

MOSAIC of MINDS

Be inspired by:

ROSALIND FRANKLIN = MARCUS HIRSCHFELD = JOHANNA WESTERDIJK
TEMPLE GRANDIN = BEN BARRES = RONDA PATRICK = MARIE CURIE
CAROLYN BERTOZZI = KIZZMEKIA CORBETT = MARY MUNSON RUNGE
PERCY JULIAN = RUTH ELLA MOORE = ANTONIE VAN LEEUWENHOEK
MAE JEMISON = HYUN YOUNG = TOMI AKINGBADE = ALAN TURING

and many other inspiring role models



This e-book is composed by students from Utrecht University, the Netherlands,
as part of the *Unravelling Bias in Science* course, an elective course
hosted by the Biomedical Sciences bachelor program:

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PREFACE

Celebrating diversity within the biomedical research community

Increased diversity within scientific research teams strongly benefits the quality of the teams' scientific output. Among others, diverse teams tend to be more creative, innovative and efficient in their scientific approach. Additionally, having a diverse research team can increase the inclination of study participants from diverse backgrounds to participate in a clinical study. This offers both ethical and health benefits as a greater diversity in the study population, provided that this is relevant for the research question, in its turn increases the generalizability of the study results.

However....

Historically, the scientific community has been dominated by white, cisgender, heterosexual men. As a result, representation of women and under-represented minorities, e.g. in terms of gender, race and ethnicity is low. This is especially the case within the fields of Science, Technology, Engineering and Mathematics (STEM). This gap between majority and minority groups is present at all academic levels but becomes increasingly larger when going higher up the academic ladder. - a phenomenon also known as the 'leaky pipeline'.

One of the factors hypothesized to underlie this leaky pipeline effect is the lack of positive role models for women and people of under-represented minorities within STEM. People from minority groups might feel a lower sense of belonging and/or could implicitly start believing that they do not fit within the academic community as they do not see themselves represented in its members. As a result, students with a minority background tend to drop out of the academic pipeline. To counteract this phenomenon, it is suggested that the promotion of diverse role models within the STEM community could increase the retention of women and under-represented minorities in STEM. Importantly, a recent study within the Utrecht Faculty of Medical Sciences has shown that, at least in the context of medical education, students tend to approach a role model as a 'mosaic' of elements from different people rather than a role model being embodied by one single person. This underscores the need for promoting a broad range of diverse role models within our scientific community.

That is why we created this book!

Inspired by the *Good night stories for rebel girls* series by Elena Favilli and Francesca Cavallo, this e-book aims to showcase the (relatively invisible) diversity within our scientific community. By spotlighting researchers with a broad range of diverse backgrounds we hope to inspire *all* young scientists, regardless of their own background, to pave their own path as a biomedical professional - be it here at Utrecht University or anywhere else in the world.

JOHANNA WESTERDIJK

Johanna Westerdijk (1883-1961) made history as the first female professor in the Netherlands, marking a significant step towards greater equality in science. In a time where it was unusual for a woman to pursue a scientific career, she followed her passion for nature and attended the University of Amsterdam to become a biology teacher. After her studies, she became a director at Willie Commelin Scholten, a phytopathological laboratory in the Netherlands. Under Westerdijks supervision, the International Association of Botanists collection grew into the largest collection of living fungi in the world.

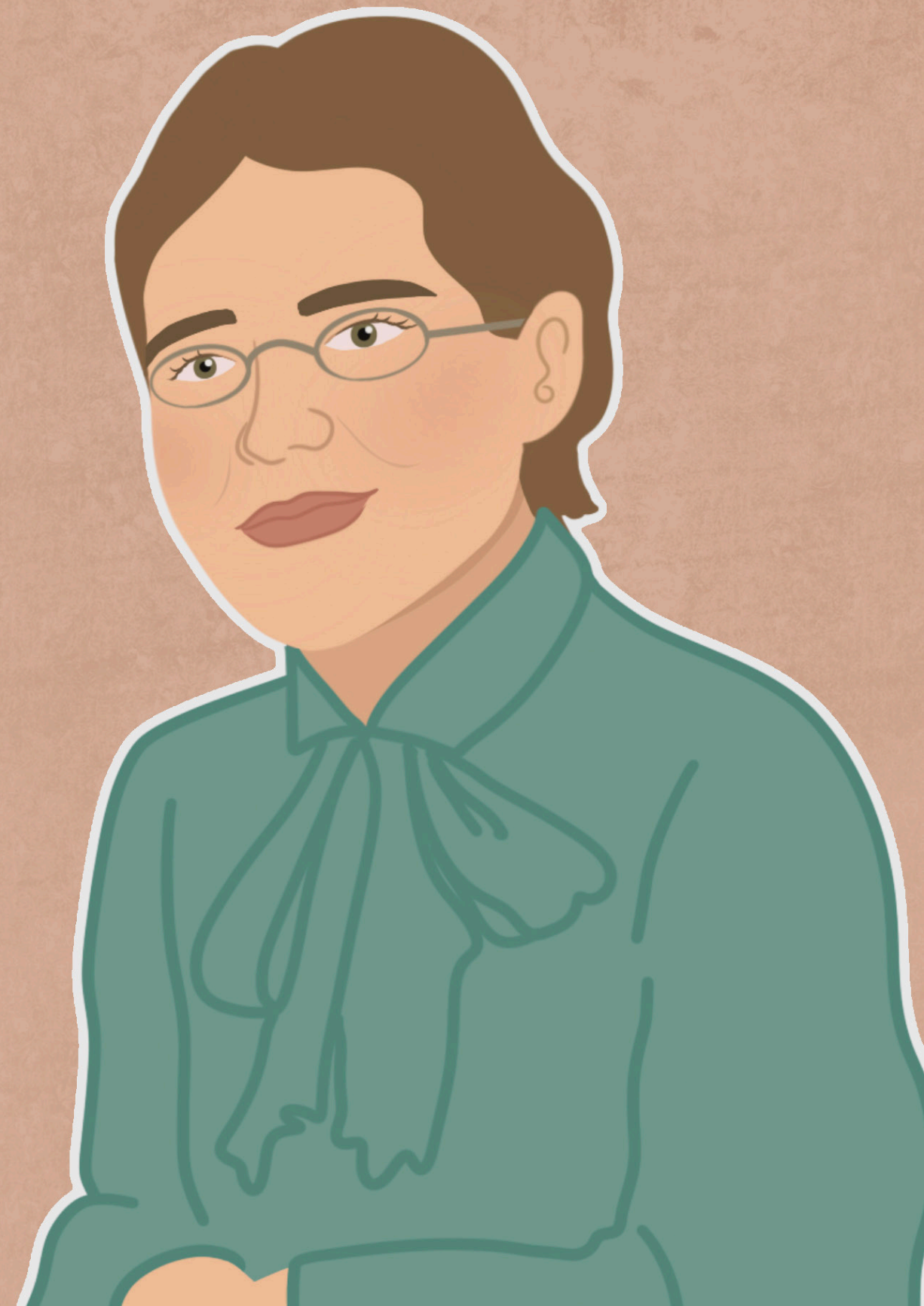
All her hard work in plant pathology and mycology led to her appointment as the first female professor in the Netherlands in 1917. As an associate professor of plant pathology at Utrecht University, she not only made groundbreaking contributions to science but also addressed significant social challenges of her time, such as combating elm and potato diseases.

In addition to her groundbreaking research, Johanna aimed to use her position as an associate professor to improve the role of women in science, mostly by often hiring female students for laboratory positions. She also participated actively in organizations for women in science, both nationally and internationally. Moreover, she sought to make science more accessible by engaging with not only fellow scientists, but also with the general public. She tried to do this by writing articles and hosting open-information days for everybody interested in her research.

Johanna's life was not just about plant pathology and mycology. Johanna loved yodelling and good parties, living by her motto: "working and partying form healthy minds".

*"When life gets dull and monotonous,
even a fungus dies off."*

= JOHANNA WESTERDIJK =



TIGIST TAMIR

Tigist Tamir is a postdoctoral associate at MIT Koch Institute for Integrative Cancer Research. While doing her postdoctoral she found out that she had ADHD. She finds it important to write about her neurodiversity in the academic world to show people you can face the daily challenges of being a neurodivergent scientist and do what you are passionate about.

Tigist was born and raised in Ethiopia, where she spent her younger years. She started her BSc Biology and Biomathematics at William & Mary in Virginia, Williamsburg. After this she did a PhD Pharmacology at the University of North Carolina at Chapel Hill.

During her time at university she noticed that her studies challenged her a lot. Way more than her peers. In high school, which offered a lot of structure and small classes, she always excelled. However, this changed in university. It put a lot of strain on her executive functions, which made her question her self-confidence. A teaching assistant noticed her interest in research and invited her to work on a project. Everything fell into place. Research created space for novelty, creativity, solving puzzles and many more.

When she got her ADHD diagnosis she felt relief, saying that “sometimes naming something is half the battle”. By educating herself on her neurodiversity and seeking strategies especially for ADHD’ers to excel in research, Tigist found tools to live up to her potential. Her research benefitted by finding people who she related to and could help her to feel more authentic!



“As academics I feel we should strive to create an environment that centers compassion and understanding. We don’t stop being human when we step into the lab, so we shouldn’t shy away from aspects of our humanity either.”

= TIGIST TAMIR =

BEN BARRES

Ben Barres (1954 – 2017) was a transgender American neurobiologist and activist. Though he was born AFAB, he always had the profound feeling of being born the wrong sex. He felt extremely uncomfortable under the societal expectations put upon him, and disconnected to his sex – something he blamed on himself. Nevertheless, he earned a Bachelor of Science in Biology through a passion for neurobiology, a medical degree, and a residency in neurology.

It was only at the age of forty, when stumbling upon a news article about a transgender man that his feelings of worthlessness and despair were suddenly explained. He considered transitioning, but he also knew it might cost him his research and his loved ones. He saw two options: living on as Ben, or committing suicide – living like this was no option. With support of his friends he became the first openly transgender scientist, and chairman at the Neurobiology department at Stanford University.

Barres was also an activist and wrote multiple pieces on the sexism he experienced himself after noticing how hard his career was before his transition, and wanted to carve a path for transgender people in science.

Ben Barres' research field involved glial cells, a topic which was, at the time, still relatively unknown. He was the first to discover how developing neurons provide signals to the oligodendrocytes that then myelinate them – valuable information for the understanding and therapy of neural degeneration. He set on to make even more major discoveries until his death by pancreatic cancer.

"I lived life on my terms: I stood up for what I believed in and I like to think I made an impact. I have zero regrets and I'm ready to die."

= BEN BARRES =



*"A country without investigation
is a country without progress"*

= MARGARITA SALAS FALGUERAS =



MARGARITA SALAS FALGUERAS

Born in Asturias, Spain (1938-2019), Margarita Salas Falgueras was a brilliant scientist who pioneered the fields of biochemistry and molecular genetics. She was raised in a supportive family that championed education without succumbing to gender biases. This upbringing fueled her intellectual curiosity, leading her to pursue chemistry at the Complutense University of Madrid, where she earned her Ph.D. in 1961. Mentored by renowned researchers, Salas began under Alberto Sols in Spain and later collaborated with the esteemed Severo Ochoa, even following him to the US.

Her most notable contribution lies in the discovery and characterization of Phi29 phage DNA polymerase, an enzyme that plays a critical role in DNA replication. This invention has proven to have immense value in fields like oncology, forensics, and archaeology.

During her career, Salas not only pioneered groundbreaking research but also occupied esteemed positions. However, her path was full of obstacles, particularly as a woman in science during an era plagued by gender bias. Despite being overshadowed by her husband, Eladio Viñuela, and disregarded due to her gender, she confronted these challenges with courage and ultimately prevailed.

Her achievements were widely recognized. She became the first woman in the Royal Spanish Academy (2001) and received the L'Oréal-UNESCO Science Award (2004). King Juan Carlos I ennobled her in 2008 (Marquesa de Canero).

Margarita Salas's legacy extends far beyond the scientific discoveries she made. She is remembered as a scientific pioneer who shattered stereotypes and inspired future generations of researchers, particularly women, to pursue their passions in science. Her unwavering dedication and fight against gender barriers continue to be a source of inspiration for many.

SANG-MOOK LEE

Dr Sang-Mook Lee was guided by his father to pursue his studies in oceanography, hoping to stand out from the rest with a niche interest. Over time, Lee's personal passion for the waters grew and he joined the Korea Ocean Research and Development Institute (KIOST) for five years before becoming a geophysics professor at Seoul National University (SNU).

A fateful car accident in 2006, less than two years after his integration into SNU, left Lee a quadriplegic. The event was, however, embraced positively by Lee, as it had wholly changed Lee's perspectives towards life and towards science. The near-death experience made Lee appreciate the time he has with his loved ones, and also deepened his commitment to greater achievements in life.

Lee did not let his physical disability hinder his strive for excellence. He returned to his position in SNU shortly after recovery. With the help of assistive devices, Lee was able to manipulate phones and computers like any able-bodied person. Lee was also committed to help disabled individuals like him regain confidence when facing life and acquire opportunities to join STEM. He started a project called ROPOS (Realizing Our Potential In Science), which funds education for persons with disabilities and provides assistive tools to help them get by with greater ease.

Lee's tenacity in face of challenges is highly valuable. When most people were mostly likely to be despirited with his situation, Lee took the accident as a pivotal point to excel in a different direction - to inspire others that could have lost motivation in life due to similar experiences.

"Because a sudden death can '[take] away an opportunity to say thank you to the other people, always aim to live life to the fullest without regrets every day."

= SANG-MOOK LEE =



"Research is not just about discovery, it's about making space for others to discover too."

= CARMEN SANDI =



CARMEN SANDI

Carmen Sandi is a Spanish neuroscientist at the École Polytechnique Fédérale de Lausanne in Switzerland, whose work on stress, social behavior, and brain function has placed her at the forefront of behavioral neuroscience.

As a female immigrant in Swiss academia, Sandi has been part of multiple minority groups. She has spoken candidly about her struggles to be taken seriously early in her career, noting, "I had to work harder to gain recognition", both because of her gender and her nationality and accent. These marginalizing experiences shaped her deep commitment to equality in science.

Her research explores the complex relationships between stress, brain function, and social behavior. Sandi was among the first to establish a causal link between mitochondrial function and social dominance, a groundbreaking insight that initially met skepticism due to its interdisciplinary nature. Today, it is considered foundational in understanding how biological and environmental factors influence behavior and mental health.

Having seen firsthand how socioeconomic and gender-related disadvantages can limit opportunities, Sandi has become a powerful voice for change in science. She actively promotes diversity through e.g. mentoring programs for women and first-generation scholars and publicly speaking about the inequalities in STEM.

Her leadership and advocacy have earned her prestigious honors, including the Behavioral Brain Research Prize. But perhaps her most enduring impact lies in her determination to ensure that science reflects and includes the full spectrum of human experience. For Carmen Sandi, research is not just about discovery, it's about making space for others to discover too.

CAROLINE SOLOMON

Caroline M. Solomon, a biological oceanographer and teacher at Gallaudet University, grew up deaf in a hearing family. She has played an important role in making STEM fields more accessible to students with an auditory disability. Raised in Delaware, Solomon contracted spinal meningitis as an infant. This infection caused Caroline to lose her hearing.

When Solomon developed a passion for swimming, she became interested in the environment, since she discovered that she couldn't swim in a polluted creek nearby her house. She went on to study environmental sciences and public policy at Harvard University. When she attended Harvard, there were no sign language interpreters available for deaf or hard of hearing students such as Solomon. Midway through her first semester, the university hired a sign language interpreter so she could better understand the course content. Despite these initial hardships, Solomon managed to complete her studies and went on to earn a master's degree in biological oceanography in Washington. She completed her PhD at the University of Maryland in 2006, and in 2011, she was promoted to professor. Her studies focus on the ecological effects of human activities such as agriculture on waterways. Through her research Solomon brings attention to possible ecosystem conservation policies.

As a teacher, Caroline Solomon pays attention to the fact that some students are better at visual learning than auditory learning. She hosts workshops to promote inclusion and participation of deaf or hard of hearing people in STEM fields. Additionally, she helped create a database of technical signs used in American Sign Language to make STEM research more accessible to people with an auditory disability.

"One important thing that I have learned over the years is to show students that they can."

= CAROLINE SOLOMON =



"I have lived a life of peace and enjoyment,
loving my family, friends, church and all."

= RUTH ELLA MOORE =



RUTH ELLA MOORE

Ruth E. Moore, born in Ohio 1903, made history by becoming the first black woman to achieve a PhD in the natural sciences. She lived in an environment where she faced a lot of discrimination, showing tremendous perseverance and courage.

When Moore was born, the Emancipation happened only 40 years earlier. Despite facing adversity, Moore's mother encouraged her to get an education. Moore attended the Ohio State University where she earned a Bachelor and Master of Science degree and in 1933, she earned a PhD in bacteriology. Her dissertation was on tuberculosis, which was the second largest cause of death in her time. Her work contributed to the eventual control of the disease.

However, racism and sexism were daily obstacles Moore had to endure while achieving her goals. She was allowed to enroll at OSU, but not able to fully participate. OSU handled segregated housing, dining, library, and restroom facilities between black and white people. She was not even allowed to enter some classes, forced to sit outside of lecture rooms and was never assigned a lab partner due to racism.

Despite living in the presence of such segregation and discrimination, Moore persevered and earned 3 degrees. Moore had a successful career, was promoted assistant professor, and became acting department chair of microbiology. However, her work was only honored in 1986 in a black ASM meeting. While Moore did not get the recognition she deserved in her time, Moore's legacy now serves as a symbol for the barriers she endured and overcoming them with utmost resilience.

TEMPLE GRANDIN

Dr. Temple Grandin is an academic with autism in the fields of both animal behaviour and autism. She helped gain new insights into the autism spectrum disorder by combining the existing knowledge and her own experiences.

Born in 1947 in Boston, Massachusetts, Grandin was unable to speak until the age of three and showed behavioural problems in her early childhood. Her parents placed her in a private school, ignoring a doctor's advice to place her in an institution. Grandin received her bachelor's degree in psychology in 1970 from the Franklin Pierce College, a master's degree in animal science in 1975 from the Arizona State University and a doctorate in animal science in 1989 from the University of Illinois.

She was not formally diagnosed with autism until her adulthood. People perceived her as 'weird' throughout most of her career, leaving her feeling socially isolated. However, she experiences positive sides of her autism as well. Her extreme visual thinking, a trait of autism, proved beneficial in working with animals.

Grandin addressed parts of autism that had been unnoticed in previous research. Neurologist Oliver Sacks wrote in the foreword of her book *Thinking in Pictures* that her work is 'unprecedented, because there had never before been an inside narrative of autism'.

Besides her work on autism, Grandin is a big spokesperson for animal welfare. She has designed more humane livestock handling processes, reducing stress, panic and injury to animals, motivated by her own experience of anxiety and feeling threatened by her environment.



"How inscrutable and incomprehensible are the hidden works of Nature!"

= ANTONIE VAN LEEUWENHOEK =



ANTONIE VAN LEEUWENHOEK

Antonie van Leeuwenhoek was born into a family of seven. As a son of a basket maker he had no education, academic titles nor scientific background. After being led up to accountant and treasurer in Amsterdam at a Scottish cloth merchant, van Leeuwenhoek opened his own store selling linen, yarn and tape.

To ensure the quality of his merchandise, he initially used a low-quality loupe. Probably out of frustration and curiosity van Leeuwenhoek tried to craft his own loupes. Around 1670, van Leeuwenhoek created his first microscope with only one lens. The microscope was two metal plates riveted together, typically made of brass.

What's exceptional about Van Leeuwenhoek's microscopes, is the fact that his magnifications of the microscope were for more superior as of his contemporaries, such as Robert Hooke. Hooke's microscope could only magnify 30x while the magnifying power of van Leeuwenhoek's devices could reach 266x. This superiority gave van Leeuwenhoek the opportunity to be the first to discover specimens like erythrocytes and spermatozoa.

After marrying his second wife, Van Leeuwenhoek became more engaged in the academic environment. He corresponded with the medicus Reinier de Graaf and Constantijn Huygens by writing them letters about his discoveries. The highly educated men introduced him to the London Royal Society, the largest scientific institution in the world at the time.

His observations led to groundbreaking new insights in the world of science, introducing the world to blood cells, sperm cells and most important of all, bacteria. In 1674, van Leeuwenhoek looked at a drop of water from a lake. "I saw in it with great astonishment, incredibly many very small animals, of various species." Van Leeuwenhoek probably discovered *Dolichospermum*.

Despite being born into a merchant family in a scientific era dominated by wealthy and privileged men, Antonie van Leeuwenhoek established himself as a self-made scientist through relentless curiosity, craftsmanship and perseverance. Without formal scientific training, he advanced microscopy with his meticulously crafted lenses, ultimately laying the foundation for microbiology as a scientific discipline.

CHARLOTTE ROUGHTON

At two years old, Charlotte was diagnosed as autistic. While growing up her family life was great as she felt loved and accepted. However, her social life was more difficult. A lot of her childhood friendships were abusive, she didn't feel like she fit in or was accepted by her peers. She felt ashamed, like she had failed at being a 'normal' human being. Internalizing this feeling eventually led to a diagnosis of depression and anxiety during her undergraduate years studying biomedical sciences at Durham University.

Her self-acceptance journey started during her research Masters. She started to become more at peace with being autistic and met friends she truly felt at ease being her authentic self with. Because of her obsession with microbes, especially bacteria, she started her microbiology PhD at Newcastle University in 2020. Around this time, she also started to share her story, being a lesbian autistic first generation researcher in science, to raise awareness and increase visibility of LGBTQ+ and neurodiverse people in STEM.

During her PhD she knew that a long-term career in academia as a researcher wasn't for her, but she discovered her love for teaching and science communication. Currently, she is working as a teaching technician at the Newcastle University. Besides this she is part of the Members Panel of the Microbiology Society. This way she can ensure that decision-making is informed by lived experiences of a diverse range of microbiologists and that EDI is embedded into the foundations of how the Society functions.



"overall, I think being autistic is an asset
— it has shaped who I am as a person,
and makes me a better scientist.

= CHARLOTTE ROUGHTON =

"People have asked me many times over the years:
what was the recipe for success for you in your lab?
It was very simple. It was diversity."

= CAROLYN BERTOZZI =



CAROLYN BERTOZZI

Carolyn Bertozzi is an American chemist known bridging the gap between chemistry and biology. In 2022 she won a Nobel prize for developing biorthogonal reactions, the study of rapid reactions that take place inside the body without disrupting biological processes. These reactions help track biological processes and improve cancer drug targeting. By winning this award she is the first openly queer woman to have won science Nobel prize.

From a young age Bertozzi science was a big part in her life, her father, a physics professor at MIT, has always encouraged her to participate in science. Along with her high school biology teacher and her organic chemistry professor at Harvard they have greatly influenced her career.

Because of the ongoing AIDS epidemic and the lack of protections against discrimination present in the '80s this was a challenging time to come out. As a woman in science she faced other hurdles: "When I was a student, there were people who were actively hostile to women in chemistry in particular, organic chemistry also has a historical culture that was not particularly welcoming of women."

Being a role model for the newer generations of queer scientists, she supports people around her and encourages people all over the world to be themselves. It does not come as a surprise that she values diversity within her own research team. As she herself says: "My lab has always been known as a welcoming place for folks who might think of themselves as being kind of minoritised."

ROSALIND FRANKLIN

Rosalind Franklin, a Jewish woman born in 1920 to a family of Anglo-Jewish scholars, is an influential British physicist renowned for her role in discovering the double helix structure of DNA. Driven by her family, she attended private boarding schools at a young age, to later enroll in Newnham College where she majored in physical chemistry. While the Nazis invaded Europe, Franklin relentlessly continued her degree.

In 1947, Franklin started work in Paris where she studied diffraction techniques. This knowledge paved the way for Franklin to be the first to capture an X-ray image of DNA depicting its density and conformation. This would be called photo 51. Franklin also used crystallography to research viral structure. Photo 51 helped distinguish the A and B forms of DNA. Her research inspired the double helical model of DNA proposed by Francis Crick and James Watson.

Franklin suffered hardships during her lifetime. She experienced hostility which she believed to be antisemitic and sexist in nature and failed to receive credit for photo 51 until the 1990s. Her diffraction picture was shared without permission by Maurice Wilkins, an adversarial colleague, to Crick and Watson of a competing lab. Crick and Watson were struggling to determine the structure of DNA, but Franklin's photo was the turning point in their research. Without her knowing, Watson published a book on those findings including photo 51.

Today, Franklin is finally recognised for photo 51. Her persistence allowed her to become an undeniably important scientist to the benefit of mankind.



"In my view, all that is necessary for faith
is the belief that by doing our best
we shall succeed in our aims:
the improvement of mankind."

= ROSALIND FRANKLIN =

"The greatest experience was helping poor African American people who couldn't even pay for their medicine. The pharmacy gave me an opportunity to help people who needed help."

= **MARY MUNSON RUNGE** =



MARY MUNSON RUNGE

Mary Munson Runge, an African American woman, was born in Donaldsonville, Louisiana. Growing up, Mary watched her father, a physician and pharmacist, provide medications to people who could not afford them.

This greatly inspired Mary to become a pharmacist as well and in 1948 she graduated from Xavier University of Louisiana College of Pharmacy. At this time, there were very few female pharmacists and segregation laws were still enacted in some states. After graduating, she became a hospital pharmacist for 21 years in California. During this time she raised a family and she became president of two different hospital pharmacist society's in California.

After being a hospital pharmacist for so long, Mary became a community pharmacist, serving in areas with African American communities with lower incomes. Helping people with lower incomes, just like her father did, was something she found great fulfillment in. In 1979 Mary became the first female, the first African American and the first employee community pharmacist to be elected president of the American Pharmacist Association (APhA), ending a 126 year history of white male presidents. As president, she was committed to increase minority inclusion in the pharmacy profession.

Mary's life work serves as an inspiration to many. Three years after her retirement, Mary was inducted into the California Pharmacists Association Hall of Fame. She also served on some federal committees and received the Hugo H. Schaefer Award from the APhA, which recognized her for a lifetime contribution to the APhA and the profession of pharmacy.

MAE JEMISON

Mae C. Jemison, born in 1956, is one of the revolutionary women in STEM. Since she was little, Jemison has had a passion for science, especially for astronomy. When Jemison finished high school, she began to study at Stanford University in California, where she served as the president of the Black Student Union. After graduating with a Bachelor's degree in Chemical Engineering and African American Studies, she went on to study at Cornell Medical School. In 1981 she completed her studies with a Doctorate in Medicine and went to practice general medicine.

In 1983, Sally Ride became the first American woman to travel to space. This inspired Jemison to also apply to the astronaut program at NASA. In 1987 she was chosen out of over 2000 applicants and was selected for NASA Astronaut Group 12. On the 12th of September 1992, Jemison and 6 other astronauts launched into space making Mae Jemison the first African American woman in space ever!

However, during her life and career, Jemison encountered multiple challenges. Her greatest struggle was being a black woman in the U.S, which meant she was faced with inequality inside and outside of classrooms, even by her own professors and teachers. But, this didn't stop her from following her dreams and becoming a role model for many other Black women who want to follow their dreams and aspirations.

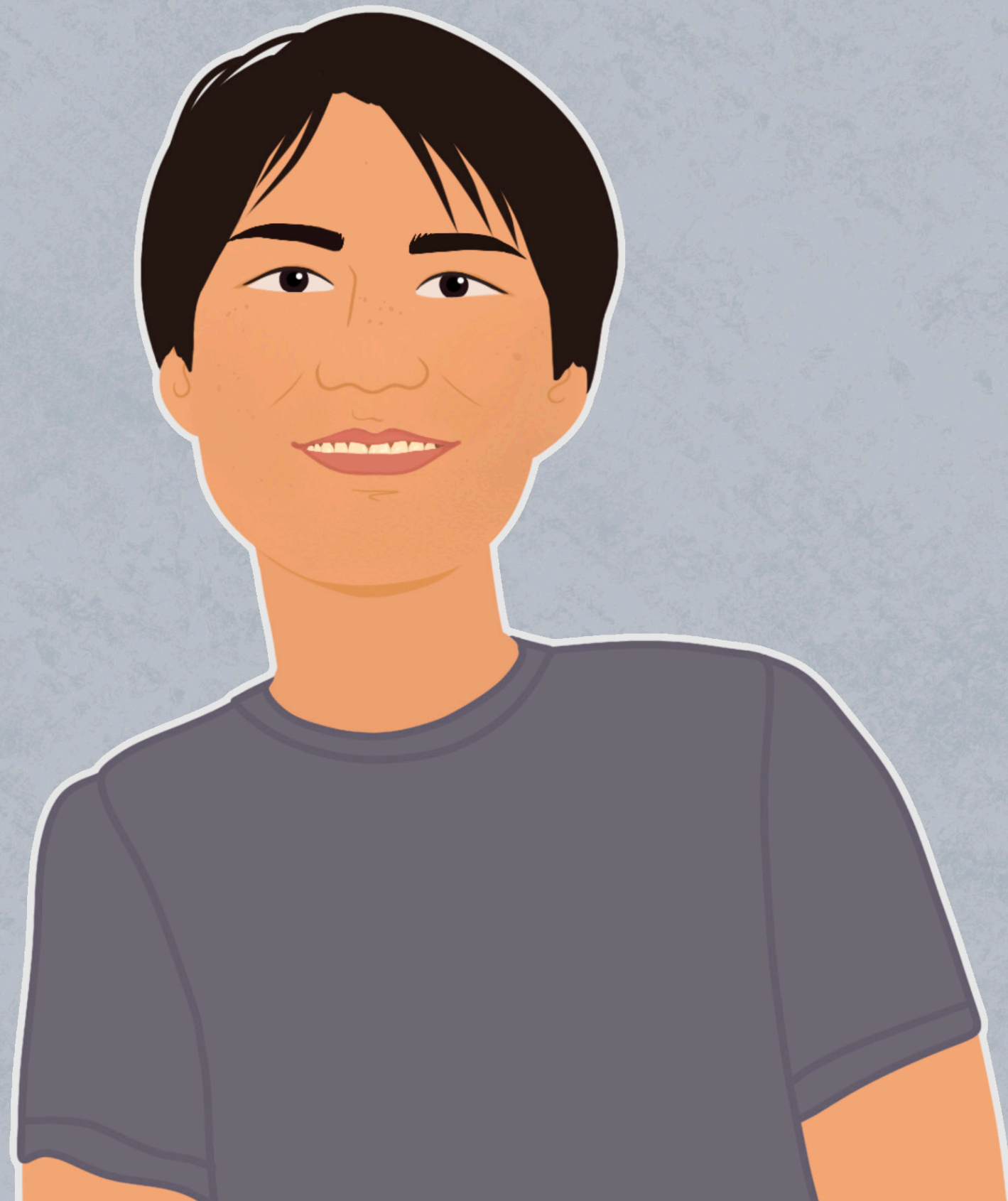
"Never be limited by other people's limited imaginations"

= MAE JEMISON =



"I don't have any magic formula. I just try my best to be open about who I am and what I know and – most importantly – what I don't know."

= HYUN YOUK =



HYUN YOUK

Dr. Hyun Youk is an Associate Professor of Systems Biology at the University of Massachusetts Chan Medical School. He currently has a lab based in Delft, the Netherlands. Hyun is fascinated by the 'life-death transition' of cells and what it means to be a living or a dead cell.

In his academic career, he faced a lot of mental hurdles. He was the first person in his family to attend university and in some cases he had a challenging time relating to people. For instance, he did not have the same economic background as many of his fellow students.

Because he is gay, some people could think that this was also a hurdle in his academic career. But Dr. Youk argues that coming out as gay gave him some qualities that were very useful to him in his career, such as his self-reflection and grit.

He does acknowledge that being in a minority group in STEM (or in general) can be challenging. According to him, making efforts to promote diversity in STEM are already improving the atmosphere and he is optimistic about where this is going. Being open about each other's values and what you don't know about some people can go a long way.

EMERY HALEY

Dr. Emery Haley is a nonbinary science communicator with a passion for diversity within the STEM community. They believe that they can combine their passions for writing and science to help address the disconnect between the scientific community and the rest of society. That's why they now work as a scientific writer.

They were born and raised in Huntsville, Alabama. In December of 2016, they received a bachelor's degree in neuroscience from the University of Alabama in Birmingham. In 2022 they finished their PhD and received a doctorate in cell and molecular biology from the Van Andel Institute.

During their PhD, they went into their social and medical transition, which was difficult. It was a big step to communicate with colleges under the right name and pronouns, but now they are proud of their commitment to be their true self no matter the challenges.

Besides their personal growth and transition, they also think it is important to invest and give back to the next generation. That is why they volunteer with several community organizations and events that focus on reaching out to kids. This way they break down stereotypes and inspire kids to pursue science.

Outside of science they also volunteer at the Grand Rapids Pride Center, to stay involved with the 2-SLGBTQ+ community and give support to kids that wasn't available to them when they were a kid.



"As approximately 1 percent of the world population, gender diverse individuals are a minority, but we don't have to be invisible."

= EMERY HALEY =

*"You become courageous by doing courageous acts...
Courage is a habit"*

= MARIE MAYNARD DALY =



MARIE MAYNARD DALY

Dr. Marie Maynard Daly was the first woman of African American descent to obtain a PhD in Chemistry in the United States. Despite living in an era when Black women faced significant discrimination, she pursued her education with determination.

In 1942, Daly graduated cum laude with a bachelor's degree. She then went on to complete her master's degree and later her PhD. Her achievements were the result of her merit, but they were also made possible in part because many scientists were called to serve during World War II, creating space for minority scientists and women to study at university.

Her passion for science was nurtured from a young age by her parents and teachers. She was particularly inspired by Paul de Kruif's book *Microbe Hunters*, which chronicles the discoveries of scientists using microscopes.

Daly also conducted research on the link between cardiovascular health and diet. She was the first scientist to discover that cholesterol can lead to clogged arteries, improving the understanding of heart disease. Furthermore, she studied the chemistry of histones, and her work provided evidence for lysine-rich histones. Since then, histones have been shown to be fundamental to gene expression.

Additionally, she researched the base composition of nucleic acids, confirming that adenine, guanine, thymine, and cytosine are the primary bases present in DNA. Furthermore, she studied the reabsorption of creatine in muscle, offering further insights into muscle metabolism.

Later in life, she started a scholarship program to support and encourage minority women to pursue degrees in science.

PRIYANKA VERMA

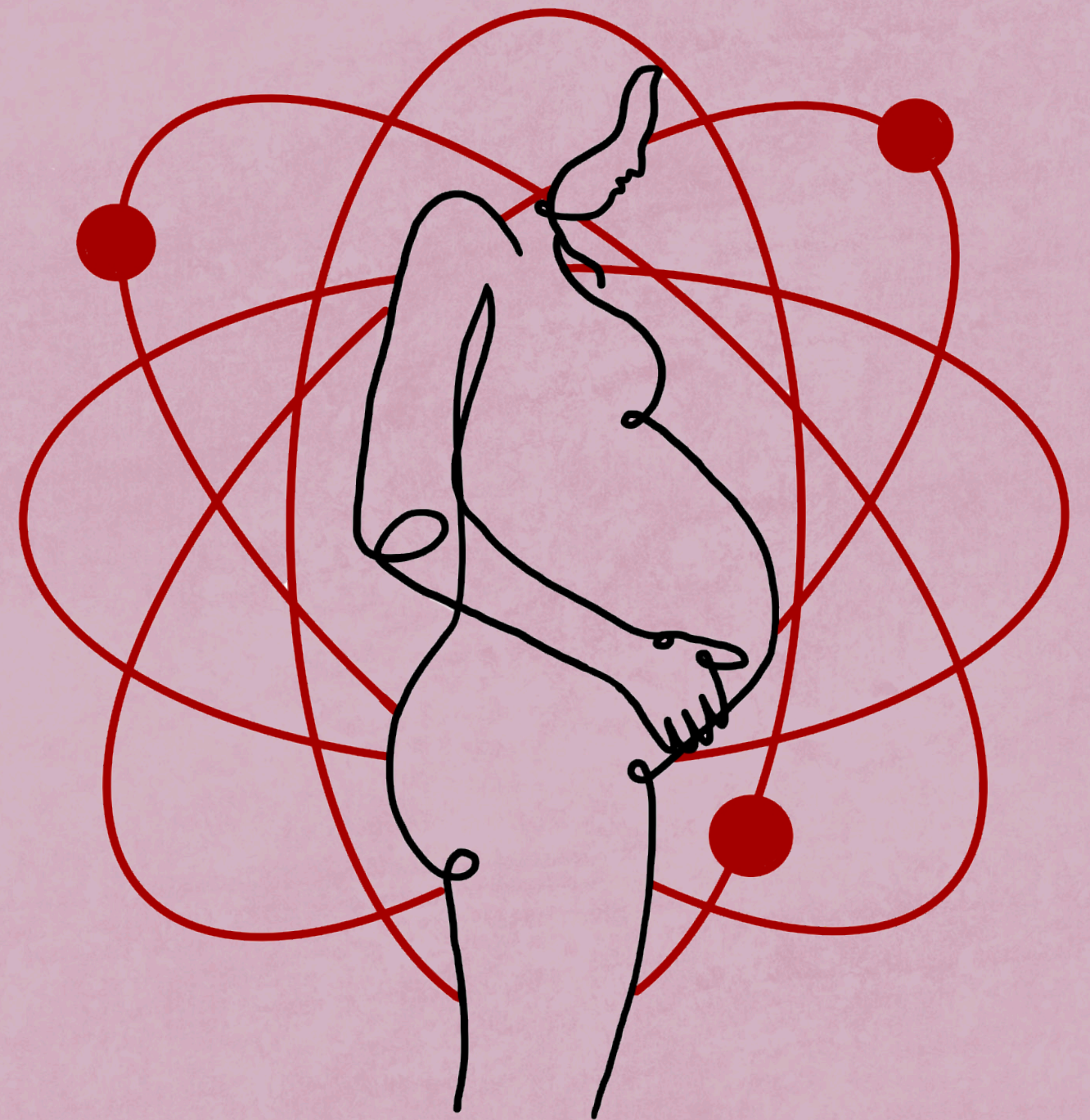
Dr. Priyanka Verma is an award winning researcher in cybersecurity at the Confirm SFI smart manufacturing research center. She became a new mother while working in STEM and applying for the Marie Skłodowska-Curie Actions fellowship. However, she did not let this pregnancy stand in her way to achieve her goals.

In February 2021, Priyanka started preparing her proposal for her application of the MSCA fellowship and in March she found out she was pregnant. She was advised not to spend more than four hours at a time on the laptop, what was impossible for her if she wanted to achieve her goal. To balance her health, work, family and fellowship proposal, she made a proper timetable which was very difficult and not always possible to follow. This all even during the extra challenges of Covid-19.

She pushed through and submitted her proposal and also completed her PhD on Information Technology and Cloud Security. In June she got the news that she got an interview for the fellowship and she started preparing while being four months pregnant.

Her extreme hard work during her pregnancy paid off, because she got selected for the fellowship. However, due to her pregnancy and Covid-19 she could not travel and could not start her fellowship directly. Luckily, the fellowship could be postponed by three months.

On 8 December she gave birth to a baby boy and only a month later Priyanka and her family moved to Dublin where she started her fellowship. There she works on Security Techniques Against Cyber Threats in Smart Manufacturing Industries projects.



*"Motherhood became the source of motivation
and encouragement to achieve my goals,
not the hurdle in my life."*

= PRIYANKA VERMA =

"There is only one thing worse than coming home
from the lab to a sink full of dirty dishes,
and that is not going to the lab at all!"

= CHIEN-SHIUNG WU =



CHIEN-SHIUNG WU

Chien-Shiung Wu (1912–1997), born in Liuhe, China, was a century-defining nuclear physicist often called the “First Lady of Physics” and the “Chinese Marie Curie.” Raised in a progressive family that valued education for all, she found her passion for science in boarding school and earned a physics degree from National Central University in Nanjing before pursuing a PhD in the U.S. just before WWII.

Upon arriving in America, Wu faced racism and sexism. Her plans to study at the University of Michigan were abandoned when she discovered women were barred from using the front entrances of buildings without a male escort. She instead enrolled at the more progressive University of California, Berkeley, where her scholarship application was later denied due to anti-Asian prejudice.

Her talent did not go unnoticed—physicist Emilio Segrè recognized her potential and mentored her closely. She went on to work on the Manhattan Project and became the first woman to teach physics at Princeton. At Columbia, she conducted the famous Wu Experiment, confirming a theory by Tsung-Dao Lee and Chen-Ning Yang—who received the Nobel Prize while she was overlooked, widely believed to be due to sexism.

Still, Wu continued to break ground. She became the first female president of the American Physical Society and received the Wolf Prize. After retiring, she championed science education for girls and spoke out about discrimination in the field. To this day, her legacy transcends hardship and stands as a testament to her perseverance, and the fight for equality in STEM.

WANDA DÍAZ-MERCED

Dr. Wanda Diaz-Merced is a visually impaired, award winning, coloured women from Puerto Rico. From a young age, Wanda was curious about the stars and galaxies. When participating in a science fair at her middle school, she came in second. This inspired her to pursue a career in STEM.

In her early twenties she started seeing spots in her sight. Later she was diagnosed with degenerative diabetic retinopathy, with a rapidly decreasing eyesight as a result. Even after losing her sight, she still wanted to continue her career in STEM and finish her degree in astronomy.

During an internship at NASA she was able to translate satellite information of the stars, into soundwaves. She used a method called sonification, which turns light waves into sounds, giving her and other visually impaired people access to more information. This allowed her to hear instead of see the stars. Proving anything is possible, if you are creative and think outside of the box!

She went on to finish her studies of physics at the university of Puerto Rico and got her doctorate in computer science from the University of Glasgow, in 2013. She has also won various awards throughout her career.

Nowadays, she travels the world, working on projects and making science more accessible for everyone. She encourages women and disabled people to love science and shares her inspiring story with the world.



"Science is for everyone.
It has to be available for
everyone because we all
are natural explorers.
Even if you can't see."

= WANDA DÍAZ-MERCED =

*"The more brilliant the lightning,
the quicker it disappears."*

= IBN SANA =



IBN SINA

Ibn Sina (980 – 1037 CE), meaning “son of Sina” in Arabic, is a man not widely known in the Western world, yet he is perceived as a cornerstone of our current scientific knowledge. With two of his most known works, “The book of healing” and “The canon of Medicine” he set the standard for medicine in medieval and current times by not only incorporating biological but also mental health to improve someones well-being.

Ibn Sina is of Arabic decent and was born in the village of Afshana in Transoxiana, this would equate to modern day Uzbekistan. His family later settled in Bukhara, the hometown of his mother, and also a significant city that contributed to the advancement of science, philosophy, and the arts in Central Asia. It is here that Ibn Sina would start his road to become an influential figure.

Since Ibn Sina was a Muslim, starting out most of his schooling was about the Quran, which was followed by a multitude of tutors coming over to teach him about philosophy, Greek science, theology, arithmetic, the list goes on. This resulted in him becoming a physician at the age of 17. Most troubles that Ibn Sina has faced (that we know of) before getting his recognition were mainly due to political reasons such as war causing his research to be halted, since he had to go into hiding.

Despite these challenges, Ibn Sina grew out to become known as the ‘father of early modern medicine’. It is tus important to acknowledge that even though Western scientists often regard the Greeks and Romans as the founders of modern science, a lot of the contributions to the field were originally made by Ibn Sina and other Eastern scientists.

ALAN TURING

Although Turing was not widely known during his lifetime, today he is recognized as an influential mathematician and computer scientist. In his younger years he studied mathematics at King's College in Cambridge.

During world war II, he worked for the British intelligence service on breaking codes in German radiosignals. Turing and his team succeeded in decoding Enigma communications using a decoding machine, providing the Allies with important information in their efforts against Nazi Germany.

After the war Turing worked at the National Physics laboratory, where he contributed to the design of an automatic computing engine. Laying the foundation of modern computer as well as programming language.

Turing was a homosexual at a time when homosexuality was a criminal offence in England. In 1952 he was prosecuted for engaging in sexual relations with man. When questioned by the police he did not deny the allegations. For his sentence he was given the choice between imprisonment or chemical castration, he chose the latter. Additionally, it ended his work in code breaking because he was deemed a security risk.

Turing was found dead in his room in 1954 having committed suicide, having eaten an apple poisoned with cyanide. In 2013 he was pardoned for his conviction in 1952.

Alan Turing was a brilliant man, of great importance in the war, a pioneer of the field of computing science and an openly queer person in a time of wide spread discrimination. His story is a powerful reminder of injustices faced by queer people throughout history.

"If a machine can think, it might think more intelligently than we do, and then where should we be?"

= ALAN TURING =



"There's a sadness that we don't know more about Li, because he's so important in queer Asian Canadian history."

= LAURIE MARHOEFER =



LI SHIU TONG

It is miraculous that we know of Li Shiu Tong, a Chinese-Canadian sexologist whose groundbreaking research was nearly lost. After his death in 1993, a neighbor discovered his life's work discarded in a dumpster. We now know him as one of the first scientists that humanized gay people and acknowledged intersex people in academia.

Born in Hong Kong, his experience with western imperialism allowed him to address blindspots among peers in research, such as his partner Magnus Hirschfeld and friend Karl Giese. These researchers empowered gay rights through science but were dumbfounded about its connection to colonialism. In his 20s, Li discontinued his medical study in Shanghai to join them.

Throughout his career, Li faced exclusion that resonates with minorities today. Li struggled to travel for research in American-occupied Manila due to the Chinese Exclusion Act. As a visible minority in Western academia, his personal opinions were generalised as 'Chinese consensus', yet his scientific effort was dismissed.

Despite adversity, his research challenged essentialist narratives. After the Nazi regime shut down the Institute of Sexual Science, Li's work helped Hirschfeld confront how his earlier belief in scientific neutrality was shaped by his privilege as a white-passing European until he reflected on his own experiences of antisemitism. Then, it became clear that the practice and implication of science could not be separated from the scientist.

Li Shiu Tong's journey shows that centering marginalized voices is essential to transforming not only what we know, but how science is defined and who shapes it.

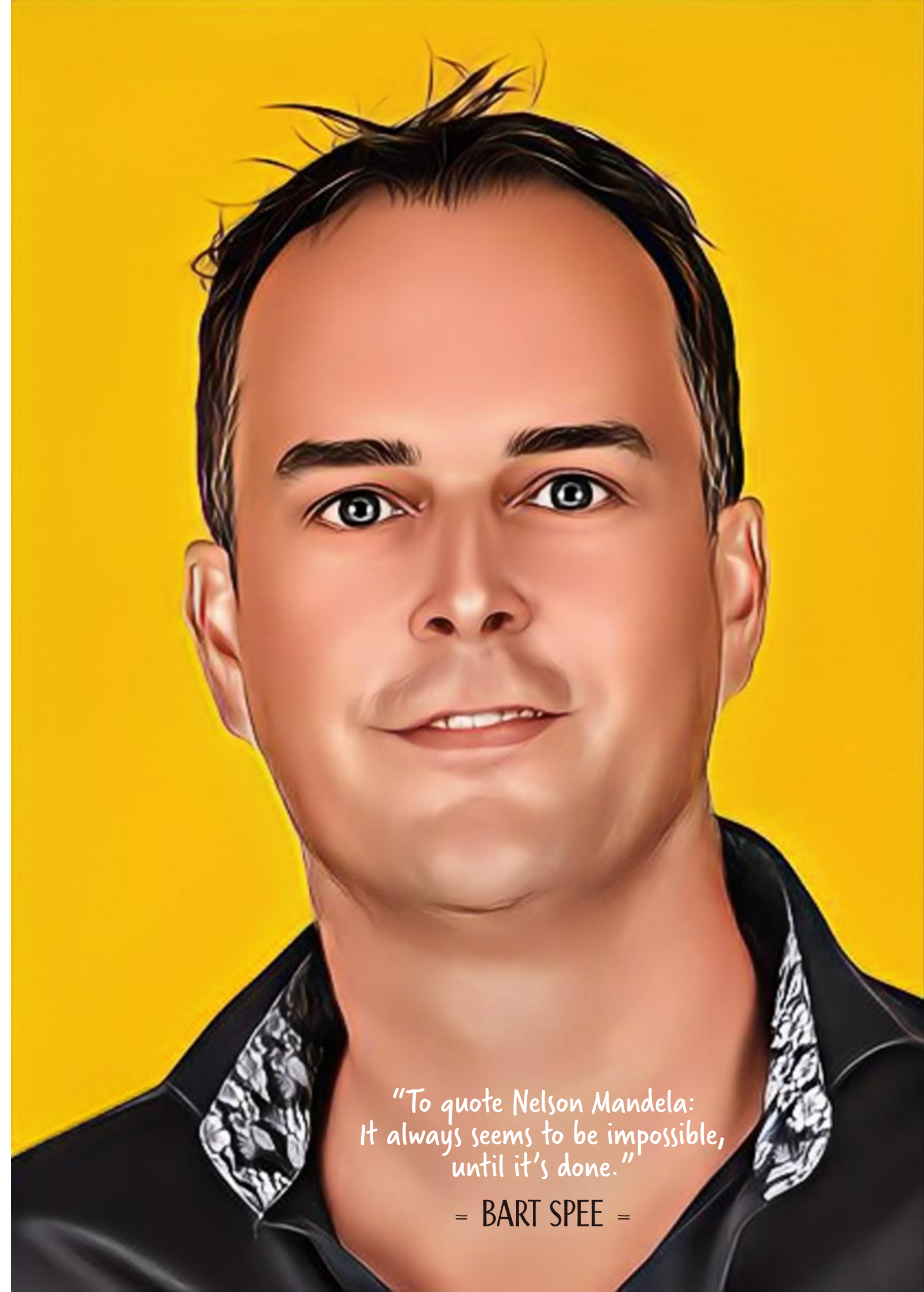
BART SPEE

Dr. Bart Spee is a professor and teacher at Utrecht University, with a passion towards hepatocytes and stem cells. The path Dr. Bart Spee walked towards becoming a professor is different than most professors. Becoming a professor was harder, because of his lower and more practical degrees.

Dr. Bart Spee was raised in Gouda and finished his high school with a Mavo degree, which is a lower level of degrees than most professors have achieved. After his Mavo degree he went to a MBO (vocational secondary education in the Netherlands) laboratory in Noord-Rotterdam. Here he opted for the less popular specialization: molecular biology. The course was quite simple for him, what led to the opportunity to start a course at university of applied sciences in Utrecht after he got his propaedeutic degree. He chose to finish his MBO degree to get more practical experience in genetic analysis of different animals species through an internship in Wageningen.

The Bachelor Molecular biology at University of applied sciences in Utrecht was well regarded and gave him an internship in veterinary at Utrecht University with different cell systems for disease modelling. His professor Jan Brokhuizen helped him to start his PhD research without a master's degree into regenerative livers in animal models and became his mentor during his PhD.

During his career, people around him told him to become an analyst, because it suited him better. The criticism motivated him to show people that everything can be done if you really go for it.



*"To quote Nelson Mandela:
It always seems to be impossible,
until it's done."*

= BART SPEE =

“Soon the day will come when science will win victory over error, justice a victory over injustice, and human love a victory over human hatred and ignorance”

= **MAGNUS HIRSCHFELD** =



MAGNUS HIRSCHFELD

Born into a Jewish family in Prussia, Magnus Hirschfeld (1868-1935) experienced societal prejudice from a young age, as a Jewish gay man. He researched enormous amounts of groundbreaking sexuality and gender science while advocating for those marginalized communities, during the rise of the Nazi regime.

After earning his medical degree (1892), he initially worked on natural remedies in Magdeburg, Germany, Hirschfeld later moved to Berlin. Here he voiced the idea that sexual orientation is innate, not a choice. Hirschfeld became one of the founders of the Institute for Sexual Science in Berlin, the first sexology institute in the world. This provided treatment, support, and education, often free of charge to the LGBTQ+ community. Also conducting some of the first gender-affirming surgeries, paving the way for modern advancements. Despite his contributions, he received opposition from the medical community and public but, particularly from the Nazi party. Resisting against his work and his identity, the Nazi party ultimately destroyed the institute.

Despite facing recurring violence from the Nazi party, he continued his advocacy and embarked on a global lecture tour in 1930, to share his findings. He became involved in a relationship with Li Shiu Tong, an Asian LGBTQ activist and sexologist. Following Adolf Hitler's appointment as chancellor in 1933, Hirschfeld was exiled and his German citizenship was revoked. He resided in France where he later passed.

Hirschfeld's publications and advocacy, courageously battled against Nazi ideologies, continue to influence the medical community today, marking him as an early pioneer for LGBTQ+ rights.

MARIE CURIE

Marie Curie (1867–1934) was an innovative physicist and chemist, renowned for her pioneering research into radioactivity. Born in Warsaw, Poland as Maria Skłodowska, she faced enormous obstacles as a woman in a scientific profession. In her homeland she had severely limited access to education, and she emigrated to Paris, where she attended the Sorbonne and earned degrees in physics and mathematics.

She discovered two new elements with her husband Pierre Curie: polonium, named for her homeland, and radium. In 1903, she became the first woman to have a Nobel Prize bestowed on her — in Physics. She then became the first ever to have two Nobels, this one in Chemistry (1911) for her work on radium and its compounds.

Curie also faced gender bias in her career, yet she managed to continue her quest for scientific discovery. She made her findings applicable as well by developing portable X-ray units for use on World War I front lines. Her research later led to cancer treatments, as well as to nuclear energy.

Marie Curie remains an icon of strength and scientific prowess, and she paved the way for future generations of women in science.

*"Now is the time to understand more,
so that we may fear less."*

= MARIE CURIE =



"I would say that my role as a scientist is really about my passion and purpose for the world and for giving back to the world."

= KIZZMEKIA CORBETT =



KIZZMEKIA CORBETT

Kizzmekia is an African American scientist that has worked on the Moderna COVID-19 vaccine. She grew up in North Carolina in a large family of step-siblings and foster siblings. She realized in high school that she wanted to pursue a scientific career. Kizzmekia received a PhD in microbiology and immunology. For her doctoral work she studied the dengue virus in Sri Lanka. Afterwards she started studying the development of vaccines for coronaviridae, which is a type of virus.

At the start of the COVID-19 pandemic she started working on a vaccine to protect people from coronavirus disease. Her research team partnered with Moderna, a biotechnology company, to manufacture and test the mRNA COVID-19 vaccine. Kizzmekia shared that she cried when the results showed that the vaccine worked.

Kizzmekia is passionate about educating people on health topics. She started educating youth on sexually transmitted diseases at the age of 20. Besides, her opinions have helped gain trust of people within black community in regard to the safety and necessity of vaccinations by visiting black churches and frequently updating her popular twitter page.

During the COVID-19 pandemic, Kizzmekia called for the public to be respectful of each other. She emphasized that we should not stigmatize people who may be from areas where the virus started. Nowadays she is also focused on paving a path to help other black women scientists breaking boundaries. Moreover, she prioritizes hiring individuals from diverse backgrounds to ensure a diverse research group.

KAMALA SOHONIE

Kamala Sohonie was born 18th June 1911 in Indore, Madhya Pradesh. Kamala has always excelled in Education, greatly inspired by her father's career in chemistry. However, with gender inequalities and institutional obstacles as well as societal expectations, her route to success was not a straight path.

Kamala attended Bombay university and achieved a Bachelor of Science degree in 1933. In the hopes of expanding her academic career, Kamala applied for a research fellowship at the Indian Institute of Science. However, her application was rejected due to scepticism about women's competence in the scientific research field. Frustrated by this decision, Kamala staged a 'satyagraha' outside the directors office to demand acceptance. Her acts of resilience and perseverance paid off and she was able to convince the director to offer her a probationary place at the institution.

Kamala was the first scientist to characterize the proteins in the leguminous plant pulses and milk. This research led to 5 scientific articles being published, 2 of which were published in the 'Biochemical Journal'. Following this discovery, Sohonie was awarded a place at Cambridge University to complete her PhD. In 1937. During her time at Cambridge she made a further ground breaking discovery of the enzyme cytochrome C, responsible for the generation of energy within plant cells. This was particularly inspiring as Cambridge had minimal diversity within this period.

Sohonie returned to India and specialised in the area of food and nutrition. Kamala's determination and resilience inspire others to pursue a career in STEM related subjects and broke down gender stereotypes.

"Never let adversity stand in the way of progress."

= KAMALA SOHONIE =



"The greatest challenge I faced in becoming a neurosurgeon was believing it was possible."

= ALEXA IRENE CANADY =



ALEXA IRENE CANADY

Alexa Irene Canady (November 7, 1950) was the first Afro-American woman in the US to become a pediatric neurosurgeon.

Whilst growing up in a white dominated society, she already faced racism: She tested a high score on her intelligence, but her results were swapped with the lower results of a white student. However, her parents encouraged her educational development.

Canady almost dropped out of college due to a 'crisis of confidence'. She decided to continue after she fell in love with medicine during a minority scholarship. In 1975, she graduated cum laude at medical school. After graduating, she found it difficult to convince the chairman that she was the right candidate for neurosurgical residency. However, her biggest obstacle was 'believing it was possible to become a neurosurgeon.' Unfortunately, she still experienced racism during her residency. A colleague once said: 'Oh, you must be our new equal-opportunity package.'

Due to her work as a neurosurgeon, the hospital achieved national recognition as a top pediatric neurosurgery department. After only 4 years she became the chief. She also continued doing research, which led to the invention of a programmable antisiphon shunt to treat hydrocephalus. She became known for her "patient-care first" techniques and received a lot of awards.

It was only later that she realized what an inspiration she was to other women and African-Americans: 'It later became clear to me that it was more significant than I realized'. After retiring, Canady nowadays gives commencement speeches and encourages young women a career in medicine.

MARY JACKSON

Mary Jackson was born and raised in Hampton, Virginia, where she graduated from a segregated Hampton Institute in 1942 with multiple degrees in mathematics and physical science. This was not an easy task, as career opportunities were extremely limited for Black women at that time.

Before joining the National Advisory Committee for Aeronautics (NACA) in 1951, she began her career teaching math and later worked as a military secretary. At the NACA, Jackson began as a research mathematician but transitioned engineering in the Supersonic Pressure Tunnel in a segregated division.

It was a struggle to advance in this position, as she needed to start a petition to complete graduate level night courses at an only white school. Besides racial struggles, she also had to work harder than her white male colleagues to prove herself in a field dominated by men. Successfully, she was promoted in 1958 to aerospace engineer, marking history as NASA's first black female engineer.

Mary Jackson retired in 1985, leaving a legacy and inspired many others by writing multiple books about her career struggles. In 2020, NASA acknowledged and tributed its Washington, D.C., headquarters to Mary W. Jackson, highlighting the importance of her work and inspirations.

*"I plan on being an engineer at NASA...
I have no choice but to be the first."*

= MARY JACKSON =



"I still feel that my own good country, noble as she is, robbed me of the chance for some of the great experiences that I would have liked to live through. Instead, I had to do like many Americans, I took a job where I could get one, and I tried to make the best of it."

= PERCY JULIAN =



PERCY JULIAN

Dr. Percy Julian was a scientist who became well known for his contributions to the pharmaceutical industry, despite the enormous obstacles he faced during his career because of his black skin color.

Percy Lavon Julian was born in 1899 in Montgomery, Alabama. He grew up in a time where education beyond the eight grade was very rare for African-Americans. He graduated from DePauw university, after which he attended Harvard university, where he finished his master's degree. However, because of his skin color, he didn't get the possibility to pursue his doctorate at this university.

After obtaining his PhD at the university of Vienna in 1931, he returned to DePauw university. At DePauw university, he synthesized physostigmine, the first drug treatment for glaucoma. Even after this discovery, he was still denied the status of professor because of his black skin color.

Julian's determination led him to significant breakthroughs in chemistry. His pioneering work at the Glidden Company, including the synthesis of progesterone, testosterone and cortisone from soybeans, revolutionized the pharmaceutical industry. This last discovery made cortisone production on an big scale possible. Because of this bigger production, the use of cortisone in the treatment of rheumatoid arthritis was finally possible on a commercial scale.

Dr. Percy Julian achieved great results in his career, even with all the obstacles he endured. His story is a great inspiration to many about perseverance and the fight against injustice.

RESOURCES

PREFACE

- Asmal, L. Lamp, G. Tan, E.J. (2022) *Considerations for improving diversity, equity and inclusivity within research designs and teams*. Psychiarty Res. Volume: 307:114295. Available via: <https://pubmed.ncbi.nlm.nih.gov/34871875/>
- Figueiredo, D. (2023) *Walking through the Leaky Academic Pipeline in STEM: Equity Not Equality Needed for Women and under Represented Minorities (URMs)*. IntechOpen. DOI: 10.5772/intechopen.111538. Available via: <https://www.intechopen.com/chapters/87062>
- Ysseldyk, R. Greenaway, K.H., Hassinger, E., Zutrauen, S., Lintz, J., Bhatia, M.P., Frye, M., Starkenburg, E., Tai, V. (2019) *A Leak in the Academic Pipeline: Identity and Health Among Postdoctoral Women*. Front. Psychol. Volume: 10:1297. Available via: <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2019.01297/full>
- Spaans, I., de Kleijn, R., Seeleman, C., Dilaver, G. (2023) ‘A role model is like a mosaic’: reimagining URiM students’ role models in medical school. BMC Medical Education, Volume: 23:396. Available via: <https://bmcmmededuc.biomedcentral.com/articles/10.1186/s12909-023-04394-y>

ALAN TURING

- British Broadcasting Corporation (2015) Alan Turing: Creator of modern computing. Available via: <https://www.bbc.co.uk/teach/articles/zhwp7nb>
- Research Institute for Mathematics & Computer Science in the Netherlands. Alan Turing. Available via: <https://www.cwi.nl/en/events/past/turing/over-alan-turing/>

ALEXA IRENE CANADY

- Wikipedia, available via: https://en.wikipedia.org/wiki/Alexa_Canady
- Biography of Dr. Alexa Irene Canady from Changing the Face of Medicine. Available via: https://cfmedicine.nlm.nih.gov/physicians/biography_53.html
- Biography of dr. Alexa Irene Canady from the National Library of Medine. Available via: https://www.nlm.nih.gov/exhibition/opening-doors/bio_Alexa_Canady.html
- Ojukqu, D. & Stone McGuire, L. (November 25, 2020) Women in Neurosurgery — A Legacy of Achievement and Breaking Barriers. Neurosurgery Blog. Available via: <https://www.neurosurgeryblog.org/2020/11/25/women-in-neurosurgery-a-legacy-of-achievement-and-breaking-barriers/>
- Nelson-Gabriel, M. Pensacola’s Dr. Alexa Canady: Saving children’s lives while blazing a trail. Pensacola News Journal. Available via: <https://eu.pnj.com/story/news/2017/11/20/pensacola-alexa-canady-first-african-american-female-neurosurgeon/867122001/>
- The Biography.com Editors (September 3, 2020) Alexa Canady Biography. The Biography.com website Available via: <https://www.biography.com/scientists/alexa-canady>
- Brame, K. (June 1, 2021) Alexa Canady. Blacklisted culture, Volume II, Issue 11. Available via: <https://blacklistedculture.com/alexa-canady/>
- Shaw, G. (February 24, 2020) Black History Month Honors Alexa Canady, MD: First African-American Woman Neurosurgeon. Women in Medicine blog, Indiana University School of Medicine. Available via: <https://medicine.iu.edu/blogs/women-in-medicine/black-history-month-honors-alexa-canady-md-first-african-american-woman-neurosurgeon>

ANTONIE VAN LEEUWENHOEK

- Wikipedia, available via: https://nl.wikipedia.org/wiki/Antoni_van_Leeuwenhoek
- Britannica Editors (2025) Antonie van Leeuwenhoek. Britannica, available via: <https://www.britannica.com/biography/Antonie-van-Leeuwenhoek>
- University of California Museum of Paleontology, Antonie van Leeuwenhoek (1632-1723). Available via: <https://ucmp.berkeley.edu/history/leeuwenhoek.html>

RESOURCES

BART SPEE

- Information obtained via personal communication with dr. Bart Spee.

BEN BARRES

- Huberman AD (2018) Ben Barres (1945-2017). Nature 553, 282. Available via: <https://www.nature.com/articles/d41586-017-08964-1>
- Wikipedia, available via: https://en.wikipedia.org/wiki/Ben_Barres#Legacy
- Standford Medicine Magazine. Deciding to change: An excerpt from the autobiography of a transgender scientist. Psychiatry & Mental Health, Fall 2018. Available via: <https://stanmed.stanford.edu/ben-barres-autobiography-transgender-scientist/>
- Svoboda E (2018) Ben Barres: A transgender scientist shares his story. The Transmitter. Available via <https://www.thetransmitter.org/spectrum/ben-barres-transgender-scientist-shares-story/>

CARMEN SANDI

- Gerschenfeld A (2018) Carmen Sandi: “There’s a causal link between mitochondrial function and rank in social hierarchy”. AR Magazine, Champalimaud Foundation. Available via <https://magazine.ar.fchampalimaud.org/carmen-sandi-there-is-a-causal-link-between-mitochondrial-function-and-rank-in-social-hierarchy/>
- Hollis F, van der Kooij MA, Zanoletti O, Lozano L, Canto C, Sandi C (2015) Mitochondrial function in the brain links anxiety with social subordination. Proceedings of the National Academy of Sciences, 112(50), 15486–15491.
- Federation of European Neuroscience Societies (2018) Message from the new FENS President: Carmen Sandi. Available via: <https://www.fens.org/news-activities/news/message-from-the-new-fens-president-carmen-sandi>
- Brain & Behaviour Research Foundation (2024). Carmen Sandi, Ph.D. Available via <https://bbrfoundation.org/about/people/carmen-sandi-phd>

CAROLINE SOLOMON

- Signing Math & Science, STEM Workforce Stories for Adolescents Who Are Deaf or Hard of Hearing (SWS). Available via: <https://signsci.terc.edu/SWS/cs.html>
- Deaf STEM Journey: Caroline Solomon – Biological Oceanographer. Available via YouTube: <https://www.youtube.com/watch?v=guMcm1ajEAs>
- Wikipedia, available via: https://en.wikipedia.org/wiki/Caroline_M._Solomon

CAROLYN BERTOZZI

- NobelPrize.org [cited 2025 Apr 24]. Transcript from an interview with Carolyn Bertozzi. Available via: <https://www.nobelprize.org/prizes/chemistry/2022/bertozzi/224792-interview-transcript/>
- The Brown Daily Heral [cited 2025 Apr 22]. Nobel Prize-winning chemist Carolyn Bertozzi talks research, identity as LGBTQ+ woman. Available via: <https://www.browndailyherald.com/article/2023/12/nobel-prize-winning-chemist-carolyn-bertozzi-talks-research-identity-as-lgbtq-woman>
- Chemical & Engineering News [cited 2025 Apr 22] One on one with Carolyn Bertozzi. Available via: <https://cen.acs.org/biological-chemistry/One-on-one-with-Carolyn-Bertozzi/100/i12>
- Chemical & Engineering News [cited 2025 Apr 24]. Opinion: LGBTQ+ chemists react to Carolyn Bertozzi’s Nobel win. Available via: <https://cen.acs.org/careers/diversity/LGBTQ-chemists-react-Carolyn-Bertozzis/100/i42>
- Stanford University [cited 2025 Apr 24]. Carolyn Bertozzi | Chemistry. Available via: <https://chemistry.stanford.edu/people/carolyn-bertozzi>

RESOURCES

CHARLOTTE ROUGHTON

- Charlotte Roughton — Neuroinclusion in STEM Available via: <https://www.neuroinclusioninstem.com/stories/charlotte-roughton?rq=autism>
- LinkedIn [cited 2025 Apr 22] Charlotte G. Roughton, PhD AFHEA RSci. Available via: <https://www.linkedin.com/in/charlotte-roughton/>
- Society M. LGBTQ+ STEM Day: Charlotte Roughton [cited 2025 Apr 22] Available via: <https://microbiologysociety.org/blog/lgbtq-stem-day-charlotte-roughton.html>
- Levy A. (2025) How to be a brilliant ally to your neurodivergent lab mate. Nature Careers Podcast. Available via: <https://www.nature.com/articles/d41586-025-00125-z>

CHIEN-SHIUNG WU

- United States Environmental Protection Agency. (2021) Women in Radiation History: Chien-Shiung Wu. Available via: <https://www.epa.gov/radtown/women-radiation-history-chien-shiung-wu>
- Encyclopaedia Britannica (2019) Chien-Shiung Wu | Chinese-American physicist. Available via: <https://www.britannica.com/biography/Chien-Shiung-Wu>
- Wikipedia, available via: https://en.wikipedia.org/wiki/Chien-Shiung_Wu#Honors
- Worthen M (2024) Chien-Shiung Wu. Biography.com, available via: <https://www.biography.com/scientist/chien-shiung-wu>

EMERY HALEY

- Emery Haley via X.com (Z.D.) https://x.com/i/flow/login?redirect_after_login=%2FEmeryHaley2
- Van Andel Institute (July 1, 2020), Graduate student spotlight: Investigating molecular ‘gates’ to understand and treat disease. Available via: <https://www.vai.org/article/graduate-student-spotlight-investigating-molecular-gates-to-understand-and-treat-disease/>
- Science Connected Magazine (2024) Emery Haley. Available via: <https://magazine.scienceconnected.org/emery-haley/>
- MyMyelomaTam writing staff (february 1, 2024) MyMyelomaTeam Writing Staff | Emery Haley, Ph.D. A vailable via: <https://www.mymyelomateam.com/writers/62e1949cd9e5c87cb875df85>
- Washington University in St. Louis, Caroline M. Solomon, available via: <https://sites.wustl.edu/inclusion/people/caroline-m-solomon/>

HAYAT SINDI

- National Geographic. Explorer Profile: Hayat Sindi, Biotechnologist. Available via: <https://education.nationalgeographic.org/resource/explorer-profile-hayat-sindi-biotechnologist/>
- Broomhall E (2012) Hayat Sindi interview: A passion for science. Arabian Business. Available via: <https://www.arabianbusiness.com/gcc/hayat-sindi-interview-passion-for-science-453690>
- World Economic Forum. Hayat Sindi. Available via: <https://www.weforum.org/people/hayat-sindi-d22cf44812/>

HYON YOUK

- Inglis, G. (2021) LGBTQ+ STEM Day 2021: an interview with Hyun Youk and Kelsey Stilson on queer experiences in STEM. Communications Biology. Volume 4:1300. Available via: <https://www.nature.com/articles/s42003-021-02829-0>

IBN SINA

- Wikipedia, available via: <https://en.wikipedia.org/wiki/Avicenna>
- Gutas, D (1987). Avicenna ii. Biography. In Yarshater, E. (ed.). Encyclopædia Iranica, Volume III/1: Ātaš–Awā’el al-Maqālāt. London and New York: Routledge & Kegan Paul. pp. 67–70. ISBN 978-0-71009-113-0.
- Gutas, D (2014). Avicenna and the Aristotelian Tradition: Introduction to Reading Avicenna’s Philosophical Works. Second, Revised and Enlarged Edition, Including an Inventory of Avicenna’s Authentic Works. Leiden: Brill. ISBN 978-9004201729.
- Madelung, W. (1975). The Minor Dynasties of Northern Iran. In Frye, Richard N.. (ed.). The Cambridge History of Iran, Volume 4: From the Arab Invasion to the Saljuqs. Cambridge: Cambridge University Press. pp. 595–633. ISBN 0-521-20093-8.
- Aligabi Z (2020). Reflections on Avicenna’s impact on medicine: his reach beyond the middle east. J Community Hosp Intern Med Perspect. Vol. 4:310–312.

RESOURCES

JOHANNA WESTERDIJK

- Utrecht University, Who was Johanna Westerdijk? Available via: <https://www.uu.nl/en/organisation/westerdijk-anniversary/who-was-johanna-westerdijk>
- University Museum Utrecht, Johanna Westerdijk. Available via YouTube: <https://www.youtube.com/watch?v=4U7Mi3CDVMM&t=30s>
- University Museum Utrecht (October 21, 2020) Johanna Westerdijk. Available via: <https://umu.nl/collectie-verhaal/johanna-westerdijk/>

KAMALA SOHONIE

- Wikipedia, available via: https://en.wikipedia.org/wiki/Kamala_Sohonie
- CivilDaily (2023) Kamala Sonhie: First Indian Woman to earn PhD. Available via: <https://www.civildaily.com/news/kamala-sohnie-first-indian/>
- Mitra A (2016) The life and times of Kamal Bhagvat Sonhie: The unsung hero of science in India. Resonance 21(3)0301-0314. Available via: <https://www.ias.ac.in/public/Volumes/reso/021/04/0301-0314.pdf>

KIZZMEKIA CORBETT

- Kamin, D. (February 9, 2023) Transforming spaces - She Helped Unlock the Science of the Covid Vaccine. The New York Times. Available via: <https://www.ncbi.nlm.nih.gov/search/research-news/18200/>
- Wikipedia, available via: https://en.wikipedia.org/wiki/Kizzmekia_Corbett
- Summit Leadership Partners (March 20, 2021) Reaching the Summit: Leadership Lessons from Historical GreatsDr. Kizzmekia Corbett. Available via: <https://www.summitleadership.com/reaching-the-summit-leadership-lessons-from-historical-greats-dr-kizzmekia-corbett/>

LI SHIU TONG

- Wikipedia, available via: https://en.wikipedia.org/wiki/Li_Shiu_Tong
- Marhoefer L (2022) The Asian Canadian gay activist whose theories on sexuality were decades ahead of their time. The Conversation, available via: <https://theconversation.com/the-asian-canadian-gay-activist-whose-theories-on-sexuality-were-decades-ahead-of-their-time-180834>

MAE JEMISON

- Boulo Solutions. Black Herstory Month: Mae Jemison. Available via: <https://boulosolutions.com/black-herstory-month-mae-jemison/#:-:text=Her%20biggest%20obstacle%2C%20in%20her,experienced%20racial%20discrimination%20in%20school>
- Google Arts & Culture. Mae Jemison. Available via: <https://artsandculture.google.com/entity/mae-jemison/m01cmn5>
- Conlon AM. Mae Jemison. The first Black women to go into space. New Scientist, available via: <https://www.newscientist.com/people/mae-jemison/>
- National Aeronautics and Space Administration (NASA). Mae Jemison, M.D. Available via: <https://www.nasa.gov/people/mae-jemison-m-d/>

MAGNUS HIRSCHFELD

- Djajic-Horváth A. Magnus Hirschfeld. Britannica, available via: <https://www.britannica.com/biography/Magnus-Hirschfeld>
- United States Holocaust Memorial Museum (2021) Magnus Hirschfeld. Available via: <https://encyclopedia.ushmm.org/content/en/article/magnus-hirschfeld-2>
- Murphy A (2022) Pioneering sexologist Magnus Hirschfeld. Europeana, available via: <https://www.europeana.eu/en/stories/pioneering-sexologist-magnus-hirschfeld>

RESOURCES

MARIE CURIE

- Wikipedia, available via: https://nl.wikipedia.org/wiki/Marie_Curie
- Women's Voices Now. Marie Curie: Discovered Radioactivity But Faced Sexism in Science. Available via: <https://www.womensvoicesnow.org/marie-curie>
- Grodyńska B (2023) Maria Skłodowska-Curie: A Catalyst for Women in STEM. The Average Scientist, available via: <https://theaveragescientist.co.uk/2023/09/28/maria-skłodowska-curie-a-catalyst-for-women-in-stem/>

MARIE MAYNARD DALY

- Kaplan J (2024) Marie Maynard Daly. Science History Institue, Museum & Library. Available via: <https://www.sciencehistory.org/education/scientific-biographies/marie-maynard-daly/>
- Colombia University, Graduate School of Arts and Sciences (2023) Ceremony Honors Dr. Marie Maynard Daly, the first Black woman in the U.S. to earn a PhD in chemistry. Available via: <https://www.gsas.columbia.edu/news/ceremony-honors-dr-marie-maynard-daly-first-black-woman-us-earn-phd-chemistry>
- Radulovski A (2024) 7 Black women in STEM who made history. Women in Tech Network, available via: <https://www.womentech.net/blog/7-black-women-in-stem-who-made-history>

MARGARITA SALAS FALGUERAS

- Margarita Salas. Biografia. Instituto Cervantes. Available via: https://www.cervantes.es/bibliotecas_documentacion_espanol/creadores/salas_margarita.htm
- Ferrero, Clara (November 8, 2019) As consiguió Margarita Salas que la dejaran de tratar como 'la mujer de'. El País. Available via: <https://elpais.com/smoda/feminismo/asi-consiguio-margarita-salas-que-la-dejaran-de-tratar-como-la-mujer-de.html>

MARY JACKSON

- Melfi T (director; 2016) Hidden Figures. Movie distributed by 20th Century Fox.
- National Aeronautics and Space Administration (NASA; 2020). NASA Names Headquarters After 'Hidden Figure' Mary W. Jackson. Available via: <https://www.nasa.gov/news-release/nasa-names-headquarters-after-hidden-figure-mary-w-jackson/>
- Shetterly ML (2016) Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race. ISBN 978-0-00-820132-6.

MARY MUNSON RUNGE

- Biomatrix Specialty Infusion Pharmacy (February 5, 2024) Mary Munson Runge: A Trailblazer in Pharmacy. Available via: <https://www.biomatrixsprx.com/news/mary-munson-runge-a-trailblazer-in-pharmacy>
- African American Registry., Mary Munson Runge. Available via <https://aaregistry.org/story/mary-munson/>
- Clark, J. (December 2022) An Historical Perspective of African American Women in Professional Pharmacy Associations, 1900-1970. Pharmaceutical Historian, Volume 52, N]umber 4, pp. 115-127(13). Available via <https://www.ingentaconnect.com/content/bshp/ph/2022/00000052/00000004/art00003>

PERCY JULIAN

- The Biography.com Editors (April 16, 2021) Percy Julian Biography. The Biography.com website Available via: <https://www.biography.com/scientists/percy-julian>
- Julian P. L.(1935) Studies in the indole series. V. The complete synthesis of physostigmine (eserine). J. Am. Chem. Soc. 57, 755-757
- Wikipedia, available via: https://en.wikipedia.org/wiki/Percy_Lavon_Julian

RESOURCES

PRIYANKA VERMA

- Verma, P. (March 8, 2022) PhD and pregnant: How this researcher used motherhood as a motivator. Silicon Republic. Available via: <https://www.siliconrepublic.com/people/motherhood-women-in-stem-researcher>
- Biography of Dr. Priyanka Verma from the University of Galway. Available via: <https://www.universityofgalway.ie/our-research/people/engineering/priyankaverma/>

ROSALIND FRANKLIN

- Elkin, L. (2012) Rosalind Elsie Franklin | Jewish Women's Archive. Jwa.org. Available via: <https://jwa.org/encyclopedia/article/franklin-rosalind>
- The Editors of Encyclopaedia Britannica (April 12, 2024). Rosalind Franklin - British scientist.. Encyclopædia Britannica. Available via: <https://www.britannica.com/biography/Rosalind-Franklin>
- Biography of Dr. Rosalind Franklin from the Rosalind Franklin University. Available via: <https://www.rosalindfranklin.edu/about/facts-figures/dr-rosalind-franklin/#:~:text=Throughout%20her%20work%20at%20King>

RUTH ELLA MOORE

- Johnson-Thompson, M. (February 29, 2024) Ruth E. Moore: Remarkable Achievements in an Invisible Life. American Society for Microbiology. Available via: <https://asm.org/articles/2024/february/ruth-e-moore-remarkable-achievements-in-an-invisib>

SANG-MOOK LEE

- The Royal Society. Sang-Mook Lee. Available via: <https://royalsociety.org/about-us/who-we-are/diversity-inclusion/case-studies/scientists-with-disabilities/sang-mook-lee/>
- Wikipedia, available via: https://en.wikipedia.org/wiki/Lee_Sang-mook
- NOVA (2009) The Unstoppable Sang-Mook Lee. Available via: <https://www.pbs.org/wgbh/nova/article/lee-oceanography/>

TEMPLE GRANDIN

- Grandin, T. (2006) Thinking in Pictures, Expanded Edition: My Life with Autism (Expanded ed. edition). Vintage.
- Keltner, D.. (April 3, 2023) Temple Grandin Shares Her Journey With Autism. Greater Good. Available via: https://greatergood.berkeley.edu/article/item/temple_grandin_shares_her_journey_with_autism
- Grandin, T. (n.d.). Temple Grandin's Official Autism Website. Available via: <https://www.templegrandin.com/>
- The Editors of the Encyclopaedia Britannica - Temple Grandin - American scientist and industrial designer. Encyclopædia Britannica. Available via: <https://www.britannica.com/biography/Temple-Grandin>

TIGIST TAMIR

- Tamir, T. (2023) Being neurodivergent in academia -Working with my brain and not against it eLife, Volume 12:e95068.. Available via: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10712947/pdf/elife-95068.pdf>
- Biography of Dr. Tigist Tamir from LinkedIn. Available via: <https://www.linkedin.com/in/tigist-tamir/>

WANDA DÍAZ-MERCED

- Biography of Dr. Wanda Diaz-Merced via the Mona Minkara website. Available via: <https://monaminkara.com/fellow-blind-scientists#gsc.tab=0>
- Speaker information of Dr. Wanda Diaz-Merced via the TED website. Available via: https://www.ted.com/speakers/wanda_diaz_merced
- BBC (November 6, 2017) 100 Women: Seven trailblazing women in science. Available via: <https://www.bbc.com/news/science-environment-41861232>

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