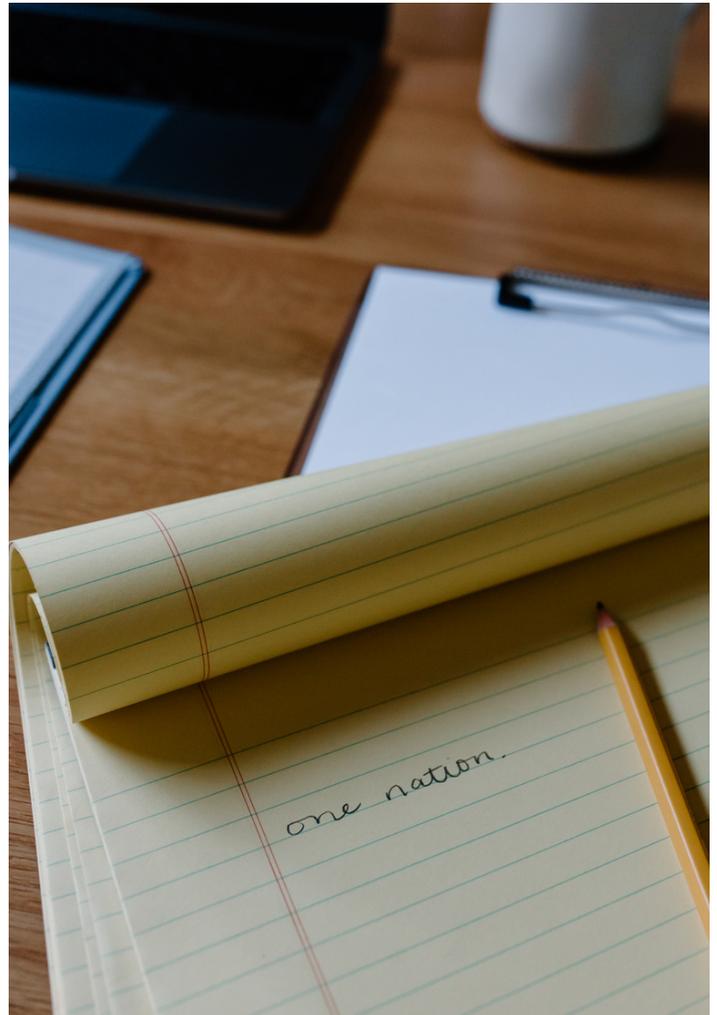




The concept of citizenship is often miscomprehended and has several articulate connotations, this being evidenced by the fact that modern thinkers never seem to agree on the correct and most accurate way to translate the concepts of politeia and civitas, the two concepts behind Greek and Roman societies. Surely the most immediate and superficial connotation of this noun is the act, of an individual, of participating in a state of some form, just like the way the noun is employed when it comes to bureaucracy ( example given: being a citizen of the United States of America, Italy, Germany...), however what is often implied by ancient terminology denoting this idea is the duty of being an operant member of the state and having a sense of belonging to the community in which the state is founded. All members of society should find in themselves the unborn duty of analyzing and judging the political operation of those in power. Moreover, a concept which is often neglected or disregarded is the idea that the power of a single voice, just like a flebile flame in a haystack, can ignite the fire of collective advocacy for change. The greatest revolutions in history could not have been accomplished without civilians stepping in the front lines. While it is highly unlikely for members of modern, Western states to overthrow the body of a democratic state, it is however possible, and perhaps profoundly necessary, to speak up against the most occult and misconstrued forms of injustice. Many members of society feel naturally inclined to take up a pessimistic and nihilist attitude when it comes to judging or proposing policies. This general way of being has been spreading like wildfire, especially amongst the youngest members of society; it is almost as if young people today were born with an underlying sense of discouragement which cannot be easily eradicated.



The question one might ask oneself is: "How can I make up for a system which promotes greed, corruption and the death of all sincere and heartfelt values?". This issue is not one that can be easily put to rest or solved, as the elaborate bureaucratic systems of state may create a sense of helplessness amongst individuals. In mere terms of numerical difference it would be concretely impossible to administer states of millions of citizens through the practices of the first ever model of Greek democracy, yet it is in the immensely elaborate hierarchies of some modern states that most find the cause to their discouragement. The most sinister and cruel regimes of all times placed one of their main sources of strength in the complexities and formalities of bureaucracy: the Nazi regime was a machine-like organization, painstakingly controlling and controlled in all of its minor and apparent futilities. It must always be taken into account that some of the worst dictators and autocrats of history were democratically elected and appreciated by crowds, this is why human beings should not blindly accept their participation in a system governed by dog control and a mere matter of trust, but instead they should value the concrete power of their judgment and never succumb to a blunt and overly elaborate system. The means of political discussion are just as important as the participation of individuals. Practices like elections and referenda are now consolidated or on the way of consolidation in most western countries, however what most underestimate is the step prior to casting one's vote in a ballot box, which is debate. As humans we often pretentiously think that our viewpoint on a matter is more correct than that of many others and we do anything in our power to move objections against those who we think to be wrong or those who simply question us. The concept of discussion is closely related to that of conflict and this is something that profoundly frightens humans. The idea of a violent contrast is not only intimidating but also profoundly inconvenient to society, as its degeneration could lead to times of hardship and warfare. Nonetheless, the eventuality of degenerations cannot be enough to function as an element of deference from engaging in debate.



In its most civilized form, debating is a practice whereby individuals can safely share ideas. Reaching general consensus is not implicit to the idea of debating, debaters will not unanimously agree on every matter, yet in that is the beauty of politics and human relations and reconciling the discrepancies between different voices is then the role of well-prepared decision makers. Debate is deeply rooted in human nature, even the most primitive forms of society engaged in discussions to determine solutions on collective matters which ranged from practical issues connected to hunting and gathering to, in modern times, the actual genesis of state constitutions. Debate can also differ in its forms, yet as long as all voices are heard and valued the practice can be judged as globally successful.



Associating discussion with its automatic degeneration is a major setback in understanding how to successfully administer a state. Like in all things, we must prudently take into account the eventuality of degenerations, as violence sparking from political matters is the death of the field of politics itself. Rage is a natural expression of one's inner, more feral, aspects of the psyche and, to effectively debate, individuals should change their way of channeling such a strong sentiment. The most immediate and impulsive reaction is that of succumbing to the instincts and reducing politics to a matter of an exercise of strength, yet it is our ability of rationalizing that birthed the concept of political thought and it is that which in the end should prevail. Hence the feelings of anger and discontent should not be repressed, as that would lead to a sentimental implosion, but simply channeled into different ways of expressing ourselves as members of a collective entity.

This is naturally easier said than done, nonetheless through common collaboration and collective effort, individuals will realize that bringing violence and conflict to the table, when it comes to discussing matters that have significant impacts on whole communities, feeds a never ending cycle of violent warfare and bloodshed amongst innocent lives; this can be evidenced by many of the greatest wars in human history and the cycle will continue feeding itself if politics, in its most exasperated and unhealthily distorted form, continues to be reduced to a mere and pathetic contest of strength and exhibitionism.

To end this reflection it is important to once again recall the emblematic words pronounced by Pericles which, with an almost paradoxical sense of modernity, carefully highlight the importance of participation and of discussion as an inevitable premise of a wise way of taking action. Humans must not succumb to their feral instincts, but instead more temperate aspects of our feeling nature should be brought to the field of political discussion, without ever neglecting the importance of rationality as a founding factor for collaboration and sustainable being. Humans will always feel naturally inclined to gather in societies and this is what in the end should act as the main and most sincere incentive to actively ensure that one's well being and rights are not neglected or overstepped by a corrupt and disorganized state.



# NYC'S RISING RENTAL RATES

Sophia Rückriegel, U.S.

New York City is currently grappling with soaring living costs, with the average new lease reaching an astonishing \$5,470 in June 2023, marking a 30% increase since February 2020. This surge contrasts with national trends and prompts experts to investigate the complex interplay of factors contributing to the city's increasingly high rents. There are various reasons for NYC's high rent, namely the shifting population after the pandemic, remote work, modified rent laws, and less supply.

The pandemic-induced shift in population dynamics, coupled with remote work trends, has created a competitive rental market. A temporary surplus of vacant apartments initially depressed rents as people left the city, but the mass return of residents, coupled with a lack of supply, has led to higher rental prices.

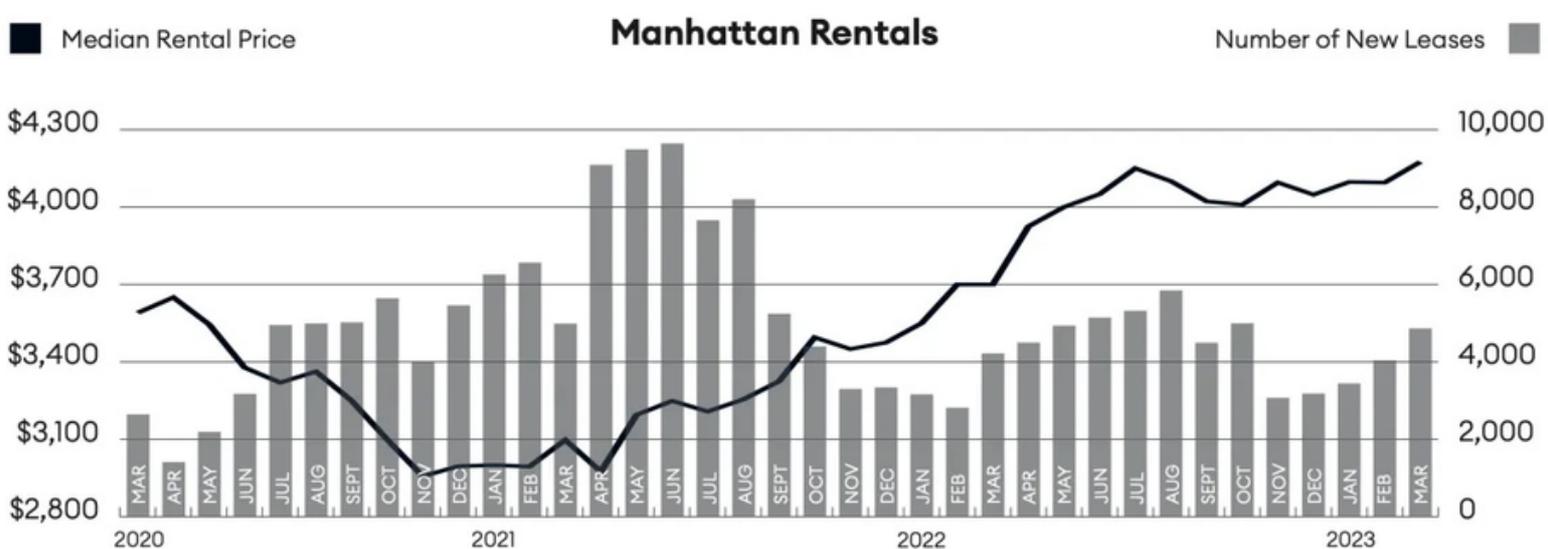
Remote work's increased popularity has further increased the demand for larger apartments, driven by the desire for more home office space and the influx of digital nomads with higher-paying finance and tech jobs. The average household size decline in the last decade has required existing housing stock to accommodate an additional 70,000 people. The demand for housing that this situation has presented cannot easily be met.

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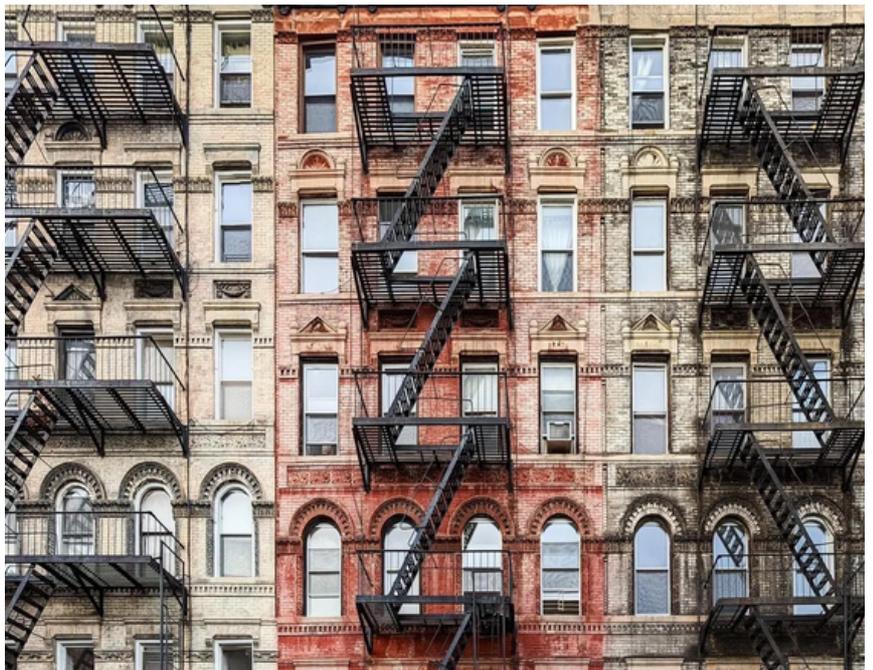
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Furthermore, a significant number of rent-stabilized apartments, around 40,000 vacant units, are being kept off the rental market, contributing to a housing shortage. Data suggests that the warehousing of these units is likely a contributing factor to rising living costs. Additionally, tenants in rent-regulated apartments, even at higher prices, are reluctant to move due to preferential rents offered during the pandemic, creating further scarcity in available units. With fewer rental options available to tenants, landlords gain leverage, allowing them to set higher prices.

Finally, the expiration of the 421 - a tax abatement - has led to a significant drop in the construction of new housing in New York City, particularly in the rental sector, with filings for multifamily buildings falling sharply every month. This decline in new housing construction intensifies the city's housing supply crisis. Mayor Eric Adams stated that some form of tax break will be needed to spur rental housing construction, but there are no plans in place for this yet.

In essence, the factors contributing to NYC's rising living costs are multifaceted and complex. They significantly drive up prices, posing massive affordability challenges for renters, which is an issue that the city will need to work to fix in the coming years.



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# CULTURE AND EDUCATION



## SOUTH AFRICAN YOUTH AT THE HEART OF WILDLIFE PHOTOGRAPHY AND CONSERVATION

*Paulina Martinez Aparicio, Colombia*

In the towns surrounding Kruger National Park in northeast South Africa, numerous Black residents have spent their entire lives without observing or acknowledging some of the country's most celebrated wildlife. Despite residing near one of the nation's largest natural reserves, home to elephants and lions, among other native creatures, seeing these animals face-to-face seems to be a luxury reserved for others.

After discerning the previous occurrences, especially the lack of Black wildlife photographers, amid organizing a symposium to recognize African wildlife photography, Mike Kendrick, a British former assistant headteacher, along with the support of his wife, zoologist Harriet Nimmo, decided to create the program Wild Shots Outreach in an attempt to address such disparities. Over the last eight years, the award-winning, Black-run organization has efficiently introduced young Black South Africans to photography and conservation through workshops and game drives. It continuously connects with local schools and engages with youth centers to allow students to visit Kruger National Park and its surrounding areas, encountering and appreciating diverse wildlife.

Vusi Mathe is one of over 1,300 residents who have participated in Kendrick's organization, claiming the program sparked his photography career. With such exposure to wildlife, he now believes local communities are encouraged and adequately equipped to join supportive efforts concerning conservation.

Another thriving WSO member is Melody Mnisi, whose introduction to South African wildlife led her to transfer her knowledge and abilities to fellow young South Africans as a guide for Koru Camp, a non-profit educational organization. "We take local people on game drives (in nearby parks) to teach them about wildlife. Back at the camp, we offer environmental education and how they can keep the environment clean," she remarks.

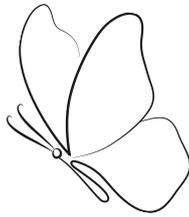
Particularly, Rifumo Mathebula, a pioneer student from the organization in 2016, now positions himself as program director, succeeding founder Mike Kendrick in 2020. He asserts his presence as a Black photographer is crucial in sharing his wisdom and experience with the upcoming cohort. "Being a part of the Wild Shots Outreach and teaching there allows people to feel more at ease when conversing with me, especially when I communicate in their native language," he explains.

For Kendrick, it is rewarding to witness WSO's participants grasp leadership roles and make their mark on the conservation of distinguished South African animal species. "Black youth in Africa now have a voice in conservation, which they have not had in the past," he expresses. "Hopefully, we are beginning to include more Black voices and photographers in that."

The program has begun expanding its reach beyond South Africa through partnering with schools and youth centers in Kenya, Namibia, and Botswana. Mathebula acknowledges the progress accomplished in local engagement and education yet emphasizes additional efforts are required to involve communities in wildlife photography and conservation, for they inhabit a continent renowned for its rich animal diversity.



# BUTTERFLY EFFECT



Raquel Rodriguez, Mexico

"Can the flap of a butterfly's wings in Sri Lanka cause a hurricane in the United States?" The answer to this Chinese proverb can only be resolved with the help of the research of Edward Lorenz, whose theory of the butterfly effect has caused uncertainty since 1963 (Redacción National Geographic), along with its relationship with chaos theory. But is it true that something so insignificant can have a big impact?

The truth is that chaos theory and the butterfly effect have tried to explain something as complex as the existence of different patterns created around us, the thousands of existing realities and the infinite possibilities of being able to reach them. What can be understood is that the theory of the butterfly effect states that "everything and everyone is involuntarily interrelated", so many times our actions modify the lives of other people without us realizing it. Thus, the theory implies that small changes can lead to totally divergent consequences, however subtle they may be, they can modify the entirety of reality (Serrano).

The butterfly effect is considered an analogy that helps us understand one of the physics-defying theories also established by Lorenz called chaos theory (Sanmiguel). Well, here alternate realities arise and how when two equal worlds or situations contain a single variable without any relationship between them, as time passes it can cause both worlds to differ until it becomes almost impossible to know that they were once the same. Let's imagine this as an endless chain. Chaos generates a certain order and order causes chaos.

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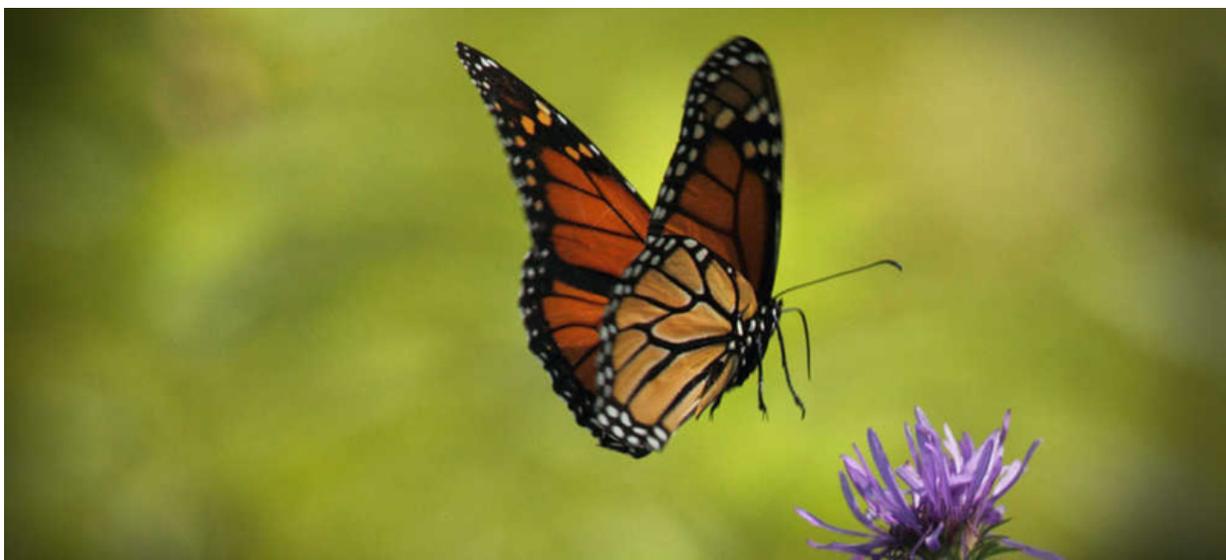
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These theories usually cause uncertainty, since one never knows when that change will occur that may save our lives. Have you ever been five minutes late to go to work and as a result have avoided a traffic accident? No? Well, this is an example of what the butterfly effect could look like. Maybe we do not stop to think about this constantly, but we live surrounded by infinite possibilities. The different paths our lives can take if we do something or not.

This theory not only applies to the daily life of human beings. In fact, Lorenz did not reach that conclusion by studying the evolution of man, but rather by studying meteorological models. That's where he noticed that small variations in the data could generate completely different results. The study showed that his theory could be used in different concepts, such as meteorology, quantum physics, economics and psychology (Serrano).

The butterfly effect reminds us of the fragility of things, as if everything depended on a decision as general as which thread to pull.

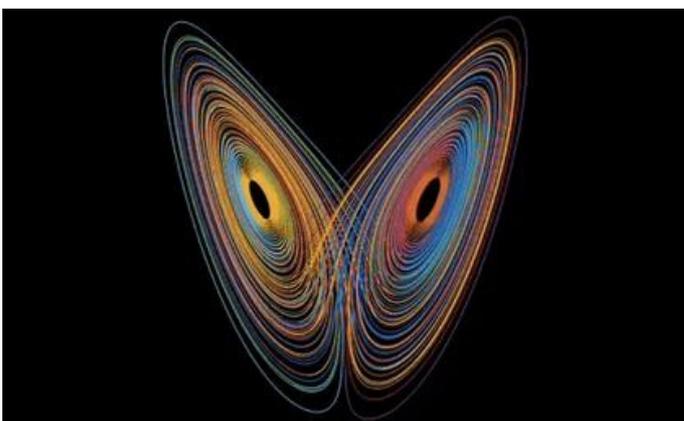
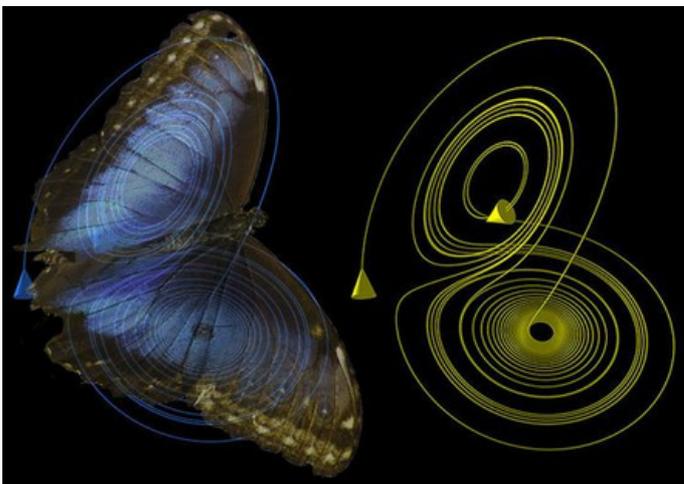


The notion of change challenges the possibility of being able to completely control our destinies or be able to know the future course of things. This effect forces us to consider all the possibilities and the impact that each one can have directly or indirectly on our lives. Like the way we flow with the world and how to cause the slightest impact/effect on what surrounds us.

Every action, every word we say and every situation we experience can be the last piece of a puzzle to cause unpredictable events. The butterfly effect does not invite us to think and reflect on our lives and the impact on them, but rather it is an obligation for us to realize how truly all of us are connected and are that pillar in the fabric of a global reality.

If we go beyond the reality of our lives and how both theories influence us, we could realize that everything is subjective. The way we ourselves are just something insignificant that causes total chaos within an order. And thinking about all our actions taken to date will only cause us more existential questions (Andrews).

Chaos theory and the butterfly effect have been used to attempt to explain everything from the relationship with nature to the uncertainty caused by the path of two raindrops. However, the big question at the beginning has never been fully answered, at least not with credible foundations. So truly, can something as unpredictable and subtle as a butterfly flapping its wings could cause something so catastrophic?





## COCAINE HIPPOS

*Paulina Martinez Aparicio, Colombia*

Throughout the past years, Pablo Escobar's notorious "cocaine hippos" have been multiplying at magnificent rates, posing significant threats to Colombian biodiversity and environmental welfare. The herd, comprising approximately 169 hippopotamuses, has rapidly reproduced from its original population of one male and three females—illegally owned by the drug master for his private, exotic animal collection. Consequently, Colombian authorities have designed a strategic plan to control the foreign population and prevent further destruction of local economies and ecosystems.

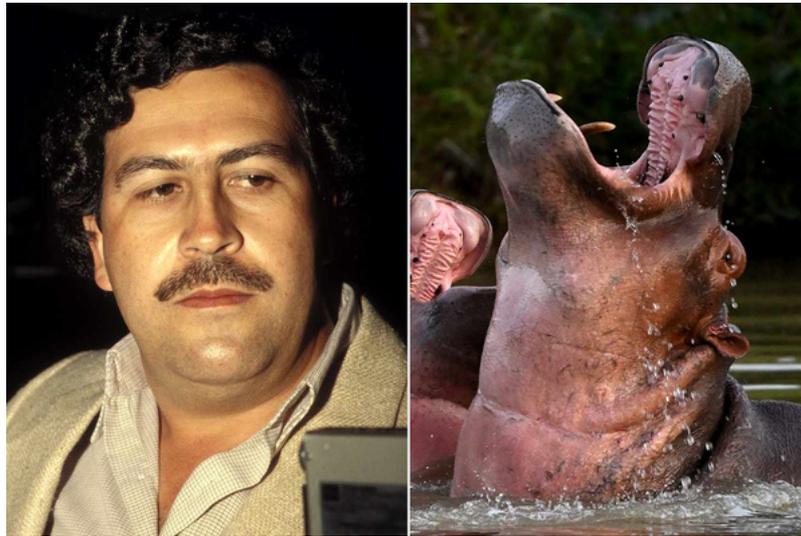
### **Surviving and Thriving Amid Cocaine**

Colombia's hippos – considered the largest invasive animal in the world – flourished in the countryside after escaping from *Hacienda Nápoles*, otherwise known as Pablo Escobar's estate. Initially, four African beasts, among other species, were illegally imported in the 1980s. Following the criminal's death in 1993, authorities succeeded in relocating most animals in Escobar's collection, except the "cocaine hippos." Hence, the male and three female hippopotamuses roamed freely and managed to reproduce with the persistent lack of droughts and predators.

These conditions provided by the fertile and swampy Antioquia region ultimately led to their thriving.

In the past months, government officials have estimated the existence of 169 hippos in Colombia, especially in the Magdalena River basin, affirming that if no "strong measures" are adopted to control them, the population could number more than "1,000 individuals by 2035." Furthermore, ecologists have expressed their concerns on the matter: highly territorial animals, which can weigh up to three tonnes, are altering the composition of the nation's central river with their excrement and are outcompeting other species, such as the capybara, for habitat and resources. Research has enlightened the prejudicial effects of hippopotamus feces on agriculture, human security, and oxygen levels in bodies of water.

After reviewing and analyzing studies on "cocaine hippos" reproductive threats, the Ministry of Environment has finally assumed its responsibility by developing three strategic solutions to prevent hippopotamuses from further reproducing and simultaneously mitigate repercussions in their surroundings.



Scientists expect these to improve national control over the animal population, for former programs, including castration, relocation, and birth control plans, were ineffective. As the ministry's representative noted in a recent press conference, "We are in a race against time in terms of permanent impacts on the environment and ecosystem."

### **The Three Strategic Measures**

On Thursday, November 9, Susana Muhamad, the Colombian environment minister, divulged three measures for restricting hippopotamus reproduction: sterilization, relocation, and "ethical euthanasia," as government officials remark.

The first stage will consist of the surgical sterilization of 40 hippopotamuses per year. Such a procedure is expensive, costing the country an average of 40 million pesos per animal, with each being approximately \$9,800. It also entails risks for the African creatures, such as allergic reactions to anesthesia or perhaps death, and hazards for the animal health personnel. The "cocaine hippos" are dispersed over a large area, implying their aggressiveness and territorial attitude.



Experts claim sole sterilization is insufficient to control invasive species' growth. "Sterilization is only a prerequisite for the other strategies. They must execute the three simultaneously," as commented by ecologist Rafael Moreno. As a result, the government has arranged the possible transfer of hippos to other countries, particularly India and Mexico. Nonetheless, animal exportations require numerous contracts, permissions, and authorizations; they are costly and logically challenging.

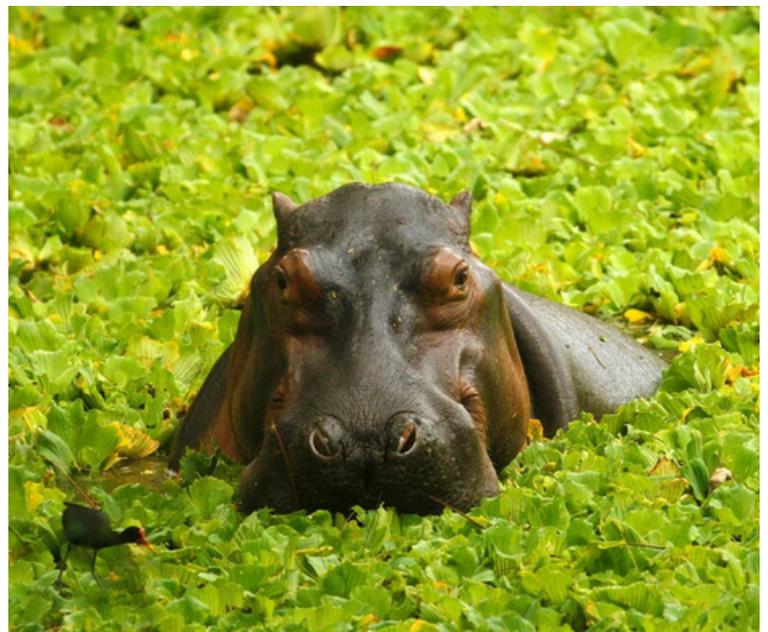
Ultimately, the last resort to control the previous population is the creation of a euthanasia protocol. Hippopotamuses have posed substantial threats to the life and welfare of numerous living beings, and thus, their numbers must decline to prevent more repercussions in Colombian lives and ecosystems.

### **Forthcoming Challenges**

Even though researchers are glad for government progress on "cocaine hippo" reproduction, they are concerned the program will heavily rely on sterilization, considering few details have been offered on the other two strategies.

Moreno, among other ecologists, affirms euthanasia is necessary: "It is a technical matter that should be taken by experienced professionals."

However, Elliot Doornobs, a senior lecturer in criminology at Nottingham Trent University, argues the initiative will encounter legal challenges, especially public outcries. Despite such comments and concerns, the Colombian Environment Minister asserts the hippopotamus control strategies are in progress; ethical programs and protocols are being developed and consulted in different expert committees to ensure their efficiency and rigor.

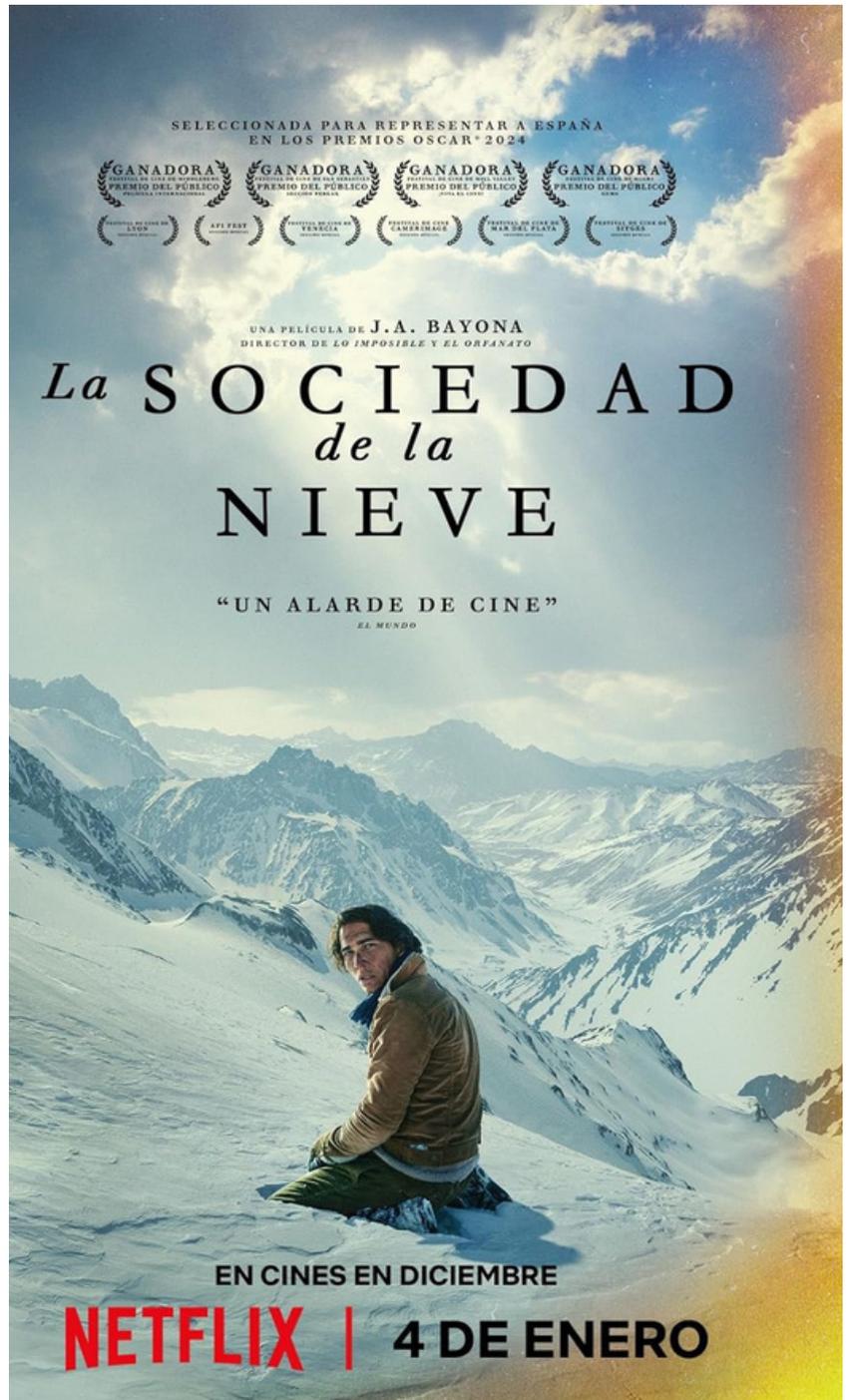


# SOCIETY OF THE SNOW

Nicole Saenz and Raquel Rodriguez, Mexico

You will never know when your survival instincts will have to kick in. This was the case for an amateur Uruguayan rugby team called Old Christians Club. It all began on October 13, 1972, when the flight 571 of the Uruguayan Air Force with forty-five passengers on the plane. The flight was going from Uruguay to Chile for a tournament. The route they were taking was going across the Andes when the pilot asked for permission to land in Santiago, Chile before time. They had calculated wrong where the plane was located and they started descending when they realized they were in between two mountains. The pilots tried going over one of the mountains, but it was too late (Djjangi).

Almost 50 years after the tragedy happened, J.A. Bayona decided to create a movie interpreting the right version of the incident. This film is recognized for all the realistic details that took place during the accident. The survivors of the tragedy are part of the project as well as the place where the real plane crash happened. Each actor visited the survivor they had to interpret during the film. If the passenger was dead they visited their families to get to know how they are remembered and what they did. Behind the scenes, the actors had to visit the Cordillera of the Andes to investigate how the accident happened, and they decided to stay some nights to live in the conditions. As a way to recreate the accident, they made three prototypes of the plane: one at the scene where the crash happened in the Andes, and two in Spain to recreate the moment the plane crashed (García).



What happened on the mountain? What did they do to survive 72 days without any essential thing to live? The movie itself answers those questions. A sunny afternoon at a rugby tournament where the Old Christian Club lost that game. They were not the happiest that day, but they needed to fill half of their plane for a rugby tournament in Chile. The passengers were either friends or family, they needed to fill 1 more seat. That is where Numa Turcatti comes in; he was not a rugby player but a friend of Alfredo 'Pancho' Delgado. The flight was ready but not everything went according to plan. The route from Montevideo to Santiago, Chile was very dangerous since the journey was known for having very sudden turbulence. It's caused because of the warm air from the fields of Argentina and the cold air from the mountains of Chile colliding creating a suction. Other flights that had gone through there ended in complete tragedy (Djangi).

This was not the case for them. As it was a chartered flight, a mechanic was supervising the plane's route. The pilots knew the route perfectly, so when they thought they were arriving, they asked for permission to land in Santiago. As soon as the plane took off, the view was wonderful. Passengers could look out the windows and see the imposing mountains that reached almost 2,000 meters high. The calculations were wrong, and when the pilots realized this vital error, in their desperation they tried to ascend as quickly as possible. The plane broke in two. When the first collision happened with one of the mountains, the wings came off. The second was when the plane collided with another mountain and the tail of the plane broke off because of the strong impact.

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The passengers in the back were abducted by the mountain, causing the icy air to seep in among those who were still there fighting for their lives. That's where the real battle began. The part of the plane that had the least impact slid down the mountain. Eighteen passengers sadly died during the impact six were injured and the rest suffered minor injuries. The suffering was palpable in the environment. The screams of their friends searching for each other and the desperation to get out of the disaster that the impact had caused. Twenty-seven survived the crash, but the real journey had just begun. Those who had suffered serious injuries slowly began to die, while those who remained stronger fought to find a solution to end their nightmare (Sadurní).

One of the survivors, Nando Parrado, was supposed to be dead, so they took him outside with the dead bodies. Parrado was in a coma for four days and a half; it wasn't more than just the mountain that saved his life. The ice made his brain reduce inflammation to almost none; because of that, his blood started circulating and bringing him back to life. Not everything went well for him; during his time awake, he asked for his family. Sadly his mother was buried and his sister passed away days later. They didn't have time to mourn their losses; they had to be strong and fight to live. Roberto Canessa and Gustavo Zerbino were the ones who took care of the injured. Liliana Methol, the only surviving woman, served as a mother figure for them.

They asked themselves what they did to deserve this suffering. The need for food and water did not help their case. They had gone days without eating when Marcelo Perez del Castillo and the Strauch cousins decided to start looking for food in the suitcases and equally dividing it amongst themselves. It did not last long until they ran out of food. They found a radio that was not working until one of them fixed it. A signal was found when they heard that there was a search that had been going on for some time looking for them. Since they could not find anything the people called the search off. Carlitos Páez said it was best for the search to be called off so that they don't depend on other people but only on themselves (Sadurní).

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*Society of the Snow [La Sociedad de la Nieve]*. Directed by J.A Bayona, performances by Enzo Vongrincic, Agustín Pardella, and Matias Recalt, Netflix, 2023.

A group was formed and their objective was to look for the tail of the plane where the radio was located. Their expeditions failed day after day as their exhaustion got worse. Finally, an important factor kicked in: they realized that their body was slowly shutting down because they weren't eating. Nothing was around them except ice and mountains, so what would they eat? The Strauch cousins: Eduardo, Fito, and Daniel, with Roberto Canessa had the courage to say that they needed to start eating the bodies. Fito Strauch was the one who chose the bodies, while Eduardo and Daniel cut the bodies without anyone seeing them. The meat they ate, they did not know where it was from. Some of the survivors denied eating the meat; they considered it something unthinkable. Their body needed it, beyond what they thought. Numa was the only one who never ate any of it. (Sadurní).

They divided the work according to their capabilities. During the day, they worked; while at night, they sheltered in the plane. They spent their nights as friends, joking around, trying to forget what they'd gone through during those 17 days. Coco Nicolich wrote letters for his father and girlfriend telling them what was happening. They were sleeping, hugging each other seeking warmth. Suddenly, they heard a strange sound like something was falling far away. Roy Harley was the first to wake up and realize they were covered by the snow. An avalanche struck that night burying his friends deep in the snow. Roy dug up his friends repeating 'I'll save you', 'I'll save you'. They slowly started coming out, but every second in the snow meant less possibility that they would survive. A second avalanche happened burying the plane in the snow. They called out for their friends, and some would answer back with 'they are dead' or 'we are here'. The people that died that day stopped feeling cold, because they stopped feeling, and not feeling was a relief. There were seventeen survivors then, spending some days buried inside losing oxygen. November 1, 1972, they felt the sun rays the Cordillera offered them that day. All of them lost someone those days which made them figure out they needed to get out urgently (El alud en la montaña).

They finally got out, and the expeditions continued. However Numa suffered a small cut in his ankle, he did not know it at that time but it would cost him his life. Numa died with a note that said 'There is no greater love than to give one's life for friends'.



Canessa was inspired by Numa to continue the expeditions, looking for Chile behind those mountains. Nando, Canessa, and Antonio Vizintín started the expedition up the mountains looking for Chile. They believed there was a way out of this tragedy. Vizintín returned with the others while Nando and Canessa continued the journey. It took them 10 days to arrive (Cuál fue la ruta).

On December 22, Parrado and Canessa arrived at a small snowless valley, formed by the San José and Del Azufre rivers. In the middle of that abrupt change of landscape, they saw a Chilean cowboy, Sergio Catalán. They had reached their destination. This character was the one who brought the news to the authorities, Nando had written on a piece of paper that he was one of the survivors of the Uruguayan flight that had crashed into the Andes 72 days before, and that he needed his help. The news was reported by all the media. It was a miracle, they were alive. The survivors who were still on the mountain heard on the radio that the helicopters were coming for them.



Gustavo Zerbino packed in his suitcase a belonging from each of those who had passed away, with the purpose that when they came to rescue them he could deliver those things to their relatives. The survivors felt shocked when they looked out the windows of the helicopter and saw the plane where they had lived for 72 days. In some twisted way, a part of them was never saved from the mountain range and remains buried along with the others. The people received them with joy. They did not feel it was a miracle for them to have been rescued, but a result of their hard work trying to survive (Djangi).

The 16 survivors of the Andes tragedy are: Pedro Algorta, Roberto Canessa, Alfredo Delgado, Daniel Strauch, Roberto Francois, Roy Harley, José Inciarte, Alvaro Mangino, Javier Methol, Carlos Paéz, Fernando Parrado, Ramón Sabella, Adolfo Strauch, Eduardo Strauch, Antonio Vizintín and Gustavo Zerbino.

What really happened? What happens when the world abandons you? When you have no clothes and you are freezing? When you have no food and you are dying? The answer is in the mountain.



# NEWSLETTER

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