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Hello lovely reader,

Thank you for picking up the inaugural issue of *GirlTech Magazine*!

We are proud to present to you this collection of articles and artworks that represent an important intellectual community at Choate Rosemary Hall. As a branch of the GirlTech Club, we hope that our content resonates with readers of all backgrounds and empowers the ones of marginalized identities.

Bringing this publication to life as first-time executives was not easy. From the day the idea was conceived, unforeseen obstacles came along our way — all of which eventually became remarkable memories, thanks to the support from our team. From copy editors to graphics and layout designers, each individual on the masthead had a strong role to play. We would like to give a special thanks to Claire Fu ’22, GirlTech Club President of the 2021-2022 school year, and our adviser Ms. Meghan Healey for their guidance that led us to today.

People of marginalized identities continue to be underrepresented in STEM. We hope that starting from this issue, *GirlTech Magazine* can serve as an advocate for those who are vulnerable to injustice. We are grateful to our readers and writers for extending our impact, and we invite people of all ages and genders to join us for change, one article at a time.

Together, we will empower, encourage, and educate.

See you next fall,

Yoyo Zhang ’24, Editor-in-Chief

Semi Obayomi ’23, Managing Editor
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Submit article ideas to yozhang24@choate.edu or sobayomi23@choate.edu!
Meet the Team
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Our Mission
Empower women and other people of marginalized genders in STEM through recognition, education, and advocacy.

Get Involved
Email any of us to join GirlTech’s email list and sign up for an article. We welcome everyone.
Birth Control
A comprehensive guide to the complexities of contraceptives
by Maya Chiravuri ’23

There are numerous types of birth control that work to prevent pregnancy. However, most of them are geared towards cisgender females and other people with uteruses, giving those people the responsibility of dealing with complex procedures and harmful side effects.

The pill The most popular method of birth control is “the pill.” The pill contains estrogen and progestin — hormones that regulate the functioning of the reproductive system. These hormones stop or decrease ovulation when an
An egg is dropped from the ovary down the fallopian tubes. They can also increase the production of mucus in the cervix, which acts as a barrier keeping out sperm before it enters the uterus. Nonetheless, they make the walls of the uterus thinner and less habitable for a potential fertilized egg. In addition, taking oral birth control can have many side effects such as depression, nausea, acne, headaches, and weight gain. An alternative would be the patch, a small, weekly-renewed sticker that also releases estrogen and progestin. Both the pill and the patch must be prescribed by a doctor but can be picked up at most local pharmacies.

**I U D s** Another popular method of birth control is the Intrauterine Device, or IUD. IUDs are long-term devices that can stay unchanged years after being inserted. These devices rest on top of the endometrial cavity with their T-shaped designs. There are two main types of IUDs, hormonal and copper. Hormonal IUDs secrete hormones similar to those in the pill that discourage ovulation and increase cervical mucus levels. Copper IUDs release copper ions into the uterus and cause an inflammatory or immune response. These responses call white blood cells to the area to attack and disable the sperm. Copper ions can also weaken sperm in their ability to swim and fertilize an egg. IUDs must be inserted by a professional but can last anywhere from three to 12 years based on the brand and type.

**I m p l a n t** Similar methods to the IUD are the implant and the ring. The implant is a small rod that is placed under the skin of the arm. Over the course of a few years, it releases estrogen and progestin similar to a hormonal IUD or the pill. The ring is a circular piece of plastic inserted into the vagina by the user and releases hormones. Once inserted, it stays in place for three weeks and is removed for one week to allow menstruation. People interested in any of these methods of contraception should talk to a gynecologist.

**B a r r i e r s** Barriers are another type of contraceptive that is often easier to access. They act as a physical obstacle in the sperm’s way into the uterus. The most common type of barrier is the condom for male usage. As previously mentioned, most contraceptives are designed for people with uteruses and the condom is the only form of birth control currently available for people with penises, other than a vasectomy. Male condoms are slapped over the penis when in use and should be discarded directly after intercourse. Some kinds of condoms come covered with spermicide, a sperm toxin for an extra level of protection.

**R A R s** Scientists around the world seek to address the problem of a lack of options for contraceptives. The most promising new development is being investigated at the University of Minnesota. A specific type of Vitamin A called retinoic acid is involved in fertility and spermatogenesis or the formation of sperm. Retinoic acid is activated when it binds to proteins called retinoic acid receptors (RARs). There are three types of RARs: -α, -β, and -γ. In the past, scientists have tried to block all three of these receptors, but researchers at the University of Minnesota believed that targeting only one would reduce potential side effects. After many trials, they isolated a...
compound called YCT529 that inhibited RAR-α at astonishingly high rates. Administered orally, this drug exhibited a 99% efficacy rate in mice and will be moving to human trials later this year. Having this option of birth control will hopefully take some of the pressure off of people with female-assigned reproductive systems and also allow people with penises to have more autonomy over their own reproductive systems and ability.

**Preventing STIs** Using protection isn’t only important for the prevention of pregnancy. Contraceptives like dental dams are also essential for preventing STIs for people engaging in oral sex.

**Dental dams** Dental dams are thin pieces of latex or other flexible material that are stretched over the vagina, clitoris, or anus before oral sex. If dental dams are unavailable, they can easily be made by cutting a condom into a square or rectangle.

**Condoms** Even if neither you nor your partner has a uterus, it’s still important to use a condom for penetrative sex since many STIs can be transmitted through semen or other fluids from the penis. Condoms are also necessary while using a strap-on or dildo. The common condom often won’t safely fit T-penises, so modified condoms can be made by cutting latex gloves and inserting the penis into the finger openings.

There are many forms of birth control available with numerous purposes. Talk to your doctor if you are interested in contraceptives, and don’t be afraid to ask for advice on having safer sex.
Soft sounds of keyboard strokes fill Lanphier Room 101 as students work to complete their computer science projects. Ms. Meghan Healey, who teaches Introduction to Programming (CS200) and Computer Science Honors (CS550), strolls through the room and assists each student with their coding endeavors.

Ms. Healey’s journey in computer science began with a class in her senior year of high school, where she fell in love with coding. Thereafter, Ms. Healey double-majored in computer science and French at Smith College. Thanks to the embracing environment at the women’s college, Ms. Healey felt supported in her academic pursuits. “I was surrounded by all sorts of other women who were super pumped about coding,” she said.

After working in France for a year upon graduation, Ms. Healey returned to the United States to work as a computer science teacher, rediscovering her love of coding which she had lost in favor of her French studies. Reflecting on her teaching experience, Ms. Healey shared, “It made me think about coding in different ways. As my understanding of it grew, I think that helped me to realize the beauty in coding.”

Ms. Healey often sees “students doing something in a different or unexpected way” that she would not have thought about, and she finds these moments fascinating. Even as a teacher now, she is excited to learn all the time from her students in the classroom.

Nonetheless, teaching computer science presents unique challenges. In addition to the careful examination needed when debugging, Ms. Healey mentioned that technology “changes all the time” and requires her to maintain familiarity with the latest practices. While the rapid shifts in the field could be an obstacle, Ms. Healey noticed that the constant evolution means that students can have “an education that’s a lot more creative ... and more of what you want to do.”

Ms. Healey strongly encourages all students to pick up coding despite the intimidation one may feel when seeing the cryptic signs for the first time. “Coding is for people who want to create art that’s interactive; coding is for people who want to study science more deeply; coding works for people who want to understand more about language,” she concluded. “Consider it because coding can be a really creative, beautiful, interdisciplinary, magical topic.”
Math is popularly regarded as one of the most important yet most intricate subjects at school. In addition to the difficulty of the material, many female and non-binary students face the challenge of gender adversity. One teacher who understands this issue is Dr. Jessica Pfeil. Having been at Choate for six years, Dr. Pfeil currently teaches Calculus BC, Honors; Linear Algebra, Honors; and Multivariable Calculus, Honors.

Dr. Pfeil lives on campus in Bernhard House with her husband, three kids, and pet dog. She has enjoyed math from a young age and even considered architecture a possible career because of her love for geometry. Growing up, Dr. Pfeil was inspired by math teachers in high school and noticed the role that mentors play in shaping the students’ learning experience. Already a lover of math, Dr. Pfeil decided that she wanted to become a teacher who would inspire and educate students.

Despite the fact that most of her math professors in college were male, Dr. Pfeil never felt lonely in her classes thanks to the other female mathematicians that she worked alongside with. However, the size of the demographic does not undermine the lack of support she would feel at times in the rigorous curriculum at her alma mater, Virginia Tech.

In her career, Dr. Pfeil strives to create an equitable classroom environment for students of different backgrounds or identities. One thing she has noticed is that female students tend to be harder on themselves in the academic setting. Although there is no definite answer as to whether the behavior stems from social norms, biology, or other factors, the point remains that there is a disproportion in the levels of support needed in the classroom. To provide adequate support for all, Dr. Pfeil makes sure to encourage every student, especially when they are faced with challenges, with verbal reinforcement or notes on assignments.

Dr. Pfeil is a teacher who understands the needs of students, recognizes the importance of equity in learning, and finds fulfillment in supporting learners of all backgrounds and gender identities. Dr. Pfeil’s students are encouraged to prosper under the care she has for each individual.
Saundra Pelletier went to a high school in the rural town of Caribou, Maine, where girls were taught to cook and sew while boys learned fly tying and arc-welding. To teenage Pelletier, it was absurd that girls did not share the same opportunities as boys. Therefore, she protested by taking arc welding and fly tying, excelling at the latter thanks to her nimble hands. Looking back on this experience years later, she reflected, “I think that sometimes what we choose chooses us, and I believe that I was chosen to be a disruptor of the status quo.”

Today, Pelletier has made that choice a reality, although not in fly tying. She is a published author, a breast cancer survivor, the founder of a nonprofit, and the Chief Executive Officer (CEO) of Evofem Biosciences. Under Pelletier’s leadership, Evofem launched Phexxi, the first-ever hormone-free contraceptive. Unlike the birth control pill, Phexxi does not need to be administered daily or cause physical or mental side effects. While people with penises can protect themselves easily with a condom, people with uteruses have never had the option of on-demand protection before Phexxi.

Phexxi works similarly to a tampon: it is inserted with a pre-filled applicator into the vagina, where it releases a gel and is then removed. The gel maintains a normal vaginal pH even when the semen enters, limiting the semen’s viability and mobility as well as reducing the probability of the sperms reaching the egg.

The road to getting Phexxi approved was riddled with challenges. When Pelletier took over as the CEO of Evofem in 2015, the company had already invested $150 million in clinical studies. At the time, Pelletier was informed by the Food and Drug Administration (FDA) that Phexxi had not passed the first round of clinical trials. No statistical analysis was approved for Evofem, and the company used an unauthorized testing site in Russia. In the midst of these setbacks, Pelletier still successfully recruited experts in the industry and raised money for Evofem. “I had to sell me and my vision; I had to sell what this product could do for women and why it was so much better,” Pelletier said.

In 2018, Pelletier was diagnosed with stage three breast cancer. She went through six months of chemotherapy, lost her hair, and had her uterus and ovaries removed, all the while meeting investors and raising money for Evofem.

Though she received support from colleagues such as Chief of Staff Ellen Thomas, who accompanied her to chemotherapy treatments, some tried to take advantage of Pelletier’s situation.
Nevertheless, Pelletier praised the corporate culture at Evofem. During her rise to the top of the industry, Pelletier kept a journal of things she liked and disliked in leadership, which now guides her as CEO. “Corporate culture is everything,” said Pelletier, “It makes or breaks a company; there is no question about it.” One idea that Pelletier implemented from her journal was diversifying employment. Constructive disagreements are encouraged at Evofem, and personal achievements outside of the cooperation are celebrated.

Pelletier’s personal achievements are notable. In 2008, she published a book titled Saddle Up Your Own White Horse. “I decided to write this book to encourage women to take credit and be comfortable with success,” she said. “It was really about trying to change that embedded mindset that we are mediators and martyrs.” In 2009, Pelletier started her own global nonprofit, Women Care Global (WCG), funded by the Susan Thompson Buffett Foundation. WCG aims to help women and girls make informed decisions and get access to reproductive health products and services.

Looking to the future, Evofem has several projects in the pipeline. In March 2022, the company completed enrollment in their Phase Three study to prevent chlamydia and gonorrhea. Both of these sexually transmitted diseases (STDs) are on the rise in the United States; untreated chlamydia is the number one cause of infertility in young American women. A few months ago, a collaboration between Evofem and Orion Biotechnology was launched to prove that Phexxi has HIV prevention properties. To add onto the list of groundbreaking projects, Evofem is looking to support products developed by companies that lack the resources for commercialization.

Though the Affordable Care Act (ACA) in the U.S. recently expanded to cover Phexxi, it is not yet available globally. This may change soon, thanks to a partnership between Evofem and a life sciences investment fund named Adjuvant Capital. Only 2.4% of venture capital partners are female, and remarkably, Adjuvant is led by a female managing partner, Jenny Yip. Adjuvant’s investment will help lower the cost of Evofem’s goods and register Phexxi in Ethiopia, Mexico, Nigeria, and other countries, making Phexxi more accessible in low and middle income regions.

Pelletier’s ambitions for Evofem do not stop here. “I hope that our company name, our company product, becomes a household conversation ... I hope that Phexxi overtakes the entire contraceptive market,” she said. “Our competitors just push hormones on women and they don’t even care about the side effects.” As a pioneer in the contraceptives industry, her approach has been to “always question what doesn’t seem logical.” This mindset has taken Pelletier a long way from being the self-proclaimed “fish out of water” in high school to the CEO of a biotech company, though Pelletier acknowledged that inequality exists even in her current position. Pelletier, Evofem, and Phexxi define what it means to be an empowered woman and to empower women.
Women have always faced multifaceted issues due to social norms and lack of representation, especially in change-making positions. For instance, the absence of a paid maternity leave policy in the United States has caused a drastic gender gap in employment, which adds on to the risk of stress during pregnancy and postpartum depression. Traditional ideology that women should take care of their children perpetuates the issue. In day-to-day lives, women feel a larger responsibility to complete household chores, even if they hold time-consuming jobs. During the Covid-19 pandemic, this host of problems for women has been exacerbated due to the failure to bring about sufficient change.

Despite a higher Covid-19 infection rate for men, women have been observed to undergo more serious medical challenges during the pandemic. A mental health program called Total Brain reported that 83% of women experienced a significant increase in feelings of depression over the past two years, compared to a mere 36% in men. Since the majority of jobs in healthcare are taken up by women, they have to witness and grapple with more tragedies that resulted from the pandemic.

Additionally, domestic violence has increased since the pandemic, and a lack of proper access to helplines and mental health facilities have led many women’s cases to go unheard. The pandemic has also had a vast impact on women in STEM fields, as most of their work requires being in a lab environment with little to no distractions. The transition to remote work is especially challenging for mothers who have to take on household duties as they complete their professional tasks.

The countless challenges that women face on a daily basis have been worsened by the pandemic and take a toll on their mental health. Systemic change must be implemented to mitigate the pandemic’s disproportionate impact on women.
Karlie Kloss is known for her work as a supermodel and Victoria’s Secret Angel. Beyond that, however, she is also an activist promoting equality in Science, Technology, Engineering, Arts, and Mathematics (STEAM). In 2015, Kloss started Kode with Klossy, an organization that addresses the gender gap in STEAM fields. It offers free two-week camps to girls and non-binary students from the ages of 13-18 for a chance to learn coding.

Kloss took her first coding lesson in 2011 at the Flatiron School, a technology bootcamp based in New York. She wished that she had access to these coding classes sooner, as they are useful in many different fields. For Kloss, the intersection between technology and fashion fascinated her, and understanding the mechanics behind the innovation that surrounded her made her a more informed businesswoman.

Kloss started by offering scholarships to girls who wished to take coding classes at the Flatiron School. Then, she founded Kode with Klossy in New York, Los Angeles, and St. Louis. In March of 2018, Kode with Klossy partnered with Teach for America, a nonprofit organization dedicated to educational equity. Through this pivotal collaboration, Kloss hired and trained qualified instructors who wanted to give back to their communities.

The camp allows students to participate in different tracks, which vary in front and back end programming as well as coding languages. As students become well-versed in Ruby, JavaScript, HTML, CSS, and Swift, they are able to create fully-functional apps and websites. Some notable projects include apps that locate gender-neutral bathrooms, treat and diagnose ADHD, or track legislation in Congress. Through Kode with Klossy, Kloss hopes to help students hone a valuable skill that can be applied to any passion or cause.

Kode with Klossy has made a difference in many students’ lives. Prior to the camp, only two in ten students have had experience in coding. After the program, 65% of alumni majored or minored in computer science or engineering. The organization also emphasizes diversity and accessibility — scholars hailed from 47 states and 20 countries, 75% of whom were students of color.

“It is critical that women are equipped with the skills to have an impact on our future”

“As technology becomes more relevant in our lives, it is critical that women are equipped with the skills to have an impact on our future, and that starts with engaging education,” said Kloss in an interview with CNET. Kode with Klossy continues to engage in its mission to eliminate the gender gap in STEAM by offering 5000 scholarships to attend a mix of in-person and online workshops this summer.
CAR T-Cell Therapy
A Growing Cure for Cancer

Immunotherapy is a form of therapy used to treat cancer patients by strengthening their immune systems to attack tumors. Chimeric antigen receptor (CAR) T-cell therapy, a form of immunotherapy, transforms immune cells to fight cancerous cells. This treatment is the fastest-developing and most widely applied form of anticancer cellular immunotherapy.

T lymphocytes, also known as T-cells, develop from bone marrow stem cells and play an important role in the immune system. They kill infected host cells, activate other immune cells, produce cytokines, and regulate immune response. In CAR T-cell therapy, T lymphocytes are engineered to recognize and respond to cancer cells. These cells are isolated from the patient’s blood, proliferated, and then infused back into the patient’s circulatory system.

Scientists first began investigating CAR T-cell therapy in the 1990s, with the first generation developed in 1993. However, the first generation was not clinically effective. In the early 2000s, the second generation was built to treat acute lymphoblastic leukemia and became the first successful treatment. Now, five CAR T-cell products — Kymriah (tisagenlecleucel, tisa-cel), Yescarta (axicabtagene ciloleucel, Axi-Cel), Tecartus (brexucabtagene autoleucel, KTE-X19), Breyanzi (lisocabtagene maraleucel, liso-cel), and Abecma (idecabtagene vicleucel, Ide-cel) have been approved by the Food and Drug Administration (FDA) for clinical treatment. These products are approved to treat various types of cancer, including acute lymphoblastic leukemia (ALL), B-cell lymphoma, follicular lymphoma (FL), mantle cell lymphoma, and multiple myeloma.

CAR T-cell therapy has changed the lives of blood cancer patients, who are now able to reengineer their own stem cells to fight cancer. This treatment is a less invasive approach compared to the widely used chemotherapy because it only targets cancerous cells as opposed to eliminating all cells. In the case of failed chemotherapy, CAR T-cell therapy is often used to treat patients with recurring cancer. CAR T-cell therapy currently has a success rate of 30-40% and is designed to eliminate cancer. Patients who receive CAR T-cell therapy usually have a recovery period of two to three months, during which they are evaluated for side effects and treatment response. Possible side effects include fever, chills, nausea, vomiting, headaches, and fatigue. Patients who receive CAR T-cell therapy often need up to two weeks of inpatient care.

CAR T-cell therapy gives patients who are out of options a last hope. As it has saved countless lives, researchers strive to make it more accessible both globally and to minority populations.
CAR T-Cell Immunotherapy
TURNING THE BODY INTO A CANCER FIGHTER.

A revolutionary, innovative immunotherapy was approved by the FDA, ushering in a new era in the treatment of cancer. CAR (chimeric antigen receptor) T-cell immunotherapy is a treatment in which a patient’s T cells, the soldiers of the immune system, are genetically reprogrammed to find and kill cancer cells. Over the past two decades, The Leukemia & Lymphoma Society has invested $40 million in research to support the development of this therapy.
On March 25, 2022, the European Parliament and European Union (EU) member states finalized the Digital Markets Act (DMA). While the legislation is yet to be officially adopted, the EU’s competition chief Margrethe Vestager expects the rules to be effective in October 2022.

**Gatekeeper (n.):**

A company that holds a stable economic position, has a considerable impact on the internal market, and operates in numerous EU countries.

The DMA establishes a set of restricted and objective standards that identifies a company as a “gatekeeper.” Gatekeeping companies are those that hold a stable economic position, have a considerable impact on the internal market, and operate in numerous EU countries. Specifically, the definition encompasses technology firms with a market capitalization of at least 75 billion euros or annual revenues of at least 7.5 billion euros within the EU in
the past three years. They must also have at least 45 million monthly users or 10,000 business users in the EU. With a formidable financial foundation, these companies link large numbers of users to businesses and have a durable position in the market. Specifically, the definition encompasses technology firms with a market capitalization of at least 75 billion euros or annual revenues of at least 7.5 billion euros within the EU in the past three years. They must also have at least 45 million monthly users or 10,000 business users in the EU. With a formidable financial foundation, these companies link large numbers of users to businesses and have a durable position in the market.

The goal of the DMA is to prevent technology giants as such from abusing their market positions and preventing the success of smaller entrepreneurship. Large internet corporations are frequently criticized for operating “walled gardens,” or closed systems that make it harder for a user to switch from one service provider to another. Under the DMA, these firms will be forbidden from operating their software (e.g. Apple’s Safari web browser) as the default option when a device is set up. They will not be allowed to prioritize their own services over similar ones by third parties; they cannot prevent consumers from connecting with external businesses or from uninstalling pre-installed software or apps. Even for smaller services that are not considered business partners, gatekeepers must ensure “interoperability” – the ability for different apps to work together.

Another controversial practice of big tech companies is generating revenue from selling user data. The DMA will prevent such invasion to privacy by requiring third-party companies to allow business users access to the data generated by gatekeeper. Large companies are required to provide third parties with the essential tools to have their advertisements independently verified. These companies must also allow business users to market services and close deals with clients outside of the gatekeeper’s platform.

If gatekeepers violate the DMA, they could be subject to fines of up to 10% of their global revenues and an additional 10% for repeated offenses. If a company breaks the rules more than three times in eight years, it risks market investigation and “behavioral” or “structural” remedies, including the internal division of the corporation. Due to the ever-changing state of the digital market, it would be easy for big tech companies to slip under the cracks of DMA regulations if not regularly updated. As a result, the European Commission will conduct market investigations to classify enterprises as gatekeepers, dynamically update gatekeeper requirements, and create remedies to address potential DMA rule violations.

With these strategies, the DMA will help improve the conditions for individual start-ups in the EU and regulate the power of technology magnates by reducing consumer reliance. Business users who rely on gatekeepers will benefit from a more equitable market climate; innovators will have new options to succeed in the online platform without having to adhere to gatekeepers’ unreasonable, restrictive terms and conditions.
Climate change and the Russia-Ukraine War are two of the biggest headlines in the world today, and they are more interconnected than one may think.

Fearing Ukraine’s interest in joining NATO and the EU, Russian President Vladimir Putin led his country into an invasion of Ukraine on February 24, 2022. Putin’s belief that Ukraine is still a part of Russia — despite it being a separate state for over 30 years — partly incited this conflict.

The main issues that have arisen from this conflict are economic strings tangled in the battle against climate change. According to Dr. Simon Evans, deputy editor and policy editor for Carbon Brief, Russia produces 12% of global oil output and 17% of global gas output, making it difficult for the U.S. to target the energy sector. As a result, many world leaders consider this event to be a compelling reason to switch to clean and renewable energy which can be sourced locally and sustainably. However, the crisis also caused some countries that are skeptical of climate change to consider increasing domestic fossil fuels to reduce reliance on Russian imports. The latter case has already started in countries like Syria, where people are leaning toward energy from harmful resources like artisanal oil refining and deforestation.

Another issue that arises from the active conflict is warefare emissions. Fire, oil spills, and deforestation reduce the opportunity for forest cover and are extremely detrimental to the environment, as stated by the Conflict and Environment Observatory (CEOBS). Burning a forest not only lets out the carbon dioxide stored in the trees but also makes it impossible for those trees to extract more carbon dioxide from the atmosphere in the future. Mongabay wrote that in the Vietnam War, approximately 14 to 44 percent of the forests in Vietnam were affected by efforts of the government to reduce forest cover for opposing troops. The same consequences are likely to be seen in the conflict in Ukraine.

A more intangible source of emissions is the humanitarian sector. In providing refugee relief during the conflict, “[s]ignificant resources are required to deliver food, water and shelter to civilians affected by conflict, and the humanitarian sector has a large carbon footprint,” according CEOBS. In 2017, for instance, an estimated $1.2 billion (5% of aid expenditure) was spent on fuels for logistics and for powering the electricity generators. Although the impact has been ameliorated through various programs like the United Nations High Commissioner for Refugees (UNHCR), it is still an urgent problem.

The Russo-Ukrainian War is inseparable from the environmental crisis experienced by people across the globe. While the conflict is detrimental to the Earth in various ways, one thing is clear: climate change will continue to be a crisis that calls for systematic intervention.
At age 19, former biotechnology entrepreneur Elizabeth Holmes dropped out of Stanford University and founded Theranos, claiming the discovery of revolutionary scientific technology. In an interview with Wired in 2014, Holmes said, “We’re able to do all the testing using just a single micro-sample, rather than having to draw a dedicated tube for each type of test.”

Blood testing is an uncomfortable and lengthy process. Typically, it requires a trip to a doctor’s office or laboratory to extract a vial of blood; then, the sample is examined by specialized machines found exclusively at off-site labs. The results are not quick and can take several weeks of analysis due to certain restrictions. Claiming to revolutionize the multi-billion-dollar market, Theranos created “Edison,” a machine that allegedly only required a finger prick and could produce results for up to 30 different tests. In reality, however, the Edison machines could not conduct accurate tests with a single drop of blood, let alone a vial of blood.

First, a drop of blood may not have enough concentrations of a specific protein for a testing device to detect it accurately. Drops of blood are so small that each one tends to have different amounts of cells and platelets. The concentrations of hemoglobin and white blood cells, for example, differ significantly from drop to drop, resulting in discrepancies. When a single drop test misses or reflects lower levels due the particular composition of the drop, a low hemoglobin value may be reflected.

Second, it is impossible for a drop of blood to be reused for different testing procedures. Specific blood tests need chemical processes...
that alter the blood to the point where it can no longer be utilized for other purposes. Other tests remove particular blood components, leaving the blood unusable for further testing.

Provided the fatal flaws of the Edison machines, how did Holmes bypass the scientific investigations and launch the product to the market? As a clever businesswoman, she did not raise money based on science but instead based on smoke and mirrors. Following the launch of Theranos, Holmes met with venture capitalists through Channing Robertson, a former adviser of hers at Stanford. Her charismatic personality and compelling presentations secured investments from well-known investors immediately, who gave Theranos credibility without having scientific expertise. Thanks to high-profile board members including former secretaries of state, military generals, and CEOs, Theranos raised $1.3 billion in funding throughout its existence.

In 2013, Theranos opened 42 “wellness centers” at Walgreens pharmacies in Arizona, California, and Pennsylvania. Holmes began lobbying state governments to order Theranos testing without first obtaining a doctor’s note. She convinced the Arizona government to adopt legislation enabling patients to bypass labs and get tested without medical clearance. Holmes attempted to disrupt the standard method of blood testing and tried to transform the way individuals engage with the healthcare system.

In 2015, Wall Street Journal released an investigation into the science behind Theranos. The report found the company’s scientific claims fraudulent. Instead of using their Edison machines, Theranos had routinely collected blood samples before diluting them so that the business could run them on equipment made by other companies rather than their own “highly-acclaimed” technology.

In order to mitigate the repercussions, Holmes did not attempt to demonstrate the science behind Edison but instead hired high-profile attorneys to fight against allegations. Eventually, the trials uncovered the truth and revealed that there was never any science behind this seemingly groundbreaking concept. Elizabeth Holmes is not a woman in STEM; instead, she is a corrupt businesswoman facing up to 20 years in jail, convicted of three charges of wire fraud and one count of conspiracy to commit wire fraud.
For Maya Rose Chiravuri ’23, the passion for STEM was passed down in her family. Her parents met in graduate school while studying the sciences; ever since then, science has been an active part of their household. This atmosphere surrounded Chiravuri ever since she was little, growing up putting a lot of faith in science and believing that science is the “ultimate truth for the world.” Therefore, she zealously envisioned a career in science with many more questions about the universe.

When Chiravuri was in elementary school, she would regularly go to work with her mother in an anatomy classroom. At seven years old, she participated in activities like dissecting sheep brains and later moved on to dissecting human cadavers. Whenever an opportunity arose, she would work arduously in the lab. Chiravuri’s first independent project explored the accuracy of the “5 seconds rule.” She went on to participate in many science camps and eventually became a camp counselor and certified Emergency Medical Technician (EMT). In middle school, Chiravuri enjoyed reading research papers and took a lot of science classes. At the end of her sophomore year at Choate, she applied for the Science Research Program (SRP) at Choate and joined the biology cohort.

Although she anticipates many challenges throughout her SRP endeavor, she is excited to continue her journey in STEM at Choate. With a strong motivation, love for the subject, and support from her peers and teachers, she intends to pursue a career in science. An important figure in Chiravuri’s STEM career is chemistry teacher Ms. Yuxin Xie. Ms.
Xie has been a female figure of inspiration for Chiravuri ever since she learned about Ms. Xie’s previous job at the U.S. Air Force Base in Colorado. Chiravuri hopes to become a similar role model for young women in STEM. “Especially in STEM, it is hard for women to find a very relatable figure to look up to in their academic pursuits. Then, I have the opportunity to become that for other people because I have a deep passion for the subject,” Chiravuri reflected.

Chiravuri’s future aspirations are using science as a vehicle for change. “People make science and medicine seem so hard, and that you need to have many different crazily expensive equipment and high-tech labs. But you can really start from absolutely nothing and accomplish great things all by yourself. The truth about science is that it could be for everyone,” she said.

In line with her project on developing accessible testing kits, Chiravuri wants to make health care much more accessible, cheaper, and easier, so people in need will not struggle to afford an expensive doctor. “My biggest passion is really just to level the playing field, and I hope I can continue to work towards that goal,” she concluded.

“**The truth about science is that it could be for everyone**”
You should continue doing something that you love, and you might not be good at everything you do. It’s important to understand that you get better over time, and that no one’s perfect."
English mathematician Ada Lovelace became the world’s first computer programmer; now, over 150 years later, Isabel Maida ’23 continues Lovelace’s legacy as the president of Choate’s chapter of Girls Who Code (GWC). Founded in 2012, GWC is a global organization that strives to close the gap between men and women in computer science by targeting the audience that has the largest drop-off: teenage girls. With core principles of bravery, sisterhood, and activism, GWC values diversity, equity, and inclusion. It has reached over 500 million people and served over 450,000 girls, 50% of whom come from underrepresented communities such as Black, Latinx, or low-income households.

Like many Choate students, Maida was introduced to the hobby of computer programming by her parents and ended up loving it. “I needed something to do after school, and my dad really enjoyed me doing Khan Academy and thought this would be a great idea,” she recalled. “I was someone who loved reading and building things, so my parents were like, oh, put her on a computer.”

Maida kept up her passion for computer science and attended free after-school programs at her local institution. “I was like, oh my god, this is really cool. So, I continued to do it on my own computer, building things like games and websites that I could show my parents to say, hey, I did something,” she said.

After spending time coding at universities like Harvard and Brown, Maida wanted to “expand her interests” by connecting with like-minded people, which led her to Choate. Every journey has its struggles, however, and Maida’s is no different. Being a Latina in computer science whose grandmother hailed from Cuba, Maida finds that both her ethnicity and gender encompass two of the most underrepresented groups in STEM. “Most of my struggles have come from the fact that I usually don’t get the respect that I deserve. It continues to get more difficult as you get hired because usually, a lot of minorities decide to leave early on because of how hard it is,” Maida said.

Despite these hardships, Maida has made remarkable achievements. This past summer, she created a company with Harvard summer school partners. The goal was to hire data scientists automatically by using artificial intelligence to put all applications through an unbiased recruiting process. Nevertheless, Maida views founding GWC at Choate as one of her main accomplishments because she is able to inspire underclassmen to seek representation in areas they never thought of pursuing. “There’s a feeling that you can’t be what you can’t see, especially at a place like Choate where there are so many students that are very qualified,” she said. “If you go into class as the only person that identifies the way you identify, you feel very out of place. You really want to see people like you because then, that says that you could do it as well.”

Like many of her peers, Maida does not have everything in her future planned out. “I feel like I’m someone who starts very small, and so I don’t look very hard in the future because I know that computer science is not a field where you can really imagine yourself doing really big things,” she said. What Maida does know, however, is that she wants to further her passion for STEM and inspire other girls to do the same: “Just continuing to encourage younger girls and nonbinary people to continue doing what they love. It doesn’t have to be computer science, but just being that support system and making sure that they can talk to me, they can talk to upperclassmen that really understand this, but you should never be turned away from something because of someone else.”

When asked what advice she would give to her fellow women in STEM, Maida said, “You should continue doing something that you love, and you might not be good at everything you do. It’s important to understand that you get better over time, and that no one’s perfect.”
Hedy Lamarr was born in Vienna, Austria in 1914. She had been interested in machines and technology from a very young age. However, her scientific pursuits were put on pause when she was scouted as an actress, moving to Hollywood at the age of sixteen. Although many focused on her beauty, giving her the title of “the most beautiful woman in the world,” Lamarr was a diligent innovator beyond her appearance. Greatly concerned with the war effort in 1940, she worked with her friend George Antheil to develop a secret communication system that would improve the existing torpedo systems used by the U.S. Navy by using radio waves and “frequency jumping.” While this technology was initially intended to be a military device, it formed the foundation to create the Internet as we know it today.

Did you know?
by Celeste Shattuck ’25

The distribution of women working in different STEM (Science, Technology, Engineering, Math) fields varies greatly. While women make up around 75% of all healthcare workers and practitioners, they account for only 25% of those working in computer-related careers. Additionally, many women who receive degrees in STEM do not end up going into a STEM career. Men are almost twice as likely to go into a STEM-related career after receiving a related degree. This highlights an underlying expectation on women: to become nurses or caregivers instead of pursuing careers in programming or engineering. As women are already frequently discouraged from exploring any STEM fields, the gendered expectation is even more harmful.
3. Dr. Roberta Bondar was the world’s first neurologist in space as well as Canada’s first female astronaut. She journeyed to space in the 1992 Space Shuttle Discovery Mission STS-42 and conducted scientific experiments in the International Microgravity Laboratory. Afterwards, Dr. Bondar spent years studying the human brain’s reaction and interpretation of unfamiliar environments. This includes pioneering research on mental illnesses in astronauts that stem from their space flight recovery. Dr. Bondar has helped countless astronauts recover from strokes, Parkinson’s disease, and other illnesses related to space medicine. While Dr. Bondar has pursued a wide range of scientific fields, including zoology, agriculture, and experimental pathology; her contributions to space medicine are what make her so remarkable.

4. Of the tens of thousands of people that received doctorate degrees in physics from 1973 to 2012, only 66 were Black women. After Katherine Johnson became the first woman to earn a Ph.D. in physics, only approximately 100 Black women have followed her footsteps. Given the difficulties that come from the intersection of female and Black identities in pursuing STEM fields, the accomplishments of these women are only more commendable. Fortunately, the numbers of Black women currently earning their doctorate degrees in physics-related subjects is increasing. According to African American Women in Physics (AAWIP), 34 Black women are currently in graduate school for degrees in physics.

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Why Theranos Failed


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