Dame Elizabeth Anionwu **(1947 – present)**

Dame Elizabeth Nneka Anionwu was born Elizabeth Mary Furlong on 2nd July 1947 in Birmingham, England. Her Irish mother and Nigerian father were both studying at the University of Cambridge but did not stay together. Anionwu's childhood was unsettled. She spent the first nine years of her life in a Catholic children's home, and then moved between her mother's home, where her stepfather was physically abusive, and her grandparents' home. At 24, Anionwu found her father and later changed her surname to match his.

Anionwu was inspired to become a nurse by a 'wonderful nursing nun' at the children's home who helped to care for Anionwu's eczema. Anionwu left school early at 16 and started to work as a school nurse assistant. At 17, she applied to train as a nurse at several London hospitals but received no replies, putting this down to institutional racism. She eventually trained as a nurse, a health visitor and a tutor, working with Black and Minority Ethnic communities in London. In these communities, she came across the diseases sickle cell and thalassemia, which she had not been taught about on her nursing course. These life-threatening conditions are the most commonly inherited blood disorders in the UK, with Black, Asian and Minority Ethnic communities the most at risk.

Anionwu had to travel to the USA for training on counselling sickle cell and thalassemia patients. She became the first ever sickle cell and thalassaemia nurse specialist in the UK and set up the first UK sickle cell and thalassaemia counselling centre in London. As a senior lecturer at the Institute of Child Health, Anionwu established a course called, 'Genetic Counselling for the Community: A Multi-Ethnic Perspective'. She then spent ten years as a Professor of Nursing at the University of West London.

Anionwu campaigned passionately for the recognition of 19th century Black nurse Mary Seacole. Despite contributing significantly to British medicine and healthcare, Seacole was often missing from historical records of the time. Anionwu supported a fundraising campaign for a statue of Seacole for 12 years until it reached its goal. In 2016, the statue was unveiled at St Thomas' Hospital, London. It was the first statue of a named Black woman in the UK. Anionwu was appointed Dame Commander of the Order of the British Empire (DBE) in 2017 for services to nursing and the Mary Seacole Statue Appeal.

Ernest Everett Just **(1883 – 1941)**

Dr Ernest E Just was born in 1883 in the USA. His father died when he was four, leaving him and his two siblings to be raised by their mother. During his second year of high school, he returned home to find that his mother had passed away. Despite the circumstances, he finished high school a year early and graduated in 1903 with the highest grades in his class.

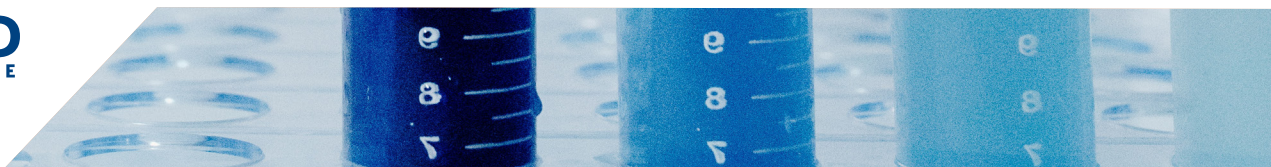
Just went on to study Biology at Dartmouth College and won many special honours while he was there. The faculty did not choose him to deliver a speech to graduating students because "It would be a faux pas to allow the only Black in the graduating class to address the crowd of parents, alumni, and benefactors."

Just graduated from college *magna cum laude*, which means 'with highest praise'. Despite this, as a Black graduate he found it almost impossible to become a faculty member at prestigious colleges or universities. Just took up a position teaching English at Howard University, which was a historically Black university. In 1910, he was put in charge of the new biology department and in 1912 became the head of the Department of Zoology, a position that he held until his death.

Just was one of the first African Americans to receive worldwide recognition as a scientist. His research focused on fertilisation of egg cells, and his skill in handling eggs and embryos was in great demand. Just published over 70 papers in cytology (the study of cells), fertilisation and early embryonic development. He recognised the important role of the cell surface in the development of organisms and advocated for the study of whole cells, instead of breaking them apart.

Just was briefly imprisoned in a Nazi prisoner-of-war camp while working in Europe. Although he was rescued, his health deteriorated, and he died in 1941.

BEYOND SCIENCE



Professor Frank Chinegwundoh **(1961 – present)**

Professor Frank Chinegwundoh, of Nigerian descent, is the first Black British urological surgeon. Urologists treat problems with the urinary system, including the kidneys, ureters, bladder, prostate and male reproductive organs. At the beginning of his career, Chinegwundoh was advised by a GP to change his name to a more English sounding one to increase the chances of his application being accepted. He refused to do this and was accepted at St George's Hospital Medical School, qualifying as a doctor in 1984. The first time that he applied for a position in A&E, he was not successful despite having a good CV and the qualifications he needed. Some years later, it was revealed that there was an automated application system in place which discriminated against those who were Black or female. Over his career, he has mentored young Black students who want to get into medical school. His experiences made him more determined, and he encourages Black students by showing them it is worth persisting with their applications.

Chinegwundoh has worked as a consultant studying prostate cancer since 1996 and is the urology lead at Newham University Hospital. He is an expert in the field of prostate cancer and sits on government advisory bodies. In 2006, he published the first paper in the UK to show that Black men have three times the risk of developing prostate cancer compared with White men. He has published book chapters and scientific research papers about the field. In 2013, he received an MBE for his services to the NHS.

Between 2001 and 2003, Chinegwundoh was the founding president of the Black and Ethnic Minority Health Section of the Royal Society of Medicine. Chinegwundoh is the chairman of Black Cancer Care, a charity set up within the Black and Minority Ethnic community. He has been involved in a project called 'Changing Lives', which works to engage Black African and Caribbean men at risk of or affected by prostate cancer. In 2011, he took part in a Sky TV initiative to use comedy to raise awareness of prostate cancer, which accounts for 24% of male cancer diagnoses in the UK.

Guion ‘Guy’ Bluford **(1942 – present)**

Guion ‘Guy’ Bluford was born in 1942 in Philadelphia, USA. He was the first of three sons born to Guion Bluford Sr, a mechanical engineer, and Lolita Bluford, a special education teacher. His parents encouraged academic success from an early age. Bluford graduated from high school in 1960, before going on to study for a degree in aerospace engineering at Pennsylvania State University. After graduating from university in 1964, he trained as a fighter pilot in the US Air Force and flew 144 combat missions in the Vietnam War, winning several medals for his service. Bluford then enrolled at the US Air Force Institute of Technology to obtain a master’s degree and a PhD in aerospace engineering. During this time, he wrote several scientific papers and served as a staff development engineer.

In 1978, Bluford was selected as one of 35 out of 10 000 applicants to become a NASA space shuttle astronaut. On 30th August 1983, Bluford became the first African American person to go into space. His first mission, STS-8, was the first space shuttle flight to have a night launch and a night landing. On the mission, the crew orbited the Earth 98 times in 145 hours while carrying out several important research projects, including testing a robotic arm and taking medical measurements to study the effects of space travel on the human body. Bluford went on to serve on the crew of three other space missions, including STS-61A, which holds the record for the largest crew to fly on a single spacecraft with eight crew members. In total, he logged over 688 hours in space.

Bluford received several medals in recognition of his NASA career, including the NASA Distinguished Service Medal and the NASA Exceptional Service Medal. He was also inducted into the International Space Hall of Fame in 1997, and the United States Astronaut Hall of Fame in 2010.

Katherine Johnson **(1918 - 2020)**

Katherine Johnson was born on 26th August 1918 in White Sulphur Springs, West Virginia. From a young age, Katherine loved maths. She even started high school early, when she was just 10 years old, and started taking college classes to become a mathematician at 15.

Katherine first worked as a teacher but, when she was 34, she heard that NACA (later called NASA) was hiring African American women to solve maths problems, as 'computers'. At this time, the word 'computer' didn't yet refer to electronic machines, but people who carried out calculations. Katherine applied for one of the jobs, but the jobs were already taken. She applied again the next year and, this time, she was hired, working with other female African American mathematicians on topics such as aerodynamics.

America had yet to put a human into space, and NACA was still trying to work out the maths behind working out a safe trajectory – all the factors that affected a flight so that the astronaut could land safely. Katherine's skill with mathematics, particularly geometry, made her ideal for this work, however, racial segregation between white and African Americans was still legally enforced at this time – African Americans attended different schools, ate in different cafeterias and used different bathrooms. Katherine's assertiveness and mathematical abilities helped her overcome some of these barriers, and she was reassigned to work on guidance and flight control in a group staffed by white male engineers. There, she made major contributions to human spaceflight in the United States.

Katherine continued working for NASA (after it was formed from NACA). She calculated the trajectory for the first American in space, and when electronic computers were first introduced, she checked their calculations (in fact, the astronaut, John Glenn, refused to fly unless Katherine had checked the results). She helped calculate the trajectory of flights to the moon, including Apollo 13. She continued working for NASA until 1988.

Lonnie Johnson **(1949 – present)**

Lonnie George Johnson was born in Alabama, USA in 1949. From a young age, he was interested in how things worked. Johnson's dad used to repair things around the house, and taught his children how to build their own toys. He also explained electricity to his son at an early age. Johnson says that he 'always liked to tinker with things' and led projects with the children in his neighbourhood, who called him 'The Professor'. Once, he used a lawnmower engine to build a motorised go-kart, which was stopped by the police because it was not street-legal.

Johnson attended an all-Black high school. During his final year there, he built a 1 metre tall, remote-controlled robot, which he called Linex. Linex was entered into a science fair which Johnson was the only Black student to attend. At the time, the country was trying to end segregation in schools and many White people were protesting because they didn't want their children to be exposed to Black children. This made it even more impressive that Linex won first place.

Johnson won an Air Force scholarship and a maths scholarship to Tuskegee University, a Black university. He graduated with a degree in mechanical engineering in 1973, followed by a master's degree in nuclear engineering in 1975. Johnson joined the United States Air Force and spent four years working on the stealth bomber programme. In 1979, he moved to NASA, where he worked on a variety of projects, including developing the nuclear power source for the Galileo mission to Jupiter. He returned to the Air Force in 1982, but spent his spare time pursuing his own inventions.

Johnson is most famous for his invention of the Super Soaker, a powerful water gun, which he came up with when working on the heat pump in his bathroom at home. In 1991, sales of the Super Soaker generated $200 million. He then adapted the design to replace the water with toy projectiles, and the Nerf gun was born. Johnson holds more than 250 patents, most of which are for these toys.

Johnson founded his own company in 1991 and has recently been working with other scientists to develop a method of transforming heat into electricity. It is hoped that this will make green energy more affordable.

Patricia Bath **(1942 – 2019)**

Dr Patricia Era Bath grew up in a deprived area of New York City where children, especially girls, did not often continue into higher education or professional careers. The closest high schools to her home only allowed boys or wealthy White families to attend, so Bath had to travel outside of her neighbourhood to continue her studies.

Bath received a degree in Chemistry, then began a doctorate degree at Howard University College of Medicine. Most doctors and medical students at this time were men. Female students faced additional restrictions, such as not being allowed to sit in the front row during lectures. Despite the discrimination she faced, Bath graduated with honours in 1968.

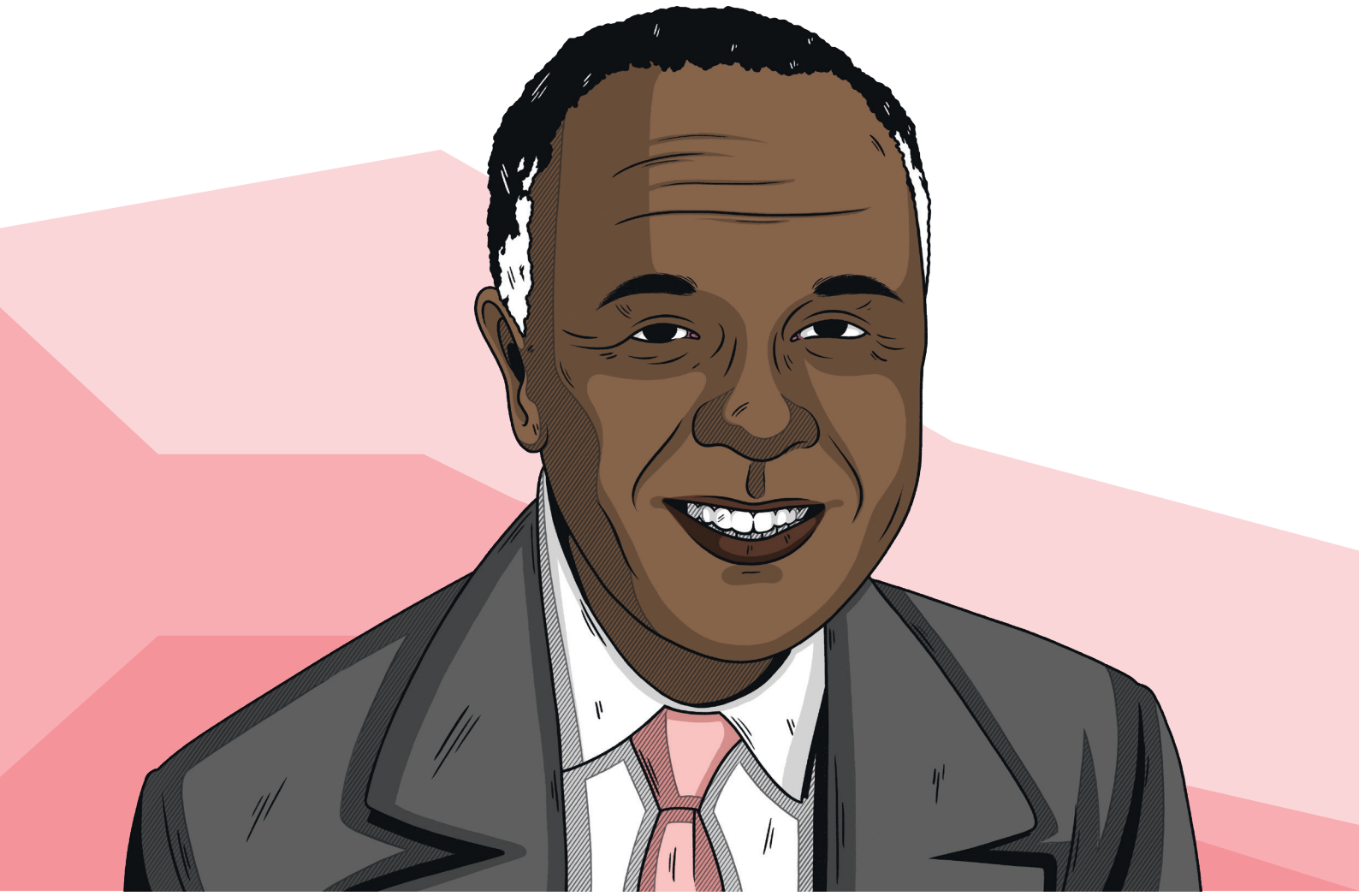
Bath returned to New York to undertake an internship at Harlem Hospital Centre. While working in the eye clinic, she noticed that Black people were losing their eyesight at higher rates than people of other ethnicities. Her research showed that Black people were twice as likely to suffer from blindness as White people and eight times as likely to suffer from glaucoma. Bath thought that these high rates were likely due to poor access to eye care, leading her to develop systems to offer preventative eye care and treatment to people living in deprived areas. In 1973, Bath became the first African American to complete an ophthalmology (medicine related to the eye) residency at New York University. A year later, she became the first full-time female faculty member in the Department of Ophthalmology at the Jules Stein Eye Institute.

In 1981, Bath began working on a device to remove cataracts using a less painful method than the one that was being used at the time. She completed her invention in 1986. In 1988, she became the first Black female doctor in the USA to receive a medical patent.

Bath believed that everyone has the right to sight and has been quoted as saying, “The ability to restore eyesight is the ultimate reward.”

BEYOND SCIENCE

Percy Lavon Julian **(1899 – 1975)**



Percy Lavon Julian was the first scientist to chemically **synthesise** the drug **physostigmine**. He also pioneered the large-scale production of the human **hormones** progesterone and testosterone. His work in the chemical synthesis of hormones led to the development of other important drugs such as the contraceptive pill.

After graduating from university, Julian took up a post as a chemistry teacher at Fisk University, then went on to obtain a master's degree in organic chemistry at Harvard University in 1923. He hoped to stay at Harvard to obtain a PhD, but his teaching assistantship was withdrawn as the university was worried that White students would resent being taught by an African American. Instead, Julian continued to teach at historically Black colleges, before receiving a scholarship to complete his studies at the University of Vienna, where he earned his PhD in 1931. He returned to DePauw University in 1933 and was hired as a research fellow.

Julian founded his own company, Julian Laboratories, where he synthesised steroids from Mexican yam. His research reduced the cost of steroids to drugs companies and helped expand the use of important drugs.

Julian overcame several challenges to become one of the first African Americans to receive a chemistry doctorate. He was the first African American chemist to become a member of the **National Academy of Sciences**.

BEYOND SCIENCE

Alice Ball (1892 – 1916)

Alice Augusta Ball was born in Washington in 1892 to a well-off family. Both of Ball's parents were members of the African American community but were listed as 'White' on her birth certificate. It has been suggested this was an attempt to reduce the racism that their daughter would face. At school, Ball achieved top grades in the sciences. She went on to study Chemistry at the University of Washington and earnt two bachelor's degrees, one in pharmaceutical chemistry and the other in pharmacy. While completing her second degree, she had an article published in a respected scientific journal. This was something that not many women, especially Black women, achieved at this time.

Ball was given a scholarship to study a master's degree in Chemistry at what is now the University of Hawaii. She graduated in 1915. During her time there, she studied the chemical properties of a plant species that has sedative properties. Because of her experience with plant chemistry, she was approached by Harry T Hollman to study chaulmoogra oil as a treatment for leprosy. Hollman was a surgeon who worked at a leprosy colony. At the time, patients with leprosy had almost no chance of recovery and were sent to the Hawaiian island of Molokai, where they were expected to die. The best treatment was chaulmoogra oil, but it wasn't very effective and was difficult to administer.

At 23, Ball developed a method to prepare the oil and make it suitable for injection. Unfortunately, Ball died a year later, before she could publish her findings. The chemist Arthur L Dean stole her work and took credit for the method to prepare the oil, naming the process after himself. The oil was used to successfully treat leprosy for 20 years.

In 1922, six years after Ball's death, Hollman published a paper giving credit to Ball and calling the method she developed the 'Ball Method'. In the 1970s, two professors at the University of Hawaii searched the archives to find Ball's research but it wasn't until 2000 that she finally gained the recognition she deserved. In 2000, the University of Hawaii finally honoured Ball by dedicating a plaque to her on a chaulmoogra tree in the grounds.