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Scientists today wield an arsenal of cutting-edge technology. Chemical engineers can turn CO2 into vodka, planetary scientists can work in outer space and physicists can manipulate single atoms in the lab. Researchers use these tools to figure out who we are and how we got here. Like Taylor Perron, a geomorphologist who searches for clues in planetary landscapes, or Monika Schleier-Smith, a physicist testing the mechanical rules of the quantum realm. They also confront humanitarian crises. By 2050, climate change will cause 250,000 deaths per year. Corinne Le Quéré traces greenhouse gases through air, land and sea, while Paul Anastas innovates ways to reduce their emissions in the first place. Meanwhile, cancer rates will increase by nearly 50 percent in the same timeframe. Carolyn Bertozzi invented a new field of chemistry that could spawn efficient cancer treatments. These scientists embody the chief objectives of science — to push the frontiers of what we know and to advance human welfare along the way. 1. Paul Anastas: The Father of Green Chemistry(Credit: Jo karen/Shutterstock)When you think of chemists, you might picture pollutants and health hazards. But Paul Anastas flips that perception on its head. Anastas founded green chemistry in the 1990s to reduce toxic wastes from chemical processes. In addition to his research on sustainable chemistry at Yale, he has advised the Environmental Protection Agency and the White House on environmental issues surrounding 9/11, the nuclear disaster at Fukushima and the BP oil spill. He even enters the board room and helps make Fortune 100 companies more sustainable. His work is transforming our future. Read more: Scientist You Should Know: Paul Anastas is the Father of Green Chemistry2. Carolyn Bertozzi: The Sugar Scientist Revolutionizing Healthcare(Credit: Anusorn Nakdee/Shutterstock)Cells are coated in sugars, like the colored layers of M&Ms. In a healthy cell, sugars organize like a neatly manicured lawn, but in tumors, they go haywire. Carolyn Bertozzi, a professor at Stanford, studies this process to develop cancer treatments. Along the way, she invented a field of chemistry that transformed medical imaging and drug delivery. Bioorthogonal chemistry involves a suite of reactions that can perform in the body without altering it. It's led to basic discoveries and medical advances, revolutionizing biochemistry as we know it. Read more: Scientist You Should Know: Carolyn Bertozzi is the Sugar Scientist Revolutionizing Healthcare3. Corinne Le Quéré: The Climate Pragmatist(Credit: elenabsl/Shutterstock)Corinne Le Quéré isn't a climate optimist. Nor is she a climate pessimist. She simply refuses to get caught up in the emotion of climate change. The climate scientist, based at the University of East Anglia, changed conventional wisdom about carbon storage in the oceans. Le Quéré brings her groundbreaking work directly to policymakers. As the chair of France's High Council on climate, advisor for the U.K. Committee on Climate Change and former member of the Intergovernmental Panel on Climate Change, she helps politicians implement science-driven policy. Read more: Scientist You Should Know: Corinne Le Quéré Tries to Stunt Climate Change4. Taylor Perron: The Planetary Detective(Credit: Karel Resl/Shutterstock)The magnitude of space and time captivates Taylor Perron. As a geomorphologist and professor at the Massachusetts Institute of Technology, he asks how landscapes shape human and planetary origins. Contemplating these questions is scary, he says, but they lead to existential questions about who we are and how we got here. Perron unearths the clues buried in planetary landscapes to piece together the past. His geological detective work spans from Hawaii to Mars, painting a clearer picture of the past and drafting a blueprint of the future. Read more: Scientist You Should Know: Taylor Perron is a Planetary Detective5. Monika Schleier-Smith: The Atom Wrangler(Credit: luchschenF/Shutterstock)Monika Schleier-Smith's lab at Stanford is filled with lasers and mirrors. She uses them to meticulously tune customizable atomic networks. Controlling this phenomenon — called quantum entanglement — augments the computational problems that quantum physics can solve. The applications are enormous. It could build the world's most precise clocks or broaden the possibilities of quantum computing. But she also asks fundamental questions about the universe, like what happens when information falls into a black hole, and how gravity works at subatomic size scales? Schleier-Smith's experimental prowess allows her to ask questions that theorists used to only dream of. Read more: Scientist You Should Know: Monika Schleier-Smith and the Quantum Universe Over the past 2,500 years, countless people have advanced the enterprise of science. By UNESCO's estimate, about 8 million of them were at the task in 2013. They are the latest generation in a long lineage of knowledge seekers — but is there anyone we can call their common ancestor? Is there, in other words, a first scientist?To some extent, it depends what you mean by "scientist." The word itself dates back only to 1834, when the philosopher William Whewell coined it as an umbrella term for the practitioners of an ever-expanding plethora of sciences. The academic ranks were full of chemists, physicists, naturalists and mathematicians (not to mention their proliferating subsets), and Whewell sought to unite them under this new name.In the sense in which he meant it, and the sense in which we understand it today, the title of first scientist could arguably go to several of the discipline's modern forefathers. Two noteworthy candidates are Roger Bacon, the medieval English philosopher who advocated experimentation, and Francis Bacon (no relation), who codified the scientific method 300 years later. For many, Galileo Galilei's famous studies of motion and the cosmos, plus his readiness to contradict religious dogma, make him the archetypal scientist. He built what was then the most powerful telescope in existence and used it to confirm the heliocentric model of the solar system, cementing perhaps the greatest scientific revolution of all time. Albert Einstein once called Galilei "the father of modern physics, indeed, of modern science altogether." Others feel that the honor belongs to earlier historical figures. Hundreds of years before any of the aforementioned Europeans, around the turn of the first century A.D., Ibn al-Haytham undertook an extensive study of light and vision. A Muslim born in present-day Iraq, he invented the camera obscura, and, as Bradley Steffens writes in Ibn al-Haytham: First Scientist, "was the first person to test hypotheses with verifiable experiments." He was also a clear influence on Roger Bacon.None of these men ever called themselves scientists, though. Rather, they were natural philosophers, not pioneers of some fundamentally new occupation, and as they saw it they embodied a tradition with roots in Ancient Greece. Turtles All the Way DownBroadening the notion of science a bit, some consider Aristotle its original proponent. He wasn't much of an experimenter, and many of his conclusions were wrong — he believed women had fewer teeth than men, and that all matter consisted of the four elements, each of which sank or rose as needed to reach its proper place. But in The Lagoon: How Aristotle Invented Science, the biologist Armand Marie Leroi argues that Aristotle nevertheless exemplified the empiricism that has since produced so many marvelous discoveries. In his curious and colossal examination of the natural world, the spirit — if not all the modern principles — of science emerged. Aristotle himself points even farther back in time, to his Greek predecessors. One of them, Anaximander, found a recent champion in the theoretical physicist Carlo Rovelli. In The First Scientist: Anaximander and His Legacy, he sets the inception of science at "Anaximader's revolution": the realization that the Earth is not supported by cosmic columns or a never-ending tower of turtles, as those before him assumed, but that the heavens continue underfoot as they do overhead. To Rovelli, that achievement is no less significant than the Copernican revolution two millenia later and deserves the epithet his book gives to Anaximander. "If this reimagining of the world is a central aspect of the scientific enterprise, then the beginning of this adventure is not to be sought in Newton's laws of motion, in Galileo's experiments, or Francis Bacon's reflections."But it's possible to take one final step back in the history of science, to Anaximander's own teacher: Thales of Miletus, one of the so-called Seven Sages of ancient Greece. He's more often known as the first philosopher, but, again, philosophy and science are born of the same inquisitiveness.It seems Thales had that in spades — he was interested in everything, from geography and mathematics to politics and history. According to Aristotle he was the first person to investigate the basic principles of matter, and the historian Herodotus writes that he predicted an eclipse in 585 B.C. (though no one knows how). But he could also wield his intellect for more earthly purposes, as Aristotle demonstrates in an amusing anecdote.Thales lived in poverty, and the people of Miletus took this as proof of philosophy's uselessness. To teach them otherwise, he used "his skill in the stars" to foresee a great olive harvest the coming year. He then bought all the olive presses in the region and, when the harvest came, "let them out at any rate which he pleased, and made a quantity of money." Thus, Aristotle writes, "he showed the world that philosophers can easily be rich if they like, but that their ambition is of another sort."Like Aristotle, Thales didn't get everything right. He claimed, for example, that "all is water." But he's important, above all, because he marked a shift from supernatural to natural explanations. After eons of divine intervention, of Zeus's lightning bolts and Poseidon's thrashing waves, Thales was the first to propose theories about the way the world works based on observation and reason — just as scientists do today. As far back as we can trace the intellectual heritage that culminated in modern science, it leads here. We may not always think about it, but scientific contributions have changed our lives. From new medicines to new technologies, science continues to shape our world. The things we take for granted may have at one time been the life's work of a scientist who had to overcome adversity due to their gender or race. However, they persisted and contributed their ideas to the world. In celebration of Hispanic Heritage Month, here are five Hispanic scientists that made amazing contributions to science. 1. César Milstein(Credit:Nishantadeb/Shutterstock)Born in Argentina in 1927, César Milstein's parents encouraged him and his brothers to make education a priority. After graduating from the University of Buenos Aires with a Ph. D., Milstein accepted a position with the National Institute of Microbiology in Buenos Aires in 1957. Afterward, he earned another Ph.D. from Cambridge University in 1960 and became a member of the Medical Research Council Laboratory of Molecular Biology in Cambridge, England.Milstein's primary area of study was with antibodies, and in 1984 — along with Georges Köhler and Niels K. Jerne — he was awarded the Nobel Prize for helping to develop monoclonal antibodies. Monoclonal antibodies can help clone and produce an almost unlimited amount of desired antibodies. They are often used in pregnancy tests, blood cell typing and detecting viruses and bacterial diseases. 2. Ynés Mexía(Credit:Med Photo Studio/Shutterstock)Ynés Enriquetta Julietta Mexía was a Mexican-American botanist, born in 1870. Though she was 55 when she began her botanist career, her contributions to botany are immeasurable. Mexía grew up in Washington, D.C., before moving to Mexico to run her late father's ranch. Her first husband died soon after they were married, and she filed for divorce from her second husband after he ran the ranch into the ground. With her mental health suffering, Mexía moved to San Francisco for treatment. While there, she worked as a social worker before joining the environmental movement. She joined the Sierra Club and the Save the Redwoods League, traveling all over California. Her work with these organizations inspired her to pursue botany, and at 51 in 1921, she enrolled at University of California Berkeley. In 1925, she went on her first plant collecting trip in Mexico, where she collected over 1500 plant species. As the first Mexican-American female botanist, Mexía traveled all over North and South America collecting samples during her 13 year career. She was even the first botanist to collect samples in Denali National Park. During her travels, she advocated for Indigenous and women's rights and shook up gender norms by traveling solo and sleeping outside — something women didn't do much during that time. By the end of her career, Mexía had collected nearly 150,000 specimens, had a new genus named after her that included 50 species and helped discover and categorize over 500 plants.3. Helen Rodríguez Trías(Credit:By National Center for Biotechnology Information - Public Domain, in 1929 to immigrant parents, Trías faced adversity at a young age. Despite her English fluency and good grades, she wasn't allowed into the more advanced classes at school in New York. Eventually, one of her teachers noticed her academic achievements and had her move up to the advanced courses. This helped propel Trías on a path toward medicine. She studied medicine in San Juan, and after completing her residency (at University Hospital in San Juan), she began teaching at the medical school. While in San Juan, she started the first infant health clinic in Puerto Rico and after three years, infant mortality dropped by 50 percent. In 1970, Trías returned to New York as head of the pediatrics department at Lincoln Hospital in the South Bronx. There, she was met with other issues. The hospital saw primarily Black and Hispanic patients. It was also in dire need of repair. Because of this, activist groups, like the Young Lords, occupied hospitals and demanded better facilities and treatment for their people. Trías recognized how poverty and inequality led to a decline in health. She brought this experience to the women's health movement of the 1970s. While white women had to fight for access to safe abortions and birth control, women of color were sometimes subjected to sterilization practices. She founded the Committee to End Sterilization Abuse and the Committee for Abortion Rights and Against Sterilization Abuse. She helped found the Women's Caucus and the Hispanic Caucus of the American Public Health Association (APHA). In the 1980s, she worked at the AIDS Institute in New York and became an advocate for women and children with HIV. And in 1993, she became the first Latina to be elected president of the American Public Health Association.Thanks to her contributions to medicine and human welfare, she was awarded the Presidential Citizens Medal in 2001. 4. Sabrina Gonzalez Pasterski(Credit:By Cambridge02138 - Own work, CC BY-SA 4.0, Gonzales Pasterski is a Cuban-American scientist who was born in 1993. Not even 30 yet, she has earned numerous scientific achievements, including being the youngest person in the world to build and pilot their own aircraft. In 2006, at the age of 12, Pasterski began building the kit aircraft, N5886Q, and in 2009 she took her maiden voyage in the craft at 16.While at Massachusetts Institute of Technology for her undergrad, Pasterski was part of the Compact Muon Solenoid (CMS) experiment. The experiment aimed to use particle physics detectors to search for things like the Higgs boson, dark matter particles and extra dimensions.She wrote a paper on electromagnetic memory in 2015 while working towards a graduate degree from Harvard — which was then cited in a 2016 Stephen Hawking paper. Pasterski is currently earning her postdoc from Princeton. 5. Carlos Juan Finlay(Credit:Manuel Esteban/Shutterstock)Carlos Juan Finlay, born in 1833, was a Cuban epidemiologist who studied yellow fever. A graduate of Jefferson Medical College in Philadelphia, Finlay was appointed by the Cuban government to study the cause of yellow fever with the North American commission. He was later the Cuban delegate at the International Sanitary Conference in Washington, D.C.At the conference, he presented his hypothesis that mosquitoes transferred yellow fever from infected people to healthy people. However, he was mostly ignored and even ridiculed by the medical community for nearly 20 years. Though, this didn't stop him from trying to prove his hypothesis. In 1900, Walter Reed of the U.S. Army Yellow Fever Board ventured to Cuba, where Finlay tried to persuade him to look into mosquitos as a possible transmitter of the disease. Though not convinced initially, Reed looked into the possible transference of yellow fever via mosquito and concluded that Finlay was indeed correct. This discovery helped eradicate yellow fever in Panama and Cuba. Finlay finally became the chief sanitation officer in 1902, and after his death in 1915, the Finlay Institute for Investigations in Tropical Medicine was established in his honor. It was a long-held belief in the scientific community that only younger scientists made significant advances. Having developed his theory of relativity at age 26, Einstein said, "A person who has not made his great contribution to science before the age of 30 will never do so." Although there have been many noted scientists in their 40s and beyond, these are five who accomplished their important discoveries at a young age. 1. Lawrence Bragg (1890-1971)(Credit:Nobel foundation, Public domain, via Wikimedia Commons)At 25 years old, Australian scientist Lawrence Bragg became one of the youngest people to receive a Nobel Prize, although his groundbreaking research began when he was only 22. In 1915, he and his father were jointly awarded the Nobel Prize in physics for their work in X-ray crystallography. His research revealed that X-rays are diffracted based on the crystal's atomic structure. The area of X-ray crystallography continues to impact the fields of chemistry, physics and medicine —and is still used to study crystalline atoms. Building on Bragg's work, other scientists have been awarded Nobel Prizes using x-ray crystallography in their research. Read More: 20 Things You Didn't Know About... The Nobel Prizes2. Subrahmanyan Chandrasekhar (1910-1995)(Credit:Startchild Project NASA, Public domain, via Wikimedia Commons)You may not know the name, but Subrahmanyam Chandrasekhar was a brilliant Indian-American scientist. An astrophysicist, his research at 19 years old eventually led to a Nobel Prize many years later, in 1983. During his research, it was known that stars eventually became unstable, collapsed in on themselves, and became what is known as a "white dwarf." Chandrasekhar discovered that white dwarfs must have a mass of 1.4 or less of the sun's mass. They become a neutron star or a black hole if it's higher. The point at which a star's end product is determined is called "The Chandrasekhar Limit." Read More: White Dwarf Warps Space-Time, Revealing New Insights3. Galileo Galilei (1564-1642)(Credit:Prachaya Roekdeethaweesab/Shutterstock)Galileo contributed much to the world of science; one of his most important achievements was improving the telescope and becoming the first person to study space with it. This led to his discovery that craters existed on the moon. But one of his most important scientific contributions occurred when he was 19. Galileo developed an accurate method to weigh the density of objects using a counterweight. His discovery — hydrostatic balance, has current applications in astrophysics, gemology and atmospheric modeling. Read More: Yes, Galileo Actually Said That 4. Sir Isaac Newton (1643-1727)(Credit:Prachaya Roekdeethaweesab/Shutterstock)Although best known for the concept of gravity — which he discovered at only 23 years old — Sir Isaac Newton impacted scientific innovation in additional ways. At 19, he developed calculus, which was a new approach to math at the time. And in his mid-20s, he had two major scientific breakthroughs. He invented the first reflecting telescope, using a mirror. He also significantly advanced the field of physical optics. Using a prism, he ascertained the composition of white light (sunlight) and discovered the color "spectrum," — a word he created. Newton's book Principia, which detailed the three laws of motion, is considered one of the greatest scientific works ever written.Read More: 5 Eccentric Facts About Isaac Newton5. Blaise Pascal (1623-1662)(Credit:Marzolino/Shutterstock)Known to be a prodigy in math and science, Blaise Pascal showed remarkable intellect from early childhood. At 16 years old, he published a mathematical treatise. A few short years later — to aid his father's work as a tax collector — Pascal created the first successful mechanical calculator. He called it the "Pascaline," which was a predecessor to what eventually became the modern computer. He was also instrumental in fluid mechanics, creating Pascal's Law. His research in this area led him to create the syringe and establish the foundation for the hydraulic press.Read More: Nobel Prize Snubs: 5 People Who Deserve RecognitionArticle SourcesOur writers at Discovermagazine.com use peer-reviewed studies and high-quality sources for our articles, and our editors review for scientific accuracy and editorial standards. Review the sources used below for this article:Allison Futterman is a Charlotte, N.C.-based writer whose science, history, and medical/health writing has appeared on a variety of platforms and in regional and national publications. These include Charlotte, People, Our State, and Philanthropy magazines, among others. She has a BA in communications and an MS in criminal justice. Despite having roamed the planet millions of years ago, thanks to advances in technology, dinosaurs aren't as inscrutable today as they once were. And over the past decades, in addition to studying what they acted like, including their habits and diets, researchers have specialized in reconstructing and depicting what they looked like — all the way down to specific details like texture and color.But how do scientists go about pinpointing these details for creatures that died 65 million years ago? It turns out, we actually know more about dinosaur looks than you might think.What Did Dinosaurs Really Look Like? Of course, there are dinosaurs we know a lot about and dinosaurs we know virtually nothing about — fitting for such a vast, diverse category of animals, and it's important to resist the urge to lump all dinosaurs together. But some scientists still argue that reconstructing the appearance of certain dinosaurs is an extremely nuanced, detailed process, allowing them to pinpoint their looks with precision. This 2020 illustration shows the Spinosaurus, the largest-known carnivorous dinosaur. (Credit: Mark Witton) "We actually know way more than paleontologists tend to convey and also way more than the average person gets," says Darren Naish, a vertebrate paleontologist specializing in reevaluating dinosaurs. "We're doing really well, actually, in terms of what we know.""I think it's really anti-scientific, anti-intellectual, and misleading when you get these memes where people say 'We don't know what Tyrannosaurus rex looks like, for all we know, it could have been like a giant sparrow'," adds Naish, who also worked as the paleontology consultant for the Apple TV+ series Prehistoric Planet. "And it's like, no, it wasn't like that. We know for sure."Read More: Here's What Dinosaurs Really Looked LikeHow Do We Know What Dinosaurs Looked Like? Experts responsible for reconstructing dinosaurs fall into two main categories: paleontologists, the academics who research prehistoric animals for scientific purposes, and paleoartists, creatives who often have paleontology backgrounds but are more concerned with artistic depictions of the creatures. Read More: What Is Paleontology, And What Does A Paleontologist Do?Recreating DinosaursThese specialists have three core tools at their disposal, the first and most straightforward of which is fossils. This can encompass fossils of bones and bits of skeletons, of course, but also fossilized items from the environment dinosaurs inhabited. The second tool is mummified organic tissue; contrary to popular belief, there are a lot of specimens of mummified bits and pieces of skin from the dinosaur era.However, when fossils and organic tissue material aren't available, paleontologists and paleoartists rely heavily on anatomical comparisons between dinosaurs and living animals who have descended from them — a phenomenon known as phylogenetic bracketing. The fossil record helps paleoartists pinpoint the smallest (and sometimes goriest) details — even this illustration of a T. rex pulling the head off a Triceratops is well-evidenced from fossils. (Credit: Mark Witton) For instance, scholars know precisely where T. rex falls on the technique's branching trees, bracketed by crocodilians on one side and birds on the other. Of course, this technique can be misunderstood or abused; living animals don't perfectly represent the ancestors of their respective groups from hundreds of millions of years ago, each with their own evolutionary histories. Still, Naish notes, it's nonetheless a good tool to have in the toolbox.Read More: What Species Today Are Descendants of Dinosaurs?Recreating Scientifically Accurate DinosaursWhen paleontologists and paleoartists work to reconstruct a dinosaur, they usually proceed from the inside out. In other words, they start at the skeleton and then build to details on the surface.1. Start with the Dinosaur's Skeleton and StanceThis first step helps scientists determine a dinosaur's core, basic form by reconstructing its skeleton through fossils like bones, shells and teeth — along with anything else tough enough to survive fossilization."Reconstructing a skeleton is a forensic task like the police do, and I think most people would understand that the skeletons you see in museums or photographs are pretty accurate," says Mike Benton, a vertebrate paleontologist at the University of Bristol. The Diplodocus, a genus of sauropod dinosaurs, has an instantly-recognizable shape and stance. (Credit: Mark Witton) From the skeleton, experts can then deduce the posture and stance of the creature, allowing them to cross-reference it with fossils of its footprints. These details then inform things like where and how far apart its feet were placed when walking, for instance. Then come computer simulations and models. "You can look at the structure of the limb skeleton and then you can model the whole thing in the computer," says Benton, who adds that experts use these projections to understand where an animal weighed the most, or had the most power.Read More: 5 Massive Dinosaur Fossils and Where They Were Found2. Flesh Out the Body, Shape and BulkThere are a few bits of preserved muscle tissue for certain extinct dinosaurs, says Mark Witton, a paleontologist and paleoartist at the University of Portsmouth. But perhaps more importantly, scholars can use fossilized bones with scars of where muscles were attached to fill in the gaps. (Shutterstock/ Rafael Trafaniuc)Plus, since muscle layout is actually quite conservative across the animal kingdom — from humans to, say, crocodiles — experts can look at living animals and get a pretty good idea of what the muscle layout of an extinct vertebrate might be, says Witton. Unfortunately, it's still unclear how bulky or atrophied these muscles may have been. "That's not always clear from fossils, and of course, we know this was very variable among living animals," says Witton, who also wrote The Paloeartist's Handbook: Recreating Prehistoric Animals in Art. It's similarly tricky to understand whether a dinosaur might might have had fatty tissues deposits. This is something that has virtually no representation in the fossil record, says Witton, although there are exceptions. Read More: The Time of Giants: How Did Dinosaurs Get So Big?3. Layer on the Skin and TextureSkin preserves more often than you might think, but also not as often as we'd like, says Witton. Experts have even made maps of different skin types throughout dinosaur evolution in order to make predictions for species without preserved skin availableCentrosaurus, a genus of herbivores from the Late Cretaceous, sported distinctive, hook-shaped horns. (Credit: Mark Witton) Similarly, experts can use depressions, creases and impressions of blood vessels from the surface of bones to help them deduce the type of skin that appeared on top. Skin and bone interact when they're very close, particularly when the skin is tough or scaly, says Witton. Still, the sheer size of many dinosaurs makes it difficult to extrapolate from one part of their anatomy to their body as a whole. In other words, knowing what their skin was like on, say, a sauropod's leg, may not apply to everywhere else on such a gargantuan animal. Read More: This Dinosaur Fossil Has Skin Intact – Here's Why it's Significant4. Add the Color and CoveringIn 1996, paleontologists in China discovered some of the first fossilized, feathered dinosaurs. Since then, nearly 50 more well-preserved, feathered dinosaur species have been discovered. These first findings cemented that some dinosaurs were indeed feathered, which allowed experts to learn more about their colors in general.A Deinonychus, which helped solidify the connection between dinosaurs and birds, pins down a juvenile sauropod. (Credit: Mark Witton) What's more, examining these feathered remains under the microscope reveals they're clad in well-preserved microscopic organisms. At first, they were mistakenly described as bacteria. But in the early 2000s, scholars proposed an alternative explanation, revealing that the elongated, sausage-like molecules were actually melanosomes — cells containing melanin that give color to hair in mammal and feathers in bird. In 2010, Benton's lab published a study describing how to ascribe color to different dinosaurs by looking at the shapes of different melanosomes. "The fact it's the same relationship with color and shape in both birds and mammals gave us the confidence that we could apply it to almost any fossil group," says Benton, adding that these pigment cells have different arrangements, densities and orientations, providing information about a dinosaur's patterns, stripes and color arrangements. Read More: Did All Dinosaurs Have Feathers?5. Draw the Dinosaur's Face The last step may be the trickiest: Possibly the most controversial part of reconstructing a dinosaur's appearance is determining what, exactly, their faces looked like. Some researchers say that the detailed, external bone surface texture on the face of, say, the T. rex is just like that of a crocodilian. Meanwhile, other scientists looking at the same data believe it's consistent with animals that have extensive soft tissues on the face and a lot of skin built up around the jaw edges.Tyrannosaurus rex bellowing with its mouth shut, like a vocalising alligator. With its mouth closed, all of the enormous teeth of T. rex would be invisible behind its lips. (Credit: Mark Witton)"Within a few years, if we do the right studies, we should be able to come up with standardized reconstructions for things like the face of T. rex or the face of something like triceratops, we've already done this for some horned dinosaurs," says Witton, whose lab published the 2023 paper in Science detailing that Tyrannosauruses actually probably had lips that concealed their teeth — upending the way they're often depicted in the media.Read More: What a Tyrannosaurus Rex Skull Tells Us About Its IntelligenceMedia Depictions of Dinosaurs Dinosaur faces aren't the only area of contention. When it comes to their appearance overall, some scientists suggest we should only depict what we know for sure, while others think experts should engage in some educated guesswork to explore the visual possibilities of their existence. "There's lots of extreme weirdness going on in living animals, and that sort of stuff was surely present in the animals of the past," says Naish, who also co-wrote All Yesterdays, a book that speculates what different dinosaurs might have looked like. "They played by the same rules as living animals do today, in terms of their lives being governed by the need to court and mate and all that sort of stuff."The Giraffatitan, one of the largest animals to have ever lived, lived on a Jurassic floodplain next to the ancient Tanzanian coastline. (Credit: Mark Witton) Regardless, not a lot of the mainstream media depictions of dinosaurs do a great job at accuracy. (We're looking at you, Jurassic Park franchise.) Many follow the "rule of cool", says Naish, featuring creatures with gnarly mouthfuls of teeth and razor-sharp claws. "I wonder [about] this continued monstrification of prehistoric animals to make them look scary [or] awesome," says Naish. "Is this actually kind of a bad thing for the societal understanding of not just prehistoric animals, but how people imagine the past?" Their depiction on the silver screen aside, paleontologists and paleoartists are continuing to unravel more nuances about what these prehistoric beasts looked like some 65 million years ago. Read More: The Real-Life Inspiration Behind the 'Jurassic Park' Velociraptors In the last two decades, glorious scientific and technical achievements have altered our lives forever. Try, for example, to imagine the world without the existence of those two little words personal and computer. But there have also been — how can this be put delicately?— blunders. Some were errors in concept: Bad science chasing a bad idea. Some were errors in execution: This would have worked so well if only it hadn't blown up. Others were cases of deliberate fraud, out-and-out hoaxes, or just dopey moments that made us laugh. Perhaps Albert Einstein said it best: "Two things are infinite: the universe and human stupidity, and I'm not sure about the universe." ChallengerSurreal in its beauty, a plume of white smoke ushered in the end of America's romance with space travel after the shuttle Challenger blew up 73 seconds into its scheduled six-day flight on January 28, 1986, at 11:39:13 a.m. The rocket was traveling at Mach 1.92 at an altitude of 46,000 feet as it incinerated all seven astronauts aboard. According to the presidential commission that investigated the accident, the explosion was caused by the failure of an O-ring seal in the joint between the two lower segments of the right-hand solid-rocket booster. This failure permitted a jet of white-hot gases to ignite the liquid fuel of the external tank. The O-ring was known to fail in cold temperatures, but the launch had been delayed five times.Darsee and Slutsky and Fraud, Oh My!Following the "greed is good" mantra of the 1980s, some scientists could not resist shortcuts. "The psychological profile of these people is interesting," says Mario Biagioli, a professor of the history of science at Harvard University. "You usually get B-plus, A-minus scientists who get into hyperproduction mode." Take, for example, former Harvard researcher John Darsee. In 1981 he was found to be faking data in a heart study. Eventually investigators at the National Institutes of Health discovered that data for most of his 100 published studies had been fabricated. Or take the case of cardiac-radiology specialist Robert Slutsky, who in 1985 resigned from the University of California at San Diego School of Medicine after colleagues began to wonder how he turned out a new research article every 10 days. University investigators concluded he had altered data and lied about the methods he used. To establish verisimilitude, Slutsky often persuaded scientists more prominent than he to put their names on his articles. The Debendox Debacle William McBride, an Australian obstetrician, was hailed as a whistle-blowing visionary in 1961 when he sounded a warning about the dangers of thalidomide, a sedative prescribed for anxiety and morning sickness. In a letter to the journal The Lancet, McBride suggested that the drug was causing infants to be born with severe limb deformities. Although McBride's hypothesis was based on limited anecdotal observations, subsequent studies proved him right. Thalidomide was removed from the market, and the drug became almost synonymous with pharmaceutical malfeasance. Two decades later, in 1982, McBride published a report about a morning-sickness drug called Debendox that, he claimed, clearly caused birth defects in rabbits. Merrell Dow took the drug off the market amid an avalanche of lawsuits. But there was a problem. McBride had altered data in research carried out by assistants. The results showed Debendox had no ill effects. After years of investigation, McBride was found guilty of scientific fraud in 1993 by a medical tribunal. Nuclear Winter of Our DiscontentIn 1983, astronomer Carl Sagan coauthored an article in Science that shook the world: "Nuclear Winter: Global Consequences of Multiple Nuclear Explosions" warned that nuclear war could send a giant cloud of dust into the atmosphere that would cover the globe, blocking sunlight and invoking a climatic change similar to that which might have ended the existence of dinosaurs. Skeptical atmospheric scientists argued that Sagan's model ignored a variety of factors, including the fact that the dust would have to reach the highest levels of the atmosphere not to be dissipated by rainfall. In a 1990 article in Science, Sagan and his original coauthors admitted that their initial temperature estimates were wrong. They concluded that an all-out nuclear war could reduce average temperatures at most by 36 degrees Fahrenheit in northern climes. The chilling effect, in other words, would be more of a nuclear autumn. Piltdown ChickenThe finding was initially trumpeted as the missing link that proved birds evolved from dinosaurs. In 1999 a fossil smuggled out of China allegedly showing a dinosaur with birdlike plumage was displayed triumphantly at the National Geographic Society and written up in the society's November magazine. Paleontologists were abuzz. Unfortunately, like the hominid skull with an ape jaw discovered in the Piltdown quarries of England in 1912, the whole thing turned out to be a hoax. The fossil apparently was the flight of fancy of a Chinese farmer who had rigged together bird bits and a meat-eater's tail.Statistics for DummiesShocking factoids based on half-baked interpretations of scientific data have been foisted on the public at an alarming rate during the past 20 years. Take the "spinsters beware" theme that gained currency in 1986. Summarizing a study on women and marriage by two Yale sociologists and a Harvard economist, several news agencies reported that single women at 35 had only a 5 percent chance of ever marrying, and unmarried women at 40 were "more likely to be killed by a terrorist." Never mind the fact that in analyzing data from the 70,000 households the authors of the original study had not looked into what percentage of the over-30 women had made a conscious choice to put off marriage. Indeed, U.S. Census Bureau statistician Jeanne Moorman's follow-up projections indicate that of unmarried women ages 30 to 34, 54 percent will marry; of those ages 35 to 39, 37 percent will marry; and of those ages 40 to 44, 24 percent will marry.Very Cold Fusion At the University of Utah in 1989, chemists Stanley Pons and Martin Fleischmann announced that the world's energy problems had been solved. They claimed to have created nuclear fusion on a tabletop by electrolyzing deuterium oxide — heavy water — using electrodes made of palladium and platinum. Deuterium is a naturally occurring stable isotope of hydrogen; its nucleus contains a neutron in addition to the single proton found in the nucleus of ordinary hydrogen. According to the chemists, the deuterium nuclei were squeezed so closely together in the palladium cathode that they fused, releasing energy. As Robert Park, professor of physics at the University of Maryland and author of Voodoo Science puts it, "Basically if what Fleischmann and Pons said was true, they had duplicated the source of the sun's energy in a test tube." The problem is, no other scientists have been able to reproduce their results — and not for lack of trying. "There's always some guy willing to say, 'OK, we found something that works, but it only works once in a while,' or 'We're not going to show it to you, because we're worried you'll steal our patent rights,'" says Marc Abrahams, editor of Annals of Improbable Research. Chernobyl April 26, 1986, was the day Soviet nuclear experts learned the true meaning of the word oops. During a test of one of Chernobyl's four reactors, they turned off the backup cooling system and used only eight boron-carbide rods to control the rate of fission instead of the 15 rods required as standard operating procedure. A runaway chain reaction blew the steel and concrete lid off the reactor and created a fireball, releasing 100 times more radiation than did the Hiroshima and Nagasaki bombs combined. Some 4,300 people eventually died as a result, and more than 70,000 were permanently disabled.Currents That Don't KillThe Clinton administration estimates that American taxpayers have paid $25 billion to determine that power lines don't do anything more deadly than deliver power. In 1989, Paul Brodeur published a series of articles in The New Yorker raising the possibility of a link between electromagnetic fields and cancer. Eight years later, after several enormous epidemiological studies in Canada, Britain, and the United States, the danger was completely discounted. "All known cancer-inducing agents act by breaking chemical bonds in DNA," says Robert Park. "The amount of photon energy it takes is an ultraviolet wavelength. So any wavelength that is longer cannot break chemical bonds. Visible light does not cause cancer. Infrared light is still longer, radio waves longer still. Power-line fields are preposterous. The wavelength is in miles." Mars Meltdowns The "better, faster, cheaper" mantra adopted by NASA in 1992 might be reinterpreted today as "you get what you pay for." In September 1999, the $125-million Mars Climate Orbiter plunged to oblivion near Mars. NASA officials were using the metric newton to guide the spacecraft. That was unfortunate, because Lockheed-Martin engineered the Orbiter to be guided in the English units of poundals. In December, the $185-million Mars Polar Lander went AWOL, and repeated efforts to contact it by space radio antennas failed. Officials now speculate that a signaling problem in the landing legs — caused by one line of missing computer code — doomed the Lander.Rock of LifeIn 1996, scientists at NASA declared that a 6.3-ounce rock, broken off from a Mars meteorite discovered in Antarctica in 1984, contained flecks of chemical compounds — polycyclic aromatic hydrocarbons, magnetite, and iron sulfide — that suggested the existence of bacteria on the Red Planet 3.6 billion years ago. "August 7, 1996, could go down as one of the most important dates in human history," intoned one newspaper report. But within two years the theory began to crack. Traces of amino acids found in the rock, crucial to life, were also found in the surrounding Antarctic ice. More damning, other non-Martian rocks — rocks from the moon, where it is clear life does not exist — showed the same "evidence" of life. By November 1998 an article in Science declared "most researchers agree that the case for life on Mars is shakier than ever."All Abuzz Sometimes mistakes that were made decades ago take a while to make the force of their foolishness felt. Consider the case of killer bees. In the 1950s, Brazilian geneticists crossbred mild-mannered European honeybees with their more aggressive, territorial cousins from Africa, reasoning that the Africanized bees would be better suited than their European counterparts to warmer South American climes. They were too right. Before the aggression could be bred out of the resulting cross, the buggers got away, and some immediately headed north. In 1990 the first Africanized honeybees were discovered in Texas. Since that time they've gradually spread to New Mexico, Arizona, California, and in 1999, to Nevada. Here They Come to Save the Day Indeed, antibiotics have been the Mighty Mouse of medicine. Since the discovery of penicillin in 1928, it seemed there were few bacteria that antibiotics couldn't destroy handily. At the turn of the last century, the average life expectancy was 47. Thanks partly to a decline in bacterial diseases like tuberculosis, dysentery, and gonorrhea, life expectancy in the United States has risen to 76 today. Unfortunately, doctors did not take seriously the consequences of promiscuous antibiotic use. Physicians have long been generous in prescribing antibiotics for minor ailments, even for viral infections like the common cold. Moreover, even when antibiotics were warranted, patients were not sufficiently warned about the dangers of not taking the drugs for the full course of treatment. When the symptoms of their infection abated, patients often threw away their pills, allowing the bacteria that had not been killed off to mutate. Now there are whole categories of antibiotics that no longer work. And there are some potentially deadly bacterial diseases, including tuberculosis, that can only be beaten by one or two of the strongest, most expensive antibiotics. The Sky Is Falling AgainUm, never mind. On March 12, 1998, on the front page of The New York Times, a headline read: "Asteroid Is Expected to Make a Pass Close to Earth in 2028." Brian G. Marsden, director of the Central Bureau for Astronomical Telegrams at the Smithsonian Astrophysical Observatory, predicted that on October 26, 2028, an asteroid about a mile in diameter would come within 30,000 miles of Earth. That's within spitting distance, spacewise, which evoked comparisons to the asteroid that crashed on the Yucatàn peninsula 65 million years ago, allegedly wiping out all the dinosaurs. "When you first discover a comet, or any kind of body, you start measuring its position," notes Robert Park. "From that you extract its trajectory. The more measurements you make, the more accurate your trajectory gets." Marsden issued his warnings based on very early trajectory measurements. Now he anticipates the asteroid will pass Earth at a safe distance of 600,000 miles.Evolution? What's That?In 1995, it became official: Colorado students would not be tested on evolution, Charles Darwin's theory that, through an endless series of genetic mutations, we all developed from single-celled organisms. "I believe in divine creation," said Clair Orr, Colorado's chairman of the state's board of education. Colorado is not alone. Kansas removed evolutionary theory from its tests in 1999. Mississippi and Tennessee do not teach the subject at all, and curricula in Florida and South Carolina touch on it only lightly

who grew up playing with Nerf guns and Super Soakers have Johnson to thank.What Inspired Lonnie Johnson?His own father, a military truck driver, taught Johnson about electrical currents and how to fix household appliances at a young age. This sparked his curiosity in building and creating things, and his talent for mechanics and experimentation quickly landed him the nickname "The Professor" among friends. Where Did Lonnie Johnson Go to College?Johnson spent most of his teen years tinkering with mechanics and small engines, even building a robot called Linex for a fair at the University of Alabama in 1968. Despite Linex coming in first place, the University of Alabama overlooked Johnson as a possible future student. Instead, he ended up going to Tuskegee University (where an inspiration of his, George Washington Carver, taught). He attended on a scholarship, earning a bachelor's degree in mechanical engineering followed by a master's degree in nuclear engineering. What Is Lonnie Johnson Famous For?After college, Johnson joined the U.S. Air Force, where he helped develop a stealth bomber program. Later he worked for NASA's Jet Propulsion Laboratory, helping the Galileo mission get to Jupiter and the Cassini mission reach Saturn.What Did Lonnie Johnson Invent?In 1989 he designed the Super Soaker squirt gun, then known as the Power Drencher in. Within two years, the toy generated $200 million in sales. To this day, Johnson has several patents under his belt and is always working on new inventions. He's currently a member of the nonprofit 100 Black Men of Atlanta and a member of the Georgia Alliance for Children, undeniably, holding a special place as one of the most influential African American scientists.Read More: Meet 9 of the Many Scientists Who Helped Create the James Webb Space Telescope6. Gladys West (1930-)(Credit: U.S. Air Force, Public domain, via Wikimedia Commons)Who Is Gladys West?Gladys West is a prominent mathematician known best for her development of the Global Positioning System (GPS). West knew from a young age that she wanted to continue her education. But at the time, the only opportunities for young Black women in her community were to work as sharecroppers or in a tobacco plant. Where Did Gladys West Go to School?Knowing she wanted more, she studied hard and, after graduating as valedictorian, was granted a full scholarship to Virginia State College. By 1955 West had earned both her bachelor's and master's degrees in mathematics.Where Did Gladys West Work?West searched for a teaching position but was continually turned down by racist and sexist institutions. However, in 1956, the U.S. Naval Proving Ground (a weapons lab) hired West as a mathematician. She became one of four Black employees, including her future husband and fellow mathematician, Ira V. West.What Did Gladys West Invent?During her time at the lab, West solved math problems by hand before programming a computer to do it for her. She worked on projects that related to Pluto and Neptune, acted as project manager for a U.S. Navy ocean surveillance satellite and helped create a GPS service.What Is Gladys West Famous For?Like Katherine Johnson, Dorothy Vaughn and Mary Jackson, West is considered a "hidden figure" and one of the most regarded Black scientists of all time. Her contributions to science were often overlooked because of her race and gender. Among her other achievements with the Navy, West also earned a master's and doctoral degree in public administration. She's been awarded numerous awards including the Prince Phillip Medal, HBCU Digest's Female Alumna of the Year and an induction into the U.S. Air Force Hall of Fame. West retired in Virginia. You can read more about her in her memoir, It Began With A Dream.Read More: Dr. Gladys West: Navigating Her Way to the Invention of GPS7. Percy Julian (1899-1975)Credit:(Olga Popova/Shutterstock) Who Was Percy Julian?Chemist Percy Julian is best known for his work on cortisone, steroids and birth control. An Alabama native, Julian couldn't find a high school in the South that would accept him, due to discrimination. So at 17, he applied to DePauw University in Indiana and took high school courses alongside college credits, graduating at the top of his class.Where Did Percy Julian Go to School?From DePauw, Julian traveled to several universities — he received his master's degree at Harvard and his doctorate at the University of Vienna in Austria. Julian then returned to DePauw, where his research led to a drug treatment for glaucoma. Despite his success, however, the university never granted him the opportunity to become a professor because of the color of his skin.What Did Percy Julian Invent?After leaving the academic world, Julian worked as a laboratory director for the Glidden Company. While there, he was credited with creating Aer-O-Foam, a soy-based foam to extinguish oil and gas fires. Used by the Navy during World War II, it also opened the door to other soy-based inventions: From soybeans, Julian helped treat rheumatoid arthritis by synthesizing cortisone.What Was Percy Julian Famous For?In 1954, Julian established Julian Laboratories in Illinois. After selling the company just seven years later, he became one of the first Black millionaires. From there, he created a nonprofit, the Julian Research Institute, where he worked until his death from cancer in 1975. Julian was a trailblazer and one of the most distinguished Black scientists in history. Yet, his contributions are not widely known. Read More: 5 Interesting Facts About Chemist Percy Julian8. Daniel Hale Williams (1858- 1931)(Credit: Public domain, via Wikimedia Commons)Who Was Daniel Hale Williams?Daniel Hale Williams, a prominent surgeon, is best known for performing one of the first successful open-heart surgeries and for opening the first interracial hospital. Prior to his medical career, he worked as both a shoemaker's apprentice and a barber. Through these, Williams found that his true passion was for helping people; he continued his education at Chicago Medical College as an apprentice under the highly accomplished surgeon Henry Palmer. What Did Daniel Hale Williams Do?After graduating, Williams opened Provident Hospital in 1891 — the first interracial hospital in the U.S. The hospital not only treated Black patients, but also served as a training institute for Black physicians and nurses. It was here that Williams performed open-heart surgery on a patient who'd been stabbed in the chest. The patient went on to live another two decades.Why Do We Celebrate Daniel Hale Williams?In 1894, Williams headed to Washington, D.C., after being appointed chief surgeon of the Freedmen's Hospital. The hospital, which provided care for formerly enslaved people, needed repair after years of neglect. Williams helped rebuild and added additional services, such as an ambulance and training for Black medical students. He spent the rest of his career working for various hospitals in Chicago until he suffered a debilitating stroke in 1926, dying five years later at his home in Idlewild, Michigan. Still, his legacy as one of the most influential African American scientists who changed history is undeniable.This article was originally published on Feb. 8, 2022. Read More: These 7 Famous Physicists Are Still Alive Today You've seen it a million times. The wild-haired, wild-eyed genius cackles and monologues about his new invention, his vision for changing the world. There might be lightning crackling in the background; there are probably burbling test tubes and humming electrical gadgets. He's a mad scientist, a stock character in countless books and films. But lurking behind the trope's ubiquity in horror and sci-fi, there's a revealing glimpse of how our society views science, and how stories can help guide our relationship with new discoveries.The Origins of the Mad Scientist ArchetypeStories about the dangers of forbidden knowledge go way back; early examples include the Judeo-Christian serpent in the garden of Eden and the ancient Greek myth of Prometheus, who created humans from clay and then was eternally punished for stealing fire from the gods and giving it to humans. These stories, says Stephen Snobelen, a professor of science history at the University of King's College in Halifax, hinge on humanity being given power that it is not meant to wield."One of the classic scenarios in the mad scientist story is that you're playing God," says Snobelen. "There's a mismatch between the power of nature and the finiteness of the human mind. So, we have this problem, that we don't see the consequences of our actions, because we can't see the big picture."Societies have continued to show concern about people knowing more than they ought or pushing the boundaries of knowledge in ways deemed unseemly or sacrilegious. Galileo Galilei spent the last decade of his life under house arrest for his support for the idea that the Earth rotates around the sun and not vice versa. The German alchemist Johann Georg Faust attracted controversy and ultimately inspired stories and plays about him making a deal with the devil for knowledge. And while Isaac Newton wasn't necessarily described as "mad," there are plenty of accounts of his idiosyncrasies, including getting so distracted by his work that he'd forget to eat.However, the first true "mad scientist" character in fiction didn't emerge until a dark, chilly summer in 1816, when 19-year-old Mary Shelley created the character of Doctor Victor Frankenstein.Read More: The Mad Genius Stereotype: Fact or Merely Fiction?Early Depictions of Crazy Scientists in Literature(Credit: Claudia Longo/Shutterstock)"Frankenstein coincides with the birth of the Industrial Revolution, which is, of course, based in science," says Gail Griffin, professor emerita of English literature at Kalamazoo College in Michigan. Shelley's novel (subtitled The Modern Prometheus) is rife with cultural anxieties of a society being transformed by new discoveries and a newfound distinction of science from other academic disciplines.Science, as we know it, was just coming into existence two hundred years ago; the word scientist wasn't even coined until 1833, more than a decade after Frankenstein was published. Before then, says Griffin, "it was called natural philosophy, and it was all imbued with theology and philosophical notions. That kind of kept it integrated with the rest of knowledge." Broken off into its own discipline, without moral guidance, says Griffin, science "gets scary." Neglecting the humanities, Shelley seems to argue in her book, makes you lose your humanity.That tracks with the tale of Victor Frankenstein. "He's not a mad scientist, or a bad one. He just loses his moral bearings," says Griffin. He's a college student in way over his head, rational to a fault and cut off from the people he cares about.Nearly a century later, Robert Louis Stevenson introduced the world to Dr. Jekyll and his counterpart Mr. Hyde. But while Dr. Jekyll concocts a chemical that transformed him into the wild, bestial Hyde, his human persona is mild-mannered.Neither of these prototypical mad scientists seem crazy — they create monstrous things, but they're normal, if a little asocial. So, how did we go from these buttoned-up nerds to more overtly maniacal behavior, with a wacky appearance to boot?"I think the answer is movies," says Griffin. "You've got to show a picture of the scientist doing crazy things, so we're going to make him look lunatic."Read More: Who Was the First Scientist?How Film Popularized the Mad Scientist Image(Credit: Stefano Chiacchiarini '74/Shutterstock)The 1927 German silent film Metropolis was the first feature-length science-fiction movie. It includes an inventor named Rotwang who builds a robot to replicate his lost love and plans to use said robot to destroy the city. "Rotwang from Metropolis is very much a mad scientist. He's power hungry, he's also vindictive," says Snobelen. And visually, Rotwang resembles Einstein: "He's got that hair."The Einsteinian look continued to influence depictions of scientists, especially strange ones. In the 1931 and 1935 Frankenstein and Bride of Frankenstein, Dr. Frankenstein "is actually relatively clean-cut," says Snobelen. But in Bride, Snobelen says, "there's this other scientist who wears a white lab coat, and he's called Dr. Septimus Pretorius, and he's played very creepily." According to Snobelen, the frizzy-haired Dr. Pretorius is a better exemplification of the mad scientist trope — Frankenstein is merely misguided, whereas Pretorius creates tiny people trapped in jars and raises a beaker of gin as he toasts "to a new world of gods and monsters."Read More: Top 5 Movies About Real-Life ScientistsEvil Scientists in Real LifeMad scientists have remained a fixture of sci-fi and horror for decades. They've changed somewhat over time; they're often more genteel and corporate these days, less clearly kooky. "The clean-cut mad scientist, in a way, is almost scarier, because the person is disarming, they may be very charming and can seduce you into thinking that they're good," says Snobelen.These more normal-seeming scientists who do terrible things are often more true to life. Science is a product of society, and like any other part of society, its practice can be swayed by greed and prejudice. While science has tremendous power to improve people's lives, it can also do just the opposite, as evidenced by high-profile human rights violations from the past century. The offenses include torturous human experimentation in Auschwitz and Unit 731, the bombings of Hiroshima and Nagasaki, the Tuskeegee syphilis trials, and the forced sterilization of thousands of Indigenous people in the U.S. by the Indian Health Service, not to mention ongoing medical racism."These cases where science was most impure, it got into bed with politics, capitalism, and other forces that led it to do terrible things," says Griffin.It's worth noting that the scientists behind these deeds were not "mad." They were behaving in ways acceptable in their societies and encouraged by their governments. It's also worth mentioning that the demonization of "madness" contributes to the stigma faced by people with mental illnesses, who are likelier to be the victims of violence than to perpetrate it. In fact, there have been many instances of people with mental illnesses living in hospitals and prisons where they were subjected to "mad scientist" types of experiments by professional psychologists and doctors. Read More: 5 Unethical Medical Experiments Brought Out of the Shadows of HistoryFiction as a Moral CompassWhile these examples make some public mistrust of science understandable, the mad scientist trope helps us explore potential moral quandaries of new discoveries, sometimes even before they happen. Science and science fiction are "in a symbiotic relationship," says Snobelen. "Science fiction often comments on the latest scientific theory. Science fiction can also inspire science." The speculative, forward-thinking nature of sci-fi comes in handy, because "one of the scary scenarios in science fiction is when you've discovered something, and the knowledge is now available, and there's no turning back," notes Snobelen. Sci-fi gives us a chance to ponder the consequences of new research before it's too late."When science grew up as its own discipline, it also became impenetrable to ordinary people," says Griffin. "I think, partly, you get the mad scientist because you start to get a science that is not clear to the general public." This lack of transparency, she says, has helped give the mad scientist trope such staying power: "I think the reason Frankenstein has had this colossal ongoing effect for 200 years is that it resonates in so many different directions. There's so many levels to it. And one of them is anxiety about science, anxiety about what's going on in these labs."In that way, these stories about mad scientists can serve as a moral compass to a discipline that often is seen as removed from the rest of human experience. They fulfill the sentiment from the final title card from Metropolis: "The mediator between the head and the hands must be the heart."Read More: Determining the Origin of Our Moral CompassArticle SourcesOur writers at Discovermagazine.com use peer-reviewed studies and high-quality sources for our articles, and our editors review for scientific accuracy and editorial standards. Review the sources used below for this article: Key Takeaways on the Top 10 Famous Scientists: Albert Einstein: Famous for the theory of relativity, and challenged conventional notions and reshaped our understanding of the universe.Marie Curie: Famous for pioneering work in radioactivity and the first woman to receive a Nobel Prize.Isaac Newton: Famous for Newton's laws of motion and gravitation, and is considered one of the key figures in the scientific revolution of the 17th century.Charles Darwin: Famous for his theory of evolution through natural selection.Nikola Tesla: Famous for electricity, magnetism, and wireless power transmission concepts.Galileo Galilei: Famous for his astronomical observations and our understanding of motion.Ada Lovelace: Famous for being the world's first computer programmer. She defied the conventions of her era and transformed the world of computer science.Pythagoras: Famous for the Pythagorean theorem and transforming mathematics.Carl Linnaeus: Famous for naming living organisms. His innovative system of binomial nomenclature not only simplified the process of scientific communication but also laid the foundation for modern taxonomy.Rosalind Franklin: Famous for X-ray crystallography and groundbreaking research on the structure of DNA.From unraveling the mysteries of the cosmos to unearthing the origins of humanity, these famous scientists have not only expanded the boundaries of human knowledge but have also profoundly altered the way we live, work, and perceive the world around us. The relentless pursuit of knowledge by these visionary thinkers has propelled humanity forward in ways that were once unimaginable. These exceptional individuals have made an extraordinary impact on fields including physics, chemistry, biology, astronomy, and numerous others. Their contributions stand as a testament to the transformative power of human curiosity and the enduring impact of those who dared to ask questions, challenge the status quo, and change the world. Join us as we embark on a journey through the lives and legacies of the greatest scientists of all time.1. Albert Einstein: Famous Scientist for the Theory of RelativityFamous scientist: Albert Einstein (Credit: Mark Marturello)Albert Einstein was not only a scientific genius but also a figure of enduring popularity and intrigue. His remarkable contributions to science, which include the famous equation E = mc2 and the theory of relativity, challenged conventional notions and reshaped our understanding of the universe.Early LifeBorn in Ulm, Germany, in 1879, Einstein was a precocious child. As a teenager, he wrote a paper on magnetic fields. (Einstein never actually failed math, contrary to popular lore.) His career trajectory began as a clerk in the Swiss Patent Office in 1905, where he published his four groundbreaking papers, including his famous equation, E = mc2, which described the relationship between matter and energy.ContributionsEinstein's watershed year of 1905 marked the publication of his most important papers, addressing topics such as Brownian motion, the photoelectric effect and special relativity. His work in special relativity introduced the idea that space and time are interwoven, laying the foundation for modern astronomy. In 1916, he expanded on his theory of relativity with the development of general relativity, proposing that mass distorts the fabric of space and time.AwardsAlthough Einstein received the Nobel Prize in Physics in 1921, it wasn't for his work on general relativity but rather for his discovery of the photoelectric effect. His contributions to science earned him a prestigious place in the scientific community.Key Moment A crowd barged past dioramas, glass displays, and wide-eyed security guards in the American Museum of Natural History. Screams rang out as some runners fell and were trampled. Upon arriving at a lecture hall, the mob broke down the door.The date was Jan. 8, 1930, and the New York museum was showing a film about Albert Einstein and his general theory of relativity. Einstein was not present, but 4,500 mostly ticketless people still showed up for the viewing. Museum officials told them "no ticket, no show," setting the stage for, in the words of the Chicago Tribune, "the first science riot in history."Such was Einstein's popularity. As a publicist might say, he was the whole package: distinctive look (untamed hair, rumpled sweater), witty personality (his quips, such as God not playing dice, would live on) and major scientific cred (his papers upended physics).Read More: 5 Interesting Things About Albert EinsteinDeathEinstein, who died of heart failure in 1955, left behind a profound legacy in the world of science. His life's work extended beyond scientific discoveries, encompassing his role as a public intellectual, civil rights advocate, and pacifist.LegacyAlbert Einstein's theory of general relativity remains one of his most celebrated achievements. It predicted the existence of black holes and gravitational waves, with physicists recently measuring the waves from the collision of two black holes over a billion light-years away. General relativity also underpins the concept of gravitational lensing, enabling astronomers to study distant cosmic objects in unprecedented detail."Einstein remains the last, and perhaps only, physicist ever to become a household name," says James Overduin, a theoretical physicist at Towson University in Maryland.Einstein's legacy goes beyond his scientific contributions. He is remembered for his imaginative thinking, a quality that led to his greatest insights. His influence as a public figure and his advocacy for civil rights continue to inspire generations."I am enough of an artist to draw freely upon my imagination," he said in a Saturday Evening Post interview. "Knowledge is limited. Imagination encircles the world." — Mark BarnaRead More: 20 Brilliant Albert Einstein Quotes2. Marie Curie: Famous for Pioneering Work in Radioactivity Famous scientist: Marie Curie (Credit: Mark Marturello)Marie Curie's remarkable journey to scientific acclaim was characterized by determination and a thirst for knowledge. Living amidst poverty and political turmoil, her unwavering passion for learning and her contributions to the fields of physics and chemistry have made an everlasting impact on the world of science.Early LifeMarie Curie, born as Maria Salomea Sklodowska in 1867 in Warsaw, Poland, faced immense challenges during her early life due to both her gender and her family's financial struggles. Her parents, fervent Polish patriots, sacrificed their wealth in support of their homeland's fight for independence from Russian, Austrian, and Prussian rule. Despite these hardships, Marie's parents, who were educators themselves, instilled a deep love for learning and Polish culture in her.Marie and her sisters were initially denied higher education opportunities due to societal restrictions and lack of financial resources. In response, Marie and her sister Bronislawa joined a clandestine organization known as the Flying University, aimed at providing Polish education, forbidden under Russian rule.ContributionsMarie Curie's path to scientific greatness began when she arrived in Paris in 1891 to pursue higher education. Inspired by the work of French physicist Henri Becquerel, who discovered the emissions of uranium, Marie chose to explore uranium's rays for her Ph.D. thesis. Her research led her to the groundbreaking discovery of radioactivity, revealing that matter could undergo atomic-level transformations.Marie Curie collaborated with her husband, Pierre Curie, and together they examined uranium-rich minerals, ultimately discovering two new elements, polonium and radium. Their work was published in 1898, and within just five months, they announced the discovery of radium.In 1903, Marie Curie, Pierre Curie, and Henri Becquerel were jointly awarded the Nobel Prize in Physics for their pioneering work in radioactivity. Marie became the first woman to receive a Nobel Prize, marking a historic achievement.Read More: 5 Things You Didn't Know About Marie CurieAwardsTragedy struck in 1906 when Pierre Curie died suddenly in a carriage accident. Despite her grief, Marie Curie persevered and continued her research, taking over Pierre's position at the University of Paris. In 1911, she earned her second Nobel Prize, this time in Chemistry, for her remarkable contributions to the fields of polonium and radium.Marie Curie's legacy extended beyond her Nobel Prizes. She made significant contributions to the fields of radiology and nuclear physics. She founded the Radium Institute in Paris, which produced its own Nobel laureates, and during World War I, she led France's first military radiology center, becoming the first female medical physicist.DeathMarie Curie died in 1934 from a type of anemia that likely stemmed from her exposure to such extreme radiation during her career. In fact, her original notes and papers are still so radioactive that they're kept in lead-lined boxes, and you need protective gear to view themLegacyMarie Curie's legacy endures as one of the greatest scientists of all time. She remains the only person to receive Nobel Prizes in two different scientific fields, a testament to her exceptional contributions to science. Her groundbreaking research in radioactivity revolutionized our understanding of matter and energy, leaving her mark on the fields of physics, chemistry, and medicine. — Lacy SchleyRead More: Marie Curie: Iconic Scientist, Nobel Prize Winner ... War Hero?3. Isaac Newton: Famous for Newton's Laws of Motion and GravitationFamous scientist: Isaac Newton (Credit: Mark Marturello)Isaac Newton was an English mathematician, physicist and astronomer who is widely recognized as one of the most influential scientists in history. He made groundbreaking contributions to various fields of science and mathematics and is considered one of the key figures in the scientific revolution of the 17th century.Early LifeIsaac Newton was born on Christmas Day in 1642. Despite being a sickly infant, his survival was an achievement in itself. Just 23 years later, with Cambridge University closed due to the plague, Newton embarked on groundbreaking discoveries that would bear his name. He invented calculus, a new form of mathematics, as part of his scientific journey.ContributionsNewton's introverted nature led him to withhold his findings for decades. It was only through the persistent efforts of his friend, Edmund Halley, who was famous for discovering comets, that Newton finally agreed to publish. Halley's interest was piqued due to a bet about planetary orbits, and Newton, having already solved the problem, astounded him with his answer.Read More: 5 Eccentric Facts About Isaac NewtonThe culmination of Newton's work was the "Philosophiæ Naturalis Principia Mathematica," commonly known as the Principia, published in 1687. This monumental work not only described the motion of planets and projectiles but also revealed the unifying force of gravity, demonstrating that it governed both heavenly and earthly bodies. Newton's laws became the key to unlocking the universe's mysteries.Newton's dedication to academia was unwavering. He rarely left his room except to deliver lectures, even if it meant addressing empty rooms. His contributions extended beyond the laws of motion and gravitation to encompass groundbreaking work in optics, color theory, the development of reflecting telescopes bearing his name, and fundamental advancements in mathematics and heat.AwardsIn 1692, Newton faced a rare failure and experienced a prolonged nervous breakdown, possibly exacerbated by mercury poisoning from his alchemical experiments. Although he ceased producing scientific work, his influence in the field persisted.AchievementsNewton spent his remaining three decades modernizing England's economy and pursuing criminals. In 1696, he received a royal appointment as the Warden of the Mint in London. Despite being viewed as a cushy job with a handsome salary, Newton immersed himself in the role. He oversaw the recoinage of English currency, provided economic advice, established the gold standard, and introduced ridged coins that prevented the tampering of precious metals. His dedication extended to pursuing counterfeiters vigorously, even infiltrating London's criminal networks, and witnessing their executions.Newton's reputation among his peers was marred by his unpleasant demeanor. He had few close friends, never married, and was described as "insidious, ambitious, and excessively covetous of praise, and impatient of contradiction" by Astronomer Royal John Flamsteed. Newton held grudges for extended periods and engaged in famous feuds, notably with German scientist Gottfried Leibniz over the invention of calculus and English scientist Robert Hooke.LegacyIsaac Newton's legacy endures as one of the world's greatest scientists. His contributions to physics, mathematics, and various scientific disciplines shifted human understanding. Newton's laws of motion and gravitation revolutionized the field of physics and continue to be foundational principles. His work in optics and mathematics laid the groundwork for future scientific advancements. Despite his complex personality, Newton's legacy as a scientific visionary remains unparalleled.How fitting that the unit of force is named after stubborn, persistent, amazing Newton, himself a force of nature. — Bill AndrewsRead More: Isaac Newton, World's Most Famous Alchemist4. Charles Darwin: Famous for Theory of Evolution Through Natural SelectionFamous scientist: Charles Darwin (Credit: Mark Marturello)Charles Darwin has become one of the world's most renowned scientists. His inspiration came from a deep curiosity about beetles and geology, setting him on a transformative path. His theory of evolution through natural selection challenged prevailing beliefs and left an enduring legacy that continues to shape the field of biology and our understanding of life on Earth.Early LifeCharles Darwin, an unlikely revolutionary scientist, began his journey with interests in collecting beetles and studying geology. As a young man, he occasionally skipped classes at the University of Edinburgh Medical School to explore the countryside. His path to becoming the father of evolutionary biology took an unexpected turn in 1831 when he received an invitation to join a world-spanning journey aboard the HMS Beagle.ContributionsDuring his five-year voyage aboard the HMS Beagle, Darwin observed and documented geological formations, various habitats and the diverse flora and fauna across the Southern Hemisphere. His observations led to a paradigm-shifting realization that challenged the prevailing Victorian-era theories of animal origins rooted in creationism. Darwin noticed subtle variations within the same species based on their environments, exemplified by the unique beak shapes of Galapagos finches adapted to their food sources. This observation gave rise to the concept of natural selection, suggesting that species could change over time due to environmental factors, rather than divine intervention.Read More: 7 Things You May Not Know About Charles DarwinUpon his return, Darwin was initially hesitant to publish his evolutionary ideas, instead focusing on studying his voyage samples and producing works on geology, coral reefs and barnacles. He married his first cousin, Emma Wedgwood, and they had ten children, with Darwin actively engaging as a loving and attentive father — an uncommon practice among eminent scientists of his era.Darwin's unique interests in taxidermy, unusual food and his struggle with ill health did not deter him from his evolutionary pursuits. Over two decades, he meticulously gathered overwhelming evidence in support of evolution.PublicationAll of his observations and musings eventually coalesced into the tour de force that was On the Origin of Species, published in 1859 when Darwin was 50 years old. The 500-page book sold out immediately, and Darwin would go on to produce six editions, each time adding to and refining his arguments.In non-technical language, the book laid out a simple argument for how the wide array of Earth's species came to be. It was based on two ideas: that species can change gradually over time, and that all species face difficulties brought on by their surroundings. From these basic observations, it stands to reason that those species best adapted to their environments will survive and those that fall short will die out.LegacyDespite facing fierce criticism from proponents of creationism and the religious establishment, Darwin's theory of natural selection and evolution eventually gained acceptance in the 1930s. His work revolutionized scientific thought and remains largely intact to this day. His theory, meticulously documented and logically sound, has withstood the test of time and scrutiny. Jerry Coyne, a professor emeritus at the University of Chicago, emphasizes the profound impact of Darwin's theory, stating that it "changed people's views in so short a time" and that "there's nothing you can really say to go after the important aspects of Darwin's theory." — Nathaniel ScharpingRead More: 8 Inspirational Sayings From Charles Darwin5. Nikola Tesla: Famous for Electricity, Magnetism, and Wireless Power Transmission Concepts Famous scientist: Nikola Tesla (Credit: Mark Marturello)Nikola Tesla grips his hat in his hand. He points his cane toward Niagara Falls and beckons bystanders to turn their gaze to the future. This bronze Tesla — a statue on the Canadian side — stands atop an induction motor, the type of engine that drove the first hydroelectric power plant.Nikola Tesla exhibited a remarkable aptitude for science and invention from an early age. His work in electricity, magnetism and wireless power transmission concepts, established him as an eccentric but brilliant pioneer in the field of electrical engineering.Early LifeNikola Tesla, a Serbian-American engineer, was born in 1856 in what is now Croatia. His pioneering work in the field of electrical engineering laid the foundation for our modern electrified world. Tesla's groundbreaking designs played a crucial role in advancing alternating current (AC) technology during the early days of the electric age, enabling the transmission of electric power over vast distances, ultimately lighting up American homes.ContributionsOne of Tesla's most significant contributions was the development of the Tesla coil, a high-voltage transformer that had a profound impact on electrical engineering. His innovative techniques allowed for wireless transmission of power, a concept that is still being explored today, particularly in the field of wireless charging, including applications in cell phones.Tesla's visionary mind led him to propose audacious ideas, including a grand plan involving a system of towers that could harness energy from the environment and transmit both signals and electricity wirelessly around the world. While these ideas were intriguing, they were ultimately deemed impractical and remained unrealized. Tesla also claimed to have invented a "death ray," adding to his mystique.Read More: What Did Nikola Tesla Do? The Truth Behind the LegendAwardsTesla's eccentric genius and prolific inventions earned him widespread recognition during his lifetime. He held numerous patents and made significant contributions to the field of electrical engineering. While he did not invent alternating current (AC), he played a pivotal role in its development and promotion. His ceaseless work and inventions made him a household name, a rare feat for scientists in his era.LegacyIn recent years, Tesla's legacy has taken on a life of its own, often overshadowing his actual inventions. He has become a symbol of innovation and eccentricity, inspiring events like San Diego Comic-Con, where attendees dress as Tesla. Perhaps most notably, the world's most famous electric car company bears his name, reflecting his ongoing influence on the electrification of transportation.While Tesla's mystique sometimes veered into the realm of self-promotion and fantastical claims, his genuine contributions to electrical engineering cannot be denied. He may not have caused earthquakes with his inventions or single handedly discovered AC, but his visionary work and impact on the electrification of the world continue to illuminate our lives. — Eric BetzRead More: These 7 Famous Physicists Are Still Alive Today6. Galileo Galilei: Famous for his Astronomical Observations and Our Understanding of MotionFamous scientist: Galileo Galilei (Credit: Mark Marturello)Galileo Galilei, an Italian mathematician, made a pivotal contribution to modern astronomy around December 1609. At the age of 45, he turned a telescope towards the moon and ushered in a new era in the field. His observations unveiled remarkable discoveries, such as the presence of four large moons orbiting Jupiter and the realization that the Milky Way's faint glow emanated from countless distant stars. Additionally, he identified sunspots on the surface of the sun and observed the phases of Venus, providing conclusive evidence that Venus orbited the sun within Earth's own orbit.ContributionsWhile Galileo didn't invent the telescope and wasn't the first to use one for celestial observations, his work undeniably marked a turning point in the history of science. His groundbreaking findings supported the heliocentric model proposed by Polish astronomer Nicolaus Copernicus, who had revolutionized astronomy with his sun-centered solar system model. Beyond his astronomical observations, Galileo made significant contributions to the understanding of motion. He demonstrated that objects dropped simultaneously would hit the ground at the same time, irrespective of their size, illustrating that gravity isn't dependent on an object's mass. His law of inertia also played a critical role in explaining the Earth's rotation.Read More: 12 Fascinating Facts About Galileo Galilei You May Not KnowAwardsGalileo's discoveries, particularly his support for the Copernican model of the solar system, brought him into conflict with the Roman Catholic Church. In 1616, an inquisition ordered him to cease promoting heliocentrism, as it contradicted the church's geocentric doctrine based on Aristotle's outdated views of the cosmos. The situation worsened in 1633 when Galileo published a work comparing the Copernican and Ptolemaic systems, further discrediting the latter. Consequently, the church placed him under house arrest, where he remained until his death in 1642.LegacyGalileo's legacy endured despite the challenges he faced from religious authorities. His observations and pioneering work on celestial bodies and motion laid the foundation for modern astronomy and physics. His law of inertia, in particular, would influence future scientists, including Sir Isaac Newton, who built upon Galileo's work to formulate a comprehensive set of laws of motion that continue to guide spacecraft navigation across the solar system today. Notably, NASA's Galileo mission to Jupiter, launched centuries later, demonstrated the enduring relevance of Galileo's contributions to the field of space exploration. — E.B.Read More: Galileo Galilei's Legacy Went Beyond Science7. Ada Lovelace: Famous For Being the World's First Computer ProgrammerFamous scientist: Ada Lovelace (Credit: Mark Marturello)Ada Lovelace defied the conventions of her era and transformed the world of computer science. She is known as the world's first computer programmer. Her legacy endures, inspiring generations of computer scientists and earning her the title of the "Enchantress of Numbers."Early LifeAda Lovelace, born Ada Byron, made history as the world's first computer programmer, a remarkable achievement considering she lived a century before the advent of modern computers. Her journey into the world of mathematics and computing began in the early 1830s when she was just 17 years old. Ada, the only legitimate child of the poet Lord Byron, entered into a pivotal collaboration with British mathematician, inventor, and engineer Charles Babbage. Babbage had conceived plans for an intricate machine called the Difference Engine — essentially a massive mechanical calculator.Read More: Meet Ada Lovelace, The First Computer ProgrammerContributionsAt a gathering in the 1830s, Babbage exhibited an incomplete prototype of his Difference Engine. Among the attendees was the young Ada Lovelace, who, despite her age, grasped the workings of the machine. This encounter marked the beginning of a profound working relationship and close friendship between Lovelace and Babbage that endured until her untimely death in 1852 at the age of 36. Inspired by Babbage's innovations, Lovelace recognized the immense potential of his latest concept, the Analytical Engine.The Analytical Engine was more than a mere calculator. Its intricate mechanisms, coupled with the ability for users to input commands through punch cards, endowed it with the capacity to perform a wide range of mathematical tasks. Lovelace, in fact, went a step further by crafting instructions for solving a complex mathematical problem, effectively creating what many historians later deemed the world's first computer program. In her groundbreaking work, Lovelace laid the foundation for computer programming, defining her legacy as one of the greatest scientists.LegacyAda Lovelace's contributions to the realm of "poetical science," as she termed it, are celebrated as pioneering achievements in computer programming and mathematics. Despite her tumultuous personal life marked by gambling and scandal, her intellectual brilliance and foresight into the potential of computing machines set her apart. Charles Babbage himself described Lovelace as an "enchantress" who wielded a remarkable influence over the abstract realm of science, a force equivalent to the most brilliant male intellects of her time. — L.S.Read More: Meet 10 Women in Science Who Changed the World8. Pythagoras: Famous for the Pythagorean TheoremFamous scientist: Pythagoras (Credit: Mark Marturello)Pythagoras left an enduring legacy in the world of mathematics that continues to influence the field to this day. While his famous Pythagorean theorem, which relates the sides of a right triangle, is well-known, his broader contributions to mathematics and his belief in the fundamental role of numbers in the universe shaped the foundations of geometry and mathematical thought for centuries to come.Early LifePythagoras, a Greek philosopher and mathematician, lived in the sixth century B.C. He is credited with the Pythagorean theorem, although the origins of this mathematical concept are debated.ContributionsPythagoras is most famous for the Pythagorean theorem, which relates the lengths of the sides of a right triangle. While he may not have been the first to discover it, he played a significant role in its development. His emphasis on the importance of mathematical concepts laid the foundation for modern geometry.AwardsPythagoras did not receive formal awards, but his legacy in mathematics and geometry is considered one of the cornerstones of scientific knowledge.LegacyPythagoras' contributions to mathematics, particularly the Pythagorean theorem, have had a lasting impact on science and education. His emphasis on the importance of mathematical relationships and the certainty of mathematical proofs continues to influence the way we understand the world. — M.B.Read More: The Origin Story of Pythagoras and His Cult Followers9. Carl Linnaeus: Famous for His System of Naming Living OrganismsFamous scientist: Carl Linnaeus (Credit: Mark Marturello)Carl Linnaeus embarked on a mission to improve the chaos of naming living organisms. His innovative system of binomial nomenclature not only simplified the process of scientific communication but also laid the foundation for modern taxonomy, leaving an enduring legacy in the field of biology.Early LifeIt started in Sweden: a functional, user-friendly innovation that took over the world, bringing order to chaos. No, not an Ikea closet organizer. We're talking about the binomial nomenclature system, which has given us clarity and a common language, devised by Carl Linnaeus.Linnaeus, born in southern Sweden in 1707, was an "intensely practical" man, according to Sandra Knapp, a botanist and taxonomist at the Natural History Museum in London. He lived at a time when formal scientific training was scant and there was no system for referring to living things. Plants and animals had common names, which varied from one location and language to the next, and scientific "phrase names," cumbersome Latin descriptions that could run several paragraphs.ContributionsWhile Linnaeus is often hailed as the father of taxonomy, his primary focus was on naming rather than organizing living organisms into evolutionary hierarchies. The task of ordering species would come later, notably with the work of Charles Darwin in the following century. Despite advancements in our understanding of evolution and the impact of genetic analysis on biological classification, Linnaeus' naming system endures as a simple and adaptable means of identification.The 18th century was also a time when European explorers were fanning out across the globe, finding ever more plants and animals new to science."There got to be more and more things that needed to be described, and the names were becoming more and more complex," says Knapp.Linnaeus, a botanist with a talent for noticing details, first used what he called "trivial names" in the margins of his 1753 book Species Plantarum. He intended the simple Latin two-word construction for each plant as a kind of shorthand, an easy way to remember what it was."It reflected the adjective-noun structure in languages all over the world," Knapp says of the trivial names, which today we know as genus and species. The names moved quickly from the margins of a single book to the center of botany, and then all of biology. Linnaeus started a revolution — positioning him as one of the greatest scientists — but it was an unintentional one.LegacyToday we regard Linnaeus as the father of taxonomy, which is used to sort the entire living world into evolutionary hierarchies, or family trees. But the systematic Swede was mostly interested in naming things rather than ordering them, an emphasis that arrived the next century with Charles Darwin.As evolution became better understood and, more recently, genetic analysis changed how we classify and organize living things, many of Linnaeus' other ideas have been supplanted. But his naming system, so simple and adaptable, remains."It doesn't matter to the tree in the forest if it has a name," Knapp says. "But by giving it a name, we can discuss it. Linnaeus gave us a system so we could talk about the natural world." — Gemma TarlachRead More: Is Plant Communication a Real Thing?10. Rosalind Franklin: Famous for X-ray Crystallography and Groundbreaking Research on Structure of DNAFamous scientist: Rosalind Franklin (Credit: Mark Marturello)Rosalind Franklin, a brilliant and tenacious scientist, transformed the world of molecular biology. Her pioneering work in X-ray crystallography and groundbreaking research on the structure of DNA propelled her to the forefront of scientific discovery. Yet, her remarkable contributions were often overshadowed, and her legacy is not only one of scientific excellence but also a testament to the persistence and resilience of a scientist who deserved greater recognition in her time.Early LifeRosalind Franklin, one of the greatest scientists of her time, was a British-born firebrand and perfectionist. While she had a reputation for being somewhat reserved and difficult to connect with, those who knew her well found her to be outgoing and loyal. Franklin's brilliance shone through in her work, particularly in the field of X-ray crystallography, an imaging technique that revealed molecular structures based on