

WOMEN IN

STEM FIELDS



BY ACI-35

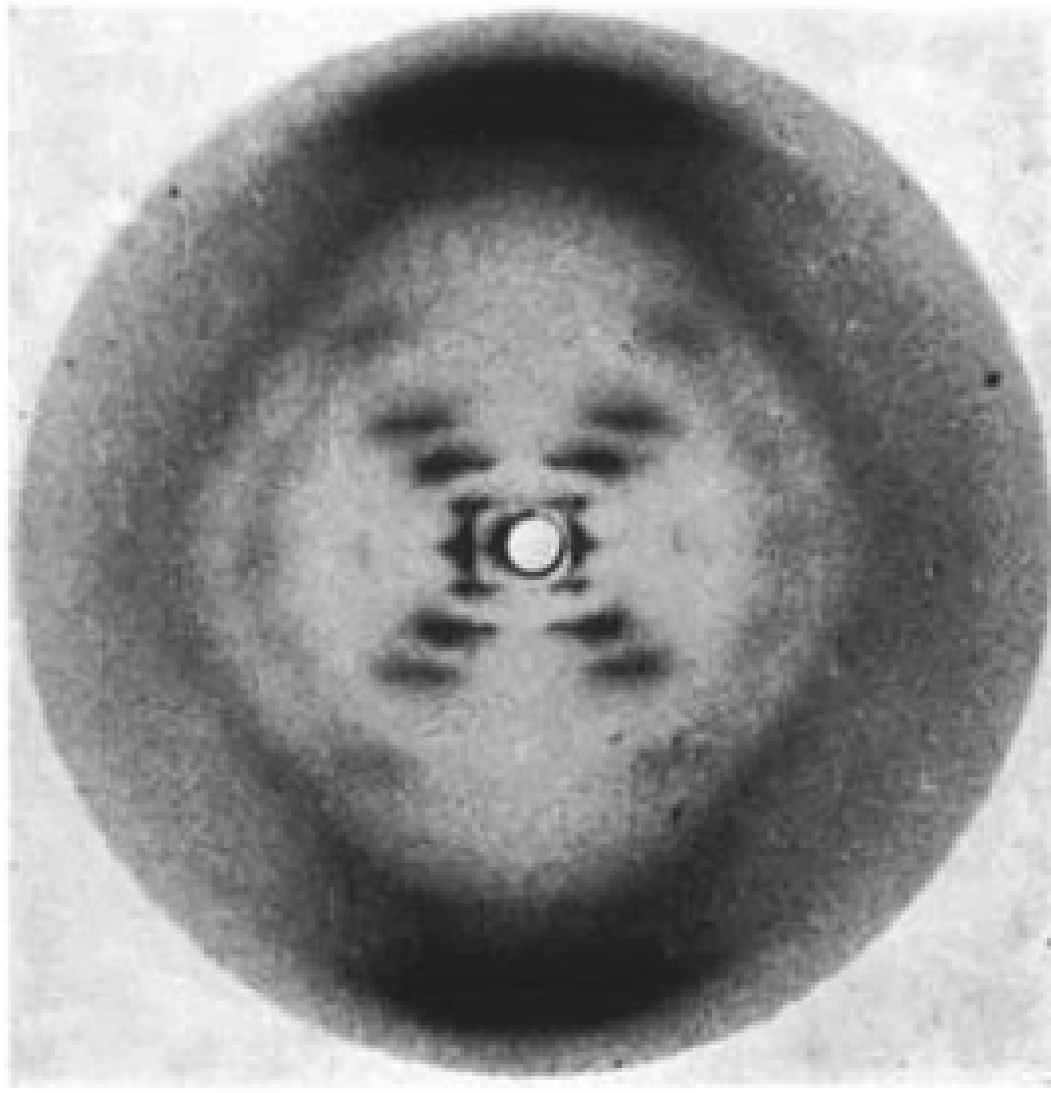


The Woman Who Radically Changed Biology:

Rosalind Franklin and Photography 51

Do you know how the discovery of DNA, one of the most fundamental areas of biology, was made?

Photo 51, obtained by British chemist Rosalind Franklin in 1952, is an X-ray image of a DNA sample obtained from human tissue.



The reason why it is important is that it is the first photograph in history to show that DNA has a helical structure. Rosalind Franklin, who made a discovery that would deeply affect the scientific world, was the first to discover the three-dimensional DNA model, which is now known as the Watson-Crick model.

Franklin, who worked in the laboratory with her assistant Wilkins, succeeded in obtaining a high-resolution DNA photograph using the X-ray crystallography method. Photograph 51, which resembles an X-shape when viewed with the naked eye, signified for Rosalind Franklin what all geneticists suspected from the beginning: the double helix of DNA.

At the same time, there were two other researchers at the University of Cambridge, about 80 km from King's College, where Franklin worked, investigating the structure of DNA. Watson and Crick, unlike Franklin, were trying to conclude literature research without doing laboratory work.

Unbeknownst to her, Franklin finds a groundbreaking photograph that falls into the hands of her colleagues Watson and Crick. As a result of Franklin's being caught in the glass ceilings of the academic environment she was in, Watson and Crick built their own models on top of Franklin's invention before she could complete her analysis. Watson and Crick, who discovered the chemical interactions in the helical structure of DNA, published an epoch-making article in genetics in the journal *Nature* in 1953.



Seeing that the efforts of Rosalind Franklin are at the core of the discovery of DNA, on which we build all the science of genetics today, is perhaps a key to realizing the place of women in STEM fields today.

More Than Just a Pair of Scissors

Emmanuelle Charpentier, Jennifer A. Doudna and CRISPR Cas-9



Seventy years ago, we said that DNA was created thanks to the work of Rosalind Franklin. What if we say that this can change, cut, and trim the DNA, which we know to be the only true one, where all our genetic information is recorded? In 2020, the Nobel Prize in Chemistry was awarded to French microbiologist Emmanuelle Charpentier and US biochemist Jennifer A. Doudna "for their contributions to the development of the "CRISPR-Cas9" system that allows cutting and reassembling DNA strands. Let's take a closer look at this new technology.

CRISPR-Cas9, also known as the "Technology That Can Perform Surgery on DNA", is an application that has created excitement in the scientific world with the 2020 Nobel Prize in Chemistry. In its shortest and most accurate form, CRISPR-Cas9 is a genome, that is, a gene-editing tool. In other words, it is a unique technology that allows geneticists and medical researchers to add, subtract, or change the DNA sequence on DNA. CRISPR-Cas9, which is faster, cheaper, and has a higher accuracy rate than any technique used to date, also has a wide range of applications.

CRISPR refers to the repetitive gene sequences that define the CRISPR region on an organism's DNA sequence. Although the sequences of repetitions are exactly the same for a living being, the sequences of intervals between these repetitions differ from each other. Cas is the general name of the proteins involved in this immune system.

In 2012, a team led by Jennifer Doudna developed an app that could cut, isolate, and edit the creature's DNA. In short, an active Cas9 protein, all they needed to cut DNA with high precision and accuracy was a pair of scissors that could cut the sequence of that DNA. Based on this, the RNA molecule corresponding to this base sequence of DNA was created and this RNA molecule was combined with the Cas9 protein to form a complex.

CRISPR-Cas9 technology is actually scissors that are known as the solution of the future for many genetic diseases such as cancer, hepatitis B, and cholesterol, which allows cutting from the desired DNA region. Would Rosalind Franklin have imagined that seventy years later, the DNA she photographed would be cut and slashed by women who broke new ground in biology and cured many diseases?



“The Troublemaker” Woman

Canan Dağdeviren and Batteries, Needles, and others



Canan Dağdeviren is the first Turk to be elected as a member of Harvard University's Young Fellowship. Dağdeviren, who managed to enter the 'Scientist Under 30' list of Forbes, one of the prestigious magazines of the USA, with her inventions, is also a name that has her name written on the 'Inventors Under 35 List' announced by MIT every year.

The story of Dağdeviren, who has achieved such important success,

begins in Kocaeli. Two books made her decide to study physics in college. The first of these is a book about the chemist and physicist Marie Curie, and the other is the work titled 'Memories and Thoughts', which Prof. Erdal İnönü, one of Turkey's most important theoretical physicists, personally gave to her at the book fair. Although no one around her, except her mother, believed that a woman could become a physicist, she continued to walk the path she chose.

In less than ten seconds, Dağdeviren, who works in the field of medical technology, invented a device that would facilitate the diagnosis of diseases such as skin cancer. The device, which maps the disease of its location, detects the deformation on the skin thanks to sensors and collects the data on the computer with electrical connections.

Another invention of Dağdeviren is the flexible and wearable pacemaker, which can convert mechanical energy into electrical energy by attaching it to the heart, lungs and diaphragm. The pacemakers used today have a lifespan of five to seven years, and if they lose their function, the mechanism must be replaced with a risky surgery. However, this device invented by Dağdeviren produces the necessary energy itself.

Another invention is a brain needle that will make life easier for Parkinson's patients. This needle, which allows drugs used in the fight against Parkinson's to be injected directly into the brain, will help treat patients' coordination disorders.

"Don't rock the boat" is unnecessary. People should be self-reliant. I think anyone can do anything. As long as they want to."

Reaching for the Stars

Mae Jemison: First Black Woman in Space



As a doctor, engineer, and NASA astronaut, the world was not the limit for Mae Jemison. Everyone wants to go into space when they are young, Jemison's influence was African American actress Nichelle Nichols, who played Lieutenant Uhura on the Star Trek television show, and she was determined to travel in space one day.

Jemison graduated from Stanford University in 1977 with a bachelor's degree in chemical engineering and African-American studies and attended Cornell

Medical School.

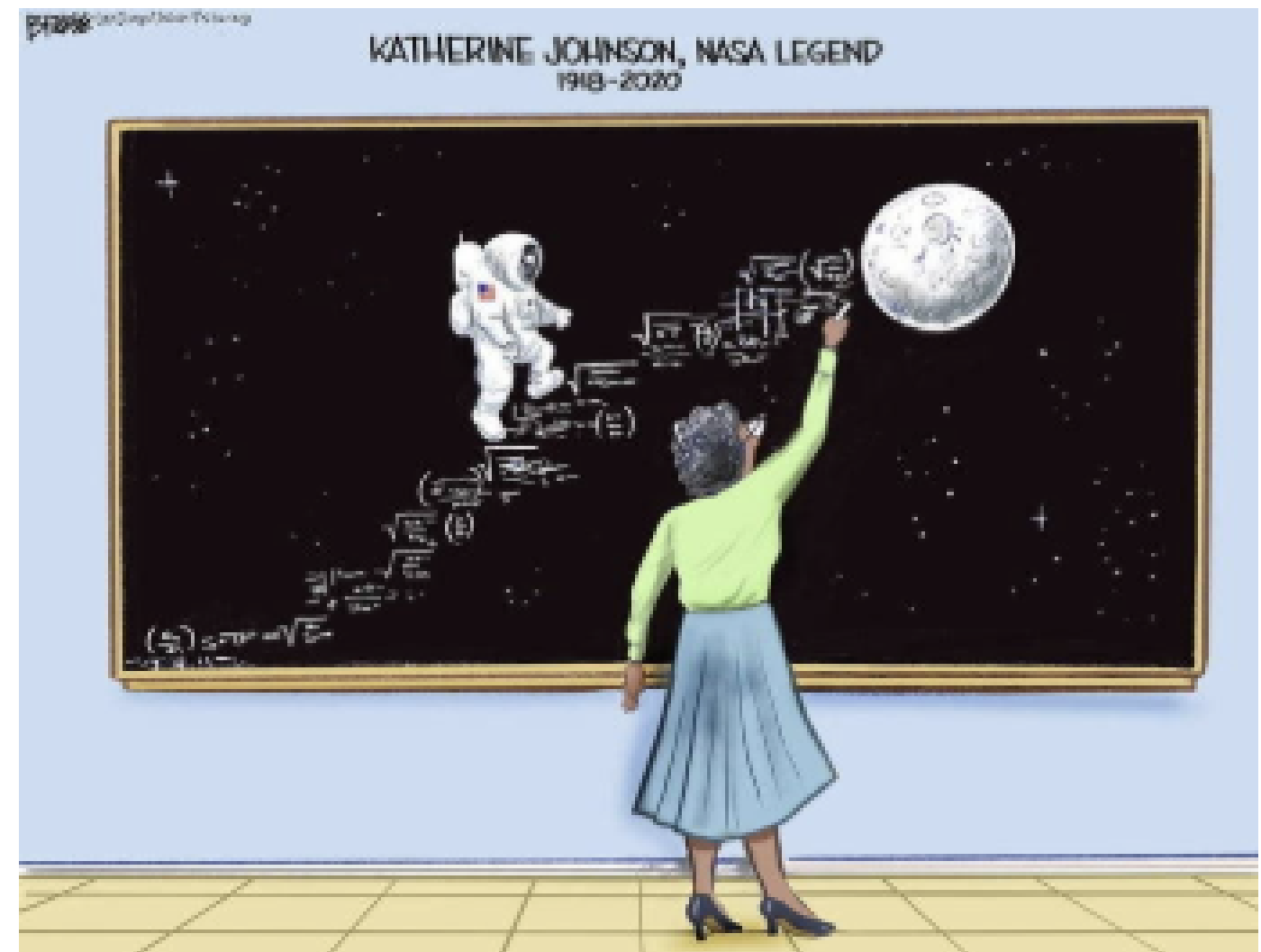
Spearheaded by Sally Ride, the first American woman in space in 1983, Jemison decided to apply for NASA's astronaut program. He applied in 1985, but after the explosion of the Space Shuttle Challenger in 1986, NASA stopped accepting new people. Jemison applied again in 1987 and was one of 15 people selected from more than 2,000 applicants. After being selected, Jemison trained with NASA and worked on projects at the Kennedy Space Center and the Shuttle Avionics Integration Laboratory in Florida. She received her first assignment on September 28, 1989, when she was selected to join the STS-47 team as a Mission Specialist. On September 12, 1992, Jemison and six other astronauts went into space aboard the space shuttle Endeavour. This trip made Jemison the first African American woman in space. The team made 127 orbits around Earth and returned to the Kennedy Space Center in Florida on September 20, 1992.

Currently, Jemison is leading the 100 Years Starship project through the United States Defense Advanced Research Projects Agency (DARPA). This project is working to enable human space to travel to another star within the next 100 years. With so many stars to reach in front of her and many determined scientists like her coming after her.

NASA Mathematician and Astrophysicist

Katherin Johnson

Known for her contributions to NASA's Mercury and Apollo 11 Projects, Katherine Johnson is an American mathematician and astrophysicist who worked at NASA from 1953 to 1986. Johnson was born on August 26, 1918; From a young age, she was very interested in numbers. She started attending high school when she was 10 years old. After graduating from high school, she began studying Mathematics and French at West Virginia State University. After Johnson graduated, teaching was the only professional job offered to her because she was black. Therefore, she moved to Virginia to teach. In 1939, she was selected as one of the first three black students to enroll in a graduate program at West Virginia University.



When Johnson was 34 years old, she applied for a job at NACA. NACA was hiring women as "computers" during this period." These women's computers were doing math for engineers working on space programs. While at NACA, Johnson accomplished many things.

NACA was incorporated into the newly formed NASA in 1958. Shortly thereafter, Johnson made calculations of the rocket's trajectory mechanics to send the first American into space in 1961. She also made the calculations that sent America to the Moon in 1969. Johnson died on February 24, 2020, at the age of 101. To learn

more about Katherine Johnson, you can watch the movie "Hidden Figures."

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Then, NACA was incorporated into the newly formed NASA in 1958. Shortly afterwards, Johnson performed orbital mechanics calculations to send the first American into space in 1961. She also coontributed to the calculations that ultimately send Americans to the moon for the first time in 1969. Johson died on February 24, 2020 at the age of 101. To learn more about Katherine Johson, we reccomend the movie "Hidden Figures".

