


# Science Funding

Leaders | Co-operate to accumulate

**Document 1 - America's neglect of global science is backfiring +** 🎧

***The Economist,*** Nov 19th 2026

AMERICAN SCIENCE leads the world because of both its home-grown strength and its openness to collaborating with foreigners. The Trump administration prefers to rely only on the first half of the formula. As we exclusively report, the number of grants made by the National Institutes of Health (NIH) involving collaborators abroad has been 38% lower on average in 2025 and 2026 than in 2022-24. At the same time the administration is making it far harder for foreign scientists to study and work in America.

The funding of overseas research needed more oversight. Yet in its approach to foreign know-how and foreign brains, the administration has overcorrected. The results will be bad for humanity, because no other country can advance the frontiers of science as much as an outward-looking America can. They will also be bad for America itself.

The NIH has funded foreign scientists since 1947. In 1960 the International Health Research Act formalised the practice. Its champion, John Fogarty, thought co-operation in medical research would foster peace. That is debatable, but the funding has done enormous good. The NIH's Fogarty International Centre has trained thousands of health researchers in poorer countries; some alumni now run national health systems. Americans have benefited directly, too. For example, in 2021 an NIH-backed trial showed how to cure TB in four months rather than six. Trials are often faster and cheaper abroad. Enrolling patients is easier for conditions that are more common in other parts of the world, such as HIV.

The Trump administration argues that overseas research can pose a national-security risk and that American taxpayers deserve better oversight. Those are reasonable concerns. The Wuhan Institute of Virology, one possible source of the covid-19 virus, received NIH money through its collaboration with the EcoHealth Alliance, a now-defunct American non-profit. Yet the administration's approach to reform has been inept and indiscriminate, cutting off money for promising global research on arthritis, hiv, dementia and more. Our analysis suggests the administration's political preoccupations have played a troubling role in the allocation of cash: research involving South Africa, with which Trumpworld has a beef about race politics, has suffered disproportionately.

The damage to global science and America's status at its summit is being aggravated by new immigration policies. Visa delays, travel bans and threats to post-study work rights have contributed to a fall of 21% in applications from international students to PhD programmes across 55 of America's research universities. (New enrolments of other foreign students have also fallen dramatically.) In July a rule was finalised limiting student and exchange visas to four years, shorter than most PhD programmes, after which visa holders must apply for an extension (though this has since been blocked by a court). The Trump administration has proposed charging universities

up to $100,000 per student for work authorisation for up to three years after graduation—a prohibitive sum.

Deterring talented foreign scientists from coming to study and work in America is an act of senseless self-harm. Foreigners are not on the margins of science in America. A third of American Nobel laureates in the sciences were born abroad. In 2023 roughly three-fifths of postdoctoral scientists held temporary visas. In Massachusetts, the de facto capital of America's biotech industry, some 30% of STEM workers were born outside the country. America's scientific engine would be far weaker without them.

The Republican-controlled Congress has already pushed back against the White House, rejecting a proposed 40% cut to the NIH and refusing to abolish the Fogarty International Centre. The Democrats who will soon take over Congress should stiffen this defence and hold hearings to scrutinise the administration's actions. So far, science does not feature much in their plans, raising the chances that its neglect will outlast Donald Trump's presidency. Trust across international research networks takes years to build. So does a reputation for welcoming talented foreigners. There is no time to lose. ■

**Document 2 - What the sudden demise of the UK's department of science means for the future of research**

The Conversation, July 22, 2026 (abridged)

The obituaries were being written before the body was cold. Within hours of Prime Minister Andy Burnham confirming that Whitehall's responsibilities for science and technology would be absorbed into a new Department for Business, Innovation, Science and Trade (DBIST), Sir Paul Nurse, president of the Royal Society, was on Radio 4 warning that "science isn't a slave to business". The trade association TechUK declared it "the wrong change at the wrong time".

You might imagine that something ancient, ineffable and essential to British science had been ripped away. In fact, the Department for Science, Innovation and Technology (DSIT) was only born in February 2023 – a surprise late tweak to the machinery of government under Rishi Sunak's faltering premiership.

Science has never enjoyed a settled home in Whitehall. For most of the period from 1995 to 2023, it sat precisely where Burnham has put it now: inside a business super-department. Notably, the single most important protection UK science secured in that era – a ring-fenced budget through the George Osborne austerity years – was won from inside the Business, Innovation and Science department, under then-business secretary Vince Cable.

The historian David Edgerton has long argued that Britain's fondness for tinkering with the machinery of government is a form of displacement activity. What actually shapes the fortunes of research is money, people and demand for what they produce, not the nameplates on London's Victoria Street.

On that test, the outlook for science is far calmer than some reactions to this latest move would suggest. Under plans published last October, the UK's total research and development budget is locked in at £58.5 billion over the four-year spending review to 2030 – a real-terms increase.

Machinery changes move budget lines across departments; they don't unravel them. As yet, nothing we've heard from the Burnham government suggests the settlement for UK Research and Innovation (UKRI) is at risk. […]

Set against political commissars patrolling the borders of knowledge, the UK's science soap opera feels deeply provincial – a debate about which secretary of state sponsors oversight of a gradually swelling budget.

And the institutional layer beneath this is in better shape than doomsayers allow. UKRI's new strategy has set a clear five-year path: priority programmes in AI, quantum and clean energy, faster funding decisions, and a welcome seriousness about experimentation with the modes and means by which we manage public investment in research.

Not everyone is happy with UKRI's approach to prioritisation. But a funder with a published strategy, agreed budget and hard targets is a more durable asset than a three-year-old ministry. The research councils have outlasted every department that ruled over them, and UKRI will outlast this too.

Nor should the science community be spooked by closer proximity to business. When I leave my office at UCL and stroll down the Euston Road through London's Knowledge Quarter – dubbed "the new square mile" – I pass by the Wellcome Trust, the Crick and Turing institutes, the British Library, Anthropic and Google DeepMind. Day in, day out, this dense weave of labs, firms and cultural institutions delivers what the triple helix of government, industry and academia is all about.

And we can find versions of the same story unfolding in Manchester, Sheffield, Cambridge and Glasgow. Rather than science being subordinate or "enslaved", the UK's world-leading universities have spent the past decade aligning themselves with agendas for regional growth and frontier technologies.

But there's a harder truth lurking here too. Public money accounts for less than a third of UK research and development investment. The rest is financed and largely performed by the private sector.

UK science's chronic weakness has never been the quality of publicly funded research. It is the R&D intensity of UK firms, and their ability to convert discoveries into products, services and revenue streams generated and owned in the UK.

### Document 3 - How federal regulations choke U.S. science

Editorial Board, The Washington Post, May 7, 2026

The United States risks falling behind China in basic science, and a major reason why is the inefficiency of federally funded research programs. The solution is not to reduce budgets but to cut the strings attached to government money.

Scientists have long battled nightmarish bureaucracy to access funding, but it's gotten much worse. Since 1991, the Council on Governmental Relations has tracked the number of regulations tied to receiving federal grants. It grew exponentially over the last decade before spiking last year as the U.S. DOGE Service cracked down on funding that appeared at odds with the administration's agenda.

Typical researchers now waste about 40 percent of their time on administrative and regulatory matters, according to a report last year from the National Academies of Sciences, Engineering, and Medicine. That means filling out endless paperwork from government agencies, which often contradict each other. Compliance is costly; even small institutions report spending more than $1 million a year to deal with regulatory burdens.

And then there are interminable review boards. The National Academies highlights the case of a professor who won federal grants to do research on artificial robotic limbs. She endured three rounds of review: one from her university, another from the Defense Department and then a re-review from her university to account for changes requested by the Pentagon. A year after winning her funding, the professor had barely begun meaningful work.

Meanwhile, China eclipsed the U.S. on spending for research and development in 2024 for the first time, after adjusting for purchasing power.

This is paying dividends for them: China has also overtaken the U.S. in the number of new pharmaceutical trials, scientific articles published and highly cited papers.

The good news is that the U.S. government accounts for only a portion of national investment in science. The share has fallen since the Cold War as a percentage of gross domestic product, whereas investment from businesses has boomed.

At the same time, companies usually focus more on developing commercial products than blue-sky research that can spark breakthroughs. This has historically happened in academic settings. Curiosity-driven science, without immediate practical goals, helped discover mRNA technology, the internet, MRIs and penicillin.

The Trump administration has repeatedly attempted — and largely failed — to slash public dollars going to universities and other research institutions. On Capitol Hill, appropriators from both parties have ignored requested cuts from the White House. Courts have blocked politically motivated efforts to slash university funding.

Now, there's an opening to roll back some of the pesky requirements imposed by bureaucrats. Some are necessary, such as disclosing conflicts of interest and protecting data from espionage. But eliminating duplicative rules would help the U.S. get so much more bang for its research bucks.

### Document 4 - New proposal would give Trump officials more control over scientific research grants

https://www.youtube.com/watch?v=WKkRVhwiJAM (stop at 4'55) – See CDP

# Trust in Science

### Document 5 - This phrase was meant to increase trust in science. It backfired.

The Washington Post, August 5, 2025 (abridged)

The Trump administration's 2025 budget proposed slashing the National Science Foundation's funding by 55 percent and the National Institutes of Health's by nearly 40 percent, labeling many grants "wasteful." Meanwhile, recent surveys show public trust in scientists has dropped sharply, particularly among conservative voters, compared to pre-pandemic levels. The value of science itself is being openly challenged.

Scientists, unfortunately, are partially to blame. One of the scientific community's greatest contributing missteps was the very phrase meant to help: "Follow the science."

Intended to inspire confidence, it became a common refrain at Centers for Disease Control and Prevention briefings and part of Joe Biden's pandemic plan. But science is evidence, not instruction. Treating it as

something definitive to be followed shut down dialogue and dismissed all critics as "anti-science."

To win back that trust, we need a new model of communication — one that clearly separates science from policy.

Science explains the facts as we currently understand them. Sound public policy, on the other hand, involves choices and trade-offs: balancing what we know, what we can reasonably predict and what outcomes we want to achieve.

We need to be honest about what science can and can't tell us. For example, studies tell us that vaccines are unmatched in preventing many communicable diseases; they also tell us that undercooked eggs carry a risk of salmonella. These two scientific truths inform very different policy responses. One may justify mandating vaccines in schools; the other certainly doesn't justify banning sunny-side-up eggs.

Such nuance was often glossed over during the covid-19 pandemic. At some point, health authorities settled on six feet of distance to limit viral spread. Why not five or Europe's one meter? Digging into the literature, as many did, yields very little evidence justifying that number. It seemed more like a guess or a compromise. Yet it was repeatedly presented and received as an absolute truth — essential and nonnegotiable. […]

In much of that communication, "follow the science" became a cudgel to dismiss criticism of *policy* as anti-*science*. But science rarely offers a single, uncontested answer. Officials could build more public trust by acknowledging that the same data can support different, reasonable interpretations. […]

By misrepresenting scientific uncertainty as certainty, we forfeit public trust. Communicating science as rigid, top-down rules rather than nuanced guidance sows confusion and skepticism. Science itself shows this to be true.

Without trust, more information doesn't solve the problem; it often makes it worse. Studies show that emphasizing fact-based corrections without restoring trust paradoxically entrenches false beliefs. When people who strongly believed the flu shot caused the flu were given corrective information from the CDC, they became less likely to be immunized.

How do we restore trust? As a pediatrician, I was taught to communicate with patients and parents openly and without judgment, to recognize complexity and uncertainty, and to build trust patiently, one conversation at a time.

Public communication about science deserves the same. Our engagement with the public must be based on three key principles: communicating through empathy rather than fear, transparency rather than false certainty and humility rather than authority.

That also means reckoning honestly with our mistakes, including the slogan "follow the science," when science alone rarely dictates what we should do.

**Document 6 –**
**Anyone can fake a scientific image with AI, tricking even academic journals – and undermining trust in science**

The Conversation, June 22, 2026 (abridged)

A photograph of Earth glowing in deep space, the Moon's cratered horizon stretching across its foreground, caught many people's eyes in April 2026. Astronauts captured the image while aboard NASA's Artemis II mission, and like the famous Apollo 8 "Earthrise" image, the picture felt instantly real and inspiring for many.

But when almost anyone can fabricate a visually similar image in seconds from a text prompt using artificial intelligence, how do people decide which image is real?

The proliferation of AI-generated science images in public spaces is not simply a misinformation problem. As a researcher who studies visual science communication and public trust, I believe it also contributes to a crisis of trust in science in the age of AI, and the tools scientists have long relied on to establish visual credibility are losing their grip.

AI tools are already changing how scientific visuals are created, shared and publicized.

Researchers use them to generate illustrations, create synthetic data, edit lab images and produce materials for education and public outreach.

While AI can help scientists communicate complicated ideas more creatively and efficiently, these same tools blur the lines between illustration, enhancement and fabrication.

In 2024, two papers were retracted after publishing AI-generated figures possessing biologically impossible structures. In April 2026, the New England Journal of Medicine retracted a paper after discovering that a clinical image had been manipulated with AI. These are just cases that came to mass public attention and are likely just the tip of the iceberg. Researchers have warned that AI-generated visuals pose growing threats in fields that depend heavily on visual evidence, such as materials science.

Academic publishers are beginning to adopt AI-detection tools. However, systems designed to detect fake images will almost always lag behind systems designed to create them. Many detectors can identify only image patterns they were trained to recognize. As new AI models emerge, developers must constantly obtain new data and retrain detectors to catch up.

The biggest concern are realistic-looking visuals that subtly distort scientific details while remaining believable enough to pass initial review.

For decades, scientific images carried authority partly because they were difficult to produce. Creating microscope images, climate graphs and space photographs required expensive equipment, institutional resources and specialized expertise. Most people assumed such images represented true observations because very few people could make them.

Research in science communication, including my own, suggests that people judge scientific visuals using a few mental shortcuts. Does the image look technically sophisticated? Does it come from a trusted institution? Does it match what I already believe? Generative AI is undermining all three of these heuristics, or mental shortcuts.

Today, anyone can create a polished, scientific-looking image from a text prompt. Images are also detached from their original source when circulating online. When visual quality and institutional attribution become unreliable cues for judging the credibility of science images, people tend to fall back on something else: their own prior beliefs.

As a result, authentic scientific images that challenge someone's existing beliefs can now be dismissed as AI-generated, whereas fabricated images that confirm them are easily accepted as evidence. AI, in this way, may amplify motivated reasoning – that is, people's tendency to accept what they already agree with and question what they do not.

This shift matters because visuals have long served as evidence for scientific claims. Nonexpert audiences rely on images not only to see what scientists have discovered but also to develop an emotional connection and perceive credibility in the science being presented.

If audiences stop trusting visual evidence altogether, science loses one of its most powerful tools for public communication. […]

**Document 7 - L'académie des sciences dénonce les coupes dans la recherche**

www.europe1.fr, 4 mai 2026

L'Académie des sciences a demandé lundi au gouvernement de "cesser de sacrifier l'avenir de la nation" à des "impératifs de court terme", dénonçant des coupes budgétaires "à répétition" dans la recherche.

Dans un communiqué, l'Académie exprime notamment "sa vive inquiétude" face à la "cure d'austérité sans précédent imposée" au Centre national de la recherche scientifique (CNRS), qui constitue, selon elle, un "choc inédit".

Depuis octobre 2024, les charges obligatoires non compensées par l'État du CNRS ont atteint plus de 500 millions d'euros. Pour 2026, s'y ajoute une diminution immédiate des dépenses de 20 millions d'euros demandée par l'État.

"Au-delà du CNRS, c'est tout l'ensemble de la recherche qui vacille", estiment les académiciens, dénonçant un "mal profond et systémique".

Le budget des universités, "en sous-financement depuis des années", a "encore été coupé en mars 2026", et "atteint un point de rupture", tandis que les fonds de l'Agence nationale de la recherche (ANR) "sont menacés d'une coupe de 200 millions d'euros, ce qui va compromettre le financement des projets de recherche dans de nombreux laboratoires", écrivent-ils.

# Diversity in science (or not)

**Document 8 - Does diversity belong in science?**

www.thepipettepen.com, March 15, 2026 (abriged)

Lately, there has been a lot of discussion about whether diversity belongs in science. While some argue that investing in a diverse scientific workforce is wasteful, biology itself tells a different story about the power of diversity. From the smallest scales of genetics to entire ecosystems, biology is consistent in its declaration that diversity is an integral part of our survival and success.

Genetic mutations, random changes in DNA, are one of the primary sources of genetic diversity. As the environment changes, some of these mutations may prove to be beneficial for a species' survival. Thus, mutations are

necessary for evolution and adaptation. In humans, well-known examples include reduced melanin levels as populations migrated out of high-UV regions of Africa, the ability to digest lactose that emerged alongside dairy farming, and genetic adaptations that allow Tibetans to thrive at high altitudes. […]

The importance of diversity can also be seen on a larger scale. Monoculture agriculture involves growing a single crop over a large area. This became common practice as it allowed farmers to specialize in the production of a single crop to maximize yield and profit; however, it is now understood to be a risky practice, as a single pest or disease can wipe out the entire crop. Alternatively, planting a more diverse array of crops confers greater resistance to these threats. Similarly, ecosystems with greater biodiversity are more resistant to changes in the climate.

So, do these lessons ranging all the way from microbiology to ecosystem biology apply on the human scale? Recent research suggests that they do. A study by the Boston Consulting Group (BCG) found a 19 percent increase in innovation revenue from companies with above-average diversity on their management teams compared to companies with below-average leadership diversity. In a separate study, McKinsey & Company, an American multinational strategy and management consulting firm, collected data from over 1,200 companies across six global regions. They found that companies in the top quartile of ethnic and gender representation on executive teams had a 39 percent increased likelihood of outperformance than those in the bottom quartile.

More specifically, diversity within the scientific workforce can have a huge impact on new technologies and public health. For example, during a school project, MIT researcher Joy Buolamwini found that facial recognition algorithms didn't work on dark-skinned women. These algorithmic biases are one example of disparities that Black and Hispanic scientists are more likely to look into. Similarly, a lack of female scientists (for example only about 33% of faculty in pharmaceutical companies are women) has led to less funding and less research into diseases that primarily affect women. Diseases that primarily affect women receive half as much funding as those that primarily affect men. It was estimated that if the scientific workforce over the last 40 years matched the 2010 US Census, there would have been 29% more articles in public health, 25% more in gynecology, and 18% more on mental health.

Again and again, biology tells the same story: diversity is an asset. It fuels adaptation to new and changing environments, protects populations from adverse health outcomes, enables complex biological functions, buffers ecosystems against change, and promotes technologies that work for more people. Loss of diversity consistently results in one thing — fragility. Crops and technologies fail, species decline, and diseases spread more easily. These patterns appear across every level of life, from DNA to entire ecosystems. The research is in: diverse perspectives drive creativity, boost innovation, and reduce bias. Just as diversity strengthens living systems, it also strengthens the teams studying them—exactly what science needs to solve the complex problems of our time.

## Document 9 - Trump's new science panel includes 9 tech billionaires—and just one scientist

Scientific American, March 26, 2026 (abridged)

U.S. President Donald Trump has named 13 people to his panel of science advisers — and all but one is a leading technology executive. The President's Council of Advisors on Science and Technology (PCAST) now includes a single university researcher and at least nine billionaires.

Among the new members are Mark Zuckerberg, the chief executive of Meta, the parent company of Facebook; Larry Ellison, the executive chairman of software giant Oracle; and Sergey Brin, the co-founder of Google. There are also chief executives of tech hardware companies — Jensen Huang of NVIDIA, Lisa Su of Advanced Microdevices and Michael Dell of Dell Technologies. The corporate chiefs have a combined wealth in excess of US$900 billion.

Three of the chief executives have earned PhDs from the Massachusetts Institute of Technology (MIT) in Cambridge. Su's degree is in electrical engineering. Jacob DeWitte and Bob Mumgaard, who both head nuclear-energy start-up firms, have degrees in nuclear engineering and applied plasma physics, respectively.

The sole academic researcher is John Martinis, a quantum physicist at the University of California, Santa Barbara, who shared the Nobel Prize in Physics last year for observations of macroscopic quantum phenomena. "I am honoured to be on the committee," Martinis told *Nature*.

Laura Greene, a physicist at Florida State University in Tallahassee and a member of PCAST during the administration of president Joseph Biden, praised Martinis and Su as being "outstanding, both in science and technology".

But others are critical of the committee's make-up. "Not a single biologist and only one university researcher on PCAST," Vaughan Cooper, an evolutionary biologist at the University of Pittsburgh in Pennsylvania, said in a post on Bluesky. "This leaves the country unbelievably ill prepared for an age of biotechnology, a race we are already beginning to lose."

The balance could yet change: under the terms of a presidential order Trump issued in 2025, he could name as many as 11 more members to the committee, says Kenny Evans at Rice University in Houston, Texas, who is a specialist in science policy and co-founder of the White House Scientists Archive.

The White House did not immediately respond to a request for comment.

PCAST makes science-policy recommendations to the White House on topics such as improving nutrition science and bolstering the scientific workforce. It also reviews cross-agency programmes that are already under way, such as the Networking and Information Technology Research and Development initiative. Most of PCAST's work is done by subcommittees, and its reports are largely prepared by staff from the Science and Technology Policy Institute, a federally funded research and development centre in Washington DC.

During Trump's first term, from 2017 to 2021, PCAST had 13 members excluding the chair — 7 academic scientists and 6 people from industry. Under Biden, whose term ran from 2021 to 2024, it had 28 members (not counting chairs), 19 of whom were academic researchers, with the remaining 9 from industry and the government. Aside from the PCASTs appointed by Trump, every PCAST since 2001 has had at least 10 members who were academic researchers.

The new PCAST members' backgrounds are no surprise, says Evans. "Historically, PCAST's membership reflects the president's science and tech priorities," he says. "This group is about what you would expect from the Trump administration — a handful of billionaires and tech executives with expertise narrowly focused on AI, quantum and nuclear fusion."

Artificial intelligence and quantum information are the first and second entries on the Trump administration's list of research and development priorities. The Trump administration aims to quadruple US commercial nuclear power by 2050, and a merger was announced in December between nuclear-fusion company TAE Technologies and a firm co-owned by Trump. […]

## Document 10 - AI's transformation of mathematics is a turning point for science

The Economist, October 12, 2026 (abridged)

[…] On October 6th OpenAI released a torrent of 719 papers detailing solutions the same model had found to at least 372 other long-standing open problems. No field of research has ever experienced an event like it.

Many mathematicians are not celebrating. "The shock is immense," wrote Hugo Duminil-Copin, a mathematician at the University of Geneva, who won a Fields Medal (maths' most distinguished prize) in 2022. "I am paralysed." In a statement published soon after the Navier-Stokes announcement—and since endorsed by more than 8,000 researchers—Dr Duminil-Copin and 27 fellow Fields medallists described the situation as a "severe misalignment of AI in mathematics". They worry about the risks posed by solutions divorced from human understanding. Left unchecked, says Martin Hairer of EPFL in Lausanne, Switzerland, another signatory, AI would "sterilise the field".

That AI's mathematical breakthroughs have prompted such reactions is, on its face, odd. Having answers to long-standing questions is an advance for humanity. Mathematicians also have a vested interest in resisting disruption to their careers. Their case is not entirely special pleading, though—and offers a preview of the uproar that could soon break out across science. […]

Mathematics is not the only field facing disruption. An analysis of 41.3m papers from disciplines across the natural sciences, co-authored by James Evans at the University of Chicago and published in January, found that researchers are adopting AI at an accelerating rate (see chart). AI has already dramatically changed how theoretical physicists work, according to David Tong of the University of Cambridge. "In terms of calculating, it's just obvious you turn to an LLM," he says. "That wasn't true three months ago." On September 25th Anthropic, another AI firm, announced that its model, Claude, had pushed the frontier in calculating the interactions between certain sets of particles.

Scientists adopting AI appear to be finding success: Dr Evans's study showed that those who use the technology publish more and attract more citations. Yet, while a boon for individuals, AI use shrank the range of topics studied by almost 5% and cut scientists' engagement with each other's work by 22%. That aligns with the findings of a recent survey of over 600 scientists conducted by Google. Almost half of the respondents said AI pushes them towards safer, more incremental projects that are guaranteed to produce publishable results in short order. Only 28% thought AI was enabling them to pursue more speculative work.

Other risks arise as AI plays an ever bigger role in science, says Hector Zenil, a computer scientist at King's College London. Writing in *Frontiers in Artificial Intelligence*, in February, Drs Zenil and Evans envisage a future in which AI models (with some robotics thrown in, too) close the scientific loop, meaning they become capable of autonomously taking measurements, forming hypotheses, testing them in the lab and evaluating their findings before beginning the process again. The researchers warn that could push science into strange new

territory where machine-driven research ceases to be legible to humans.

It may still be possible, in such a world, to check the machines' results are correct, and perhaps even make use of them. Scientists, says Dr Zenil, might thus become like archaeologists, following up AI discoveries and trying to work out how they were achieved. Dr Tong, who is optimistic that AI will be a force for good, nonetheless warns that "I'm not sure we're really prepared for what's coming in six months or a year." Theoretical physics is a close relative of mathematics, so is the most ripe of the sciences for similar disruption.

Mathematicians are not jobless yet, though. The very opacity of OpenAI's results promises plenty of work verifying AI's methods and identifying which approaches prove most fruitful. What's more, say mathematicians, good as AI is at problem-solving, it still struggles with creative work; whether an AI could have invented imaginary numbers, for instance, remains unclear. Yet as Dr Connes is finding out, scientists underestimate the potential of the technology at their peril.

# Gene Editing

**Document 11 –**

**Gene-edited babies are now closer to becoming a reality. The ethical debate is far from settled**

CNN, July 8, 2026

[…] The gene-editing technique known as CRISPR-Cas9 is used in laboratories around the world and has revolutionized scientific research, allowing scientists to edit the genes of living organisms for biotechnology and medical research. In 2020, two of the scientists who devised the technology won the Nobel Prize in chemistry, and in 2023, the US Food and Drug Administration approved the first two gene therapies for sickle cell disease, a debilitating and life-shortening inherited red blood cell disorder that disproportionately affects African Americans.

But, in some respects, CRISPR-Cas9 is a blunt tool. When the technology edits DNA it creates a double strand break at the target site in the helix, and when used to modify human embryos, several studies have shown it to result in large and unintended changes — possibly even the loss of an entire chromosome.

The potential for unknown health effects is one reason why the scientific community condemned the work of Chinese researcher He Jiankui when he revealed in 2018 the existence of two girls who had been born from embryos he said he had modified using CRISPR-Cas9 to make them resistant to HIV. He received a three-year jail sentence in 2019 but has since been released. He did not respond to a request for comment.

A newer, more precise form of CRISPR, known as base editing, can change a single letter (or base) of DNA at a time.

Base editing was used for the first time in a 2022 clinical trial to modify the immune cells of a UK teenager after doctors exhausted all other options to treat her form of leukemia. Eight other children and two adults have gone on to receive the treatment. And last year, doctors used base editing to treat a baby born with a severe CPS1 deficiency, a rare and dangerous genetic disease.

[…] Genome editing in human embryos has value, allowing scientists to understand the rules that govern the earliest stages of human life, said Helen O'Neill, an associate professor in reproductive and molecular genetics at the Institute for Women's Health, University College London. She was not involved in either study.

"It can help us understand why so many embryos in IVF fail to develop, arrest, implant or progress, despite appearing morphologically acceptable," O'Neill said in statement.

"In the longer term, it may help us think more clearly and compassionately about a very small group of patients with serious inherited conditions for whom preimplantation genetic testing is not enough."

O'Neill added that the debate around embryo editing is often framed as if the only possible endpoint is designer babies. "That framing misses the actual scientific and clinical value," she noted.

Laurie Zoloth, a professor of religion and ethics at the University of Chicago, said the research activated once more the ethical debate about altering human embryos, noting that editing embryos is risk laden and, except for use in scientific research, should therefore remain banned for the time being on the grounds of safety alone. She noted there are already ways to avoid having babies with genetic abnormalities — using genetic screening before conception and during pregnancy, and testing embryos prior to implantation during IVF. […]

A newly released survey on public attitudes toward research on human embryos in four countries indicated that a majority of respondents in the UK, the Netherlands

and Spain supported the use of genome editing in embryos that would help establish a pregnancy by eliminate a severe or life-threatening condition. However, in Italy that figure was 46%.

Zoloth noted that while bioethicists have a duty to reflect and raise questions, prohibiting science also has its risks.

"We don't want to prohibit inquiry," she said. "That is why setting guardrails for new science is important, and protective both of the inquiry and of the society."

**Document 12 - The Plan To Collect and Save the DNA of Everything on the Endangered Species List**

Jeffrey Kluger, Time, June 25, 2026 (abridged)

Not a lot of plants and animals make it off the Endangered Species List alive. Established Under the Endangered Species Act of 1973, the list now comprises more than 2,100 struggling species. In the past half century, only 54 species have recovered sufficiently to be delisted (like the bald eagle and the giant panda). Along with the ones that have managed to fly off the list, 67 others died off it—such as the Bachman's warbler and the Little Marianas fruit bat—going extinct despite government protection. In 2023 alone, 21 species met this end. The thousands of others on the list continue to survive—but on the extinction knife edge.

Now there is a plan to save them—or at least their genetic material. On June 25, Colossal Biosciences—the Dallas-based company that last year de-extincted the dire wolf and aims to bring back more lost beasts including the dodo, the Tasmanian tiger, and the woolly mammoth—announced that it is partnering with the U.S. Fish and Wildlife Service to collect and freeze cell and tissue samples of every species on the list. The goal is to establish something of a library of the species' genomes in case they ever have to be de-extincted or, in the alternative, if their populations dwindle so far that more heartiness or genetic variability needs to be gene-edited into the survivors. […]

The need is pressing. The 2,100 species on the U.S. list are a lot, but they're just a fraction of a whopping 48,600 species identified as either threatened or endangered on the so-called red list of the International Union for the Conservation of Nature (IUCN). All of those could be lost in less than a human lifetime. According to the Arizona-based Center for Biological Diversity, up to 30% of the planet's existing genetic diversity will vanish by as early as 2050 due to factors including climate change, habitat loss, and environmental pollutants.

Against this onrushing die-off, Colossal and Fish and Wildlife are hoping to hold the line at least a little bit. The two began having discussions about an effort of this kind five years ago. The government agency was aware of a frozen biobank Colossal was already establishing in its Dallas headquarters—where tissue and cell lines of some 200 species so far are kept preserved in a liquid nitrogen bath at -274°F. That collection, however, was not specific to the species on the official endangered list and Fish and Wildlife was interested in seeing such an inventory take shape. […]

The new collaboration will not keep its samples and its sequences to itself. The biobank will be open-sourced to labs and universities around the world that may be doing similar conservation and de-extinction work of their own. "Everyone should share in what we have," says Lamm. […]

Though Colossal has made its public name with its de-extinction efforts, the company and Fish and Wildlife see particular potential not in efforts to bring animals back from the dead but in keeping them alive before they are lost in the first place. That's where the whole-genome sequencing they will do before the samples are frozen could be of real benefit. In a steadily warming world, endangered animals have to deal with climatic extremes and new pathogens that they might not have been exposed to before but that thrive in hotter climates. […]

Whether merely enhanced or fully de-extincted, the listed animals fighting for their lives can be real-world beneficiaries of the public-private deal struck this week. "This is a service to America," says Lamm. "It's a global biological vision, [helping animals go] from freezer to free."

**Document 13 - Gene-edited beagles may offer a future option for people with dog allergies**

The Guardian, 5 August 2026 (abridged)

Matt Walker couldn't pet a dog without sneezing – until he and other scientists used a gene editing technique to produce a hypoallergenic beagle named Bailey.

Now, he can feed Bailey spoons of peanut butter while she lies on his lap and play fetch with her in Central Park. His allergies didn't go away: Bailey's saliva and hair no longer contain a key allergy-causing protein.

"The feeling right now is sort of a mix of relief and awe and gratitude that it worked," said Walker, a geneticist. His company, Kindred Companion Sciences, created Bailey

and her twin Alfie using a Nobel prize-winning technique called Crispr.

It'll take years before the millions who suffer from dog-related allergies can walk into a pet store and buy a pooch like Alfie or Bailey.

Scientists have to monitor the long-term health effects of the genetic tweak, and find ways to commercialize the approach to make it affordable. And experts not involved with the effort say it could hurt shelter and rescue animals waiting to be adopted.

"It opens the door to a lot more people being able to own pets. On the negative side, it may discourage people from trying to use strays and unwanted animals that are not engineered to be allergy-free," said bioethicist Arthur Caplan with New York University's Grossman School of Medicine.

Researchers have tried to create hypoallergenic pets before, mostly using cloning. But this led to sicker pups that were too genetically similar. Two years ago, researchers used Crispr to reduce levels of an allergy-causing protein in a cat named Alsik. But it's not yet clear whether this technique is safe to be tested on other cats.

Dogs that shed less, like poodles, are often thought of as hypoallergenic. But these pups still produce allergy-causing proteins that end up in their saliva, hair and dander, so they can still make people sniffly.

To create Alfie and Bailey, scientists started in the lab. They edited the genetic code inside dog skin cells, switching off the main gene responsible for producing allergy-causing proteins. Then they transferred the edited genetic code into eggs that went into a beagle surrogate that gave birth to two healthy female pups in September 2024. Scientists tested their saliva and fur and didn't find signs of the allergy-causing protein.

They also performed an allergy test, pricking Walker's skin with extracts from Alfie and Bailey's saliva and dander. His skin reacted to samples from a poodle and goldendoodle, but not from the beagles.

The research, published on Wednesday in the Crispr Journal, is the first time such an approach has been tried successfully in dogs.

Walker says all dogs have the same allergy-causing gene that was edited in Alfie and Bailey. Kindred Companion Sciences hopes to test the technique on other dogs and service animals to see if they can breed an allergy-free line of pups beyond beagles.

Future research should test the gene-edited hypoallergenic dogs on more people with pet allergies to be sure they can soothe symptoms across a broader swath of the human population, said Dr Jeff SoRelle, a pathologist at University of Texas Southwestern Medical Center.

Since the switched-off gene is the main – but not the only – allergy-causing culprit in dogs that was tested, "we don't exactly know just how effective or broadly useful this could be for stopping dog allergy in humans," said SoRelle, who had no role in the study.

Bailey lives with Walker in New York, and Alfie lives in Florida with another Kindred scientist. The edit made to their genes is rare but does occur naturally in some dogs, so Walker said it's unlikely to have any negative effects on the pups. But it will still be important to monitor them at routine vet visits and make sure they stay healthy. […]

**Document 14 - 🎧 Burglars could be identified from airborne DNA**

***The Economist,*** October 7th 2026 – Se CdP

# Thème Littéraire

- Ce sont ce qu'on appelle des kits CRISPR. Ils pullulent sur Internet pour quelques centaines de dollars et sont conçus pour être utilisés sans formation, comme une recette de cuisine. De quoi jouer les apprentis sorciers. La découverte CRISPR-CAS9 est certainement la plus grande boîte de Pandore jamais ouverte dans le monde de la micro-biologie. Les services de santé et les comités d'éthique de différents pays, notamment européens, commencent à regarder la chose de très très près. Des procès en Allemagne sont déjà ouverts quant à la commercialisation de ces kits. A mon avis, il y a plus qu'urgence.
- CRISPR quoi ?
- CRISPR-CAS9. Ça se prononce CASNEUVE, mais ça s'écrit CAS9. Une technique découverte en 2012 par un duo franco-américain de chercheurs. Elle est devenue un enjeu économique faramineux en biotechnologie. Une révolution. Elle permet de modifier, supprimer ou ajouter des informations sur un brin d'ADN avec une grande précision pour trois fois rien et d'une façon extrêmement simple. Des millions de laboratoires dans le monde s'en sont emparé.

Elle alla chercher un livre dans la poche de d'une blouse, « Les Raisins de la colère » de Steinbeck.

- Ma lecture du moment va vous aider à comprendre. Représentez-vous le contenu de ce livre comme la séquence ADN d'une cellule, une succession de lettres qui, assemblées, forme des instructions, des phrases concernant ce livre, des gènes d'un point de vue biologique. Supposez que vous vouliez modifier un mot précis de la quatrième ligne page 221, remplacer « maison » par « demeure », par exemple. Avant l'invention de la technique CRISPR, cela aurait demandé du temps et des moyens énormes, aurait été réalisable seulement dans des laboratoires dernier cri. Grosso modo, il aurait fallu réécrire une partie du livre rien que pour effectuer cette modification. Aujourd'hui – elle désigna trois flacons du kit – c'est beaucoup plus simple. Voici, en quelque sorte, l'équipe de choc qui va aller faire le boulot. Il y a la tête chercheuse biologique, qui connaît la page, la ligne et le mot exact que vous voulez modifier.

Elle montra le second flacon.

- Voici le ciseau, une enzyme qui va découper ce mot.

Troisième flacon.

- Et il y a le pansement qui va remplacer « maison » par « demeure ». Pour simplifier à l'extrême, vous versez ces flacons dans un autre flacon qui contient l'ADN à modifier, et vous laissez agir. C'est mieux que la lessive.

Luca, Franck Thilliez, 2019

# Space

**Document 15 - 'Starwashing': How space companies use the greenwashing playbook while engaging in environmentally damaging practices**

The Conversation, August 12, 2026 (abridged)

From launchpads to low Earth orbit and beyond, space companies and their affiliates are deploying a familiar marketing tactic – with a new twist. In a space economy projected to reach US$1.8 trillion by 2035, they sell space exploration narratives by appealing to a desire to expand humankind beyond Earth – while downplaying or omitting the negative repercussions for Earth and the space environment. Welcome to the age of starwashing.

You may have heard the term greenwashing, which describes when companies falsely claim that their practices or products are more environmentally friendly than they are, or when their green efforts are insignificant compared to their harmful environmental practices. […]

Starwashing can also appeal to an interest in learning about life's origins, Earth's place in the universe, or the desire for humans to explore places beyond our planet. For example, positioning a space-related idea, activity, product or policy as a benefit to "all humankind," even if it could damage Earth or the larger cosmic environment, would be starwashing.

Blue Origin is a leading space technology company. Its mission states that it aims both to colonize space and "restore and sustain Earth."

The company's founder, Jeff Bezos, envisions building space habitats that could house billions as a solution to environmental catastrophes on Earth. He's also outlined a vision for moving industry off Earth, most immediately to the Moon.

Bezos' other company, Amazon, has a carbon footprint larger than dozens of nations, including Ireland, Bolivia and Norway. At face value, moving some of Amazon's activities into space to lessen its carbon footprint may seem environmentally desirable.

But even if having a fraction of the human population live and work in space one day far in the future were possible, it would not fix pressing environmental crises such as wildfires or climate change in the near term.

Blue Origin also makes misleading claims about its rocket fuel. Its New Shepard rocket, it says, is "for the benefit of Earth," with the company claiming that nearly all the rocket fuel's dry mass is reused. Its engine's combustion results only in water vapor, with no carbon emissions. But water vapor can amplify atmospheric warming that other greenhouse gases such as carbon dioxide cause, which the statement omits, and on which Blue Origin did not respond to a request for comment.

Companies are also racing to extract resources from the Moon for what some, including Blue Origin, say will enable lunar development by reducing trips to and from the Moon. Other companies aim to harvest valuable resources such as helium-3.

These activities will require more frequent rocket launches, which will increase demand for launch sites that use more coastal land and, potentially, ocean waters.

Such ventures will also affect the environment of the Moon. The lunar surface area is less than the combined surface area of North America and South America, and desirable resources are restricted to certain locations – far from limitless. Prime landing locations are also priceless scientific sites that human ventures could endanger.

At an annual Space Resources Week event in Luxembourg, businesses have publicly discussed how to make mining other celestial bodies, including the Moon, more palatable for the public. While the host has suggested coming up with a word that sounds "more beneficial," venture capitalists have proposed a marketing campaign to divert the focus from environmental damage off-Earth by espousing space's promises for pharmaceutical research and wireless connectivity.

Artificial intelligence, referred to by financial experts as a "key" ingredient for space economy growth, is also relevant.

Bezos and Elon Musk both have companies that build and rely on resource-intensive data centers based on land. They've espoused plans to construct solar-powered orbital data centers and to help other companies such as Google do the same. They frame these plans as environmentally beneficial because an orbital data center wouldn't require the same amount of water or electricity as a data center on Earth.

But orbital data centers, made up of satellite clusters, would add to an already-crowded space environment. […]

## Document 16 - A Ton of Space Junk Tumbles Unpredictably to Earth Every Week

Selam Gebrekidan, The New York Times, July 31, 2026 (abridged)

[…] More space debris is raining down on Earth than ever before — one effect of the frenetic race among governments and companies like SpaceX to reign over the skies.

Last year, the U.S. Space Force issued alerts for nearly 820 objects entering the Earth's atmosphere. The government issued alerts for 110 objects a decade ago. […]

Much of the debris incinerates in the atmosphere or splashes into the Pacific, but when it does not, it plummets to the ground, uncontrolled and unpredictable.

The more objects humans launch into orbit, the more debris they will have to dodge on Earth. More than 300 rockets launched last year, nearly four times as many as a decade ago. That means many more bits and spent parts are expected to drop back.

Dying satellites are another common detritus of this space age. A good number of the roughly 16,000 satellites in orbit will ultimately come back to Earth.[…]

The patchwork of regulation governing rocket launches and orbital junk is no match for the pace of space development.

Elon Musk's SpaceX, which has more than 10,000 satellites in orbit, has applied to launch a million more. Jeff Bezos' Blue Origins has similar ambitions and Chinese "megaconstellations" are expected to have hundreds of thousands of satellites.

For now, people are more likely to be struck by lightning than by falling space junk. The only documented case is of an Oklahoma woman who was hit by debris in the 1990s. She survived relatively unharmed.

But those odds are shifting. A study for the U.S. Federal Aviation Administration concluded that by 2035, debris from SpaceX satellites alone could kill or injure someone every two years.

The risk diminishes if satellites burn up in the atmosphere, the study concluded. For a while, SpaceX said that all its returning satellites incinerated. Then, in 2024, a chunk of SpaceX metal was found on a Canadian farm. SpaceX, which previously disagreed with the F.A.A. report, did not respond to questions. The company now says that about 5 percent of the mass of some satellites may not disintegrate.

Sean O'Keefe, a Syracuse University professor and former NASA administrator, said: "Humans have a lot of failure of imagination. We just can't imagine that it will happen to us."

"All it's got to do is show up in a major metropolitan area," he added.

Mr. O'Keefe and other experts say that governments and companies should be compelled to use materials that will fully disintegrate.

No such regulation exists. In the United States, the Federal Communications Commission requires companies to report on the risk of casualties from falling satellites, but the agency mostly focuses on regulating radio frequencies.

The F.A.A., which oversees launches, proposed a rule to regulate the disposal of orbital debris but it withdrew the idea in January after the space industry pushed back.

United Nations treaties govern liability for space debris that hurts people or damages property, but those are Cold War relics with limited scope. The U.N. issued guidelines for space debris in 2007, when there were far fewer satellites. Those guidelines are nonbinding.

If objects are in free fall, even the best rocket scientists cannot accurately predict where they will land or whether they will fully incinerate. A one-minute error in predicting re-entry changes the landing zone by nearly 300 miles, according to the Aerospace Corporation, a nonprofit research group. […]

## Document 17 - Guardian view on Artemis II: the light and dark sides of the moon

Editorial, The Guardian, 7 April 2026

"Everything we need, Earth provides. And that is somewhat of a miracle, and one that you can't truly know until you've had the perspective of the other." This is how the US astronaut Christina Koch summed up her experience of travelling to the far side of the moon on Monday. The feeling of a deepened appreciation for home recalls statements by an earlier generation of space travellers. The famous Earthrise photograph, taken on the Apollo 8 mission in 1968, has been credited as one of the drivers behind the environmental movement. Such was the power of the first images of the "blue planet" captured from space.

The hope that such journeys can foster global cooperation and appreciation for life was also the theme of the prize-winning novel Orbital, which is set on a space station among a multinational crew. But if it was ever possible to overlook the darker side of space travel, it definitely isn't today. In the 1960s, the American and Soviet programmes were projections of the two blocs' military strength. In the 2020s, the tech billionaires Jeff Bezos and Elon Musk are key players in a dramatically revived US industry, while a post-terrestrial geopolitical battle between the US and China takes shape. Nasa aims to put a nuclear reactor on the moon by 2030.

Rather than serving to remind us of Earth's preciousness, there is a risk that the £100bn Artemis programme is a dangerous distraction from the urgency of finding ways to live within the ecological limits of the world we already have. The US has undertaken its first moon voyage in half a century in the same year that Donald Trump withdrew it from the Paris climate agreement for the second time. Space-focused techno-optimism shades into moral nihilism when it opts for fantasies of colonising new worlds in preference to policies aimed at protecting the one we already have.

But the unquenchable human curiosity and remarkable science that have always underpinned space travel should not be dismissed out of distaste for its darker implications. The Artemis II launch last week only went ahead after a rare bipartisan display of support for Nasa in Congress saw off Mr Trump's attempts to cut its funding. The credit for the past week's experiences and discoveries belongs with the scientists, astronauts and support teams – not the White House. Mr Trump's murderous bellicosity in recent days has been a horrifying contrast to the wonder of the astronauts.

Their voyage to the fabled dark side of the moon will not solve the world's problems. Much of the research is geared towards future moon landings and the exploitation of natural resources that may be found there, as well as the impact of space travel on astronauts' health, including the risks from dormant viruses.

But there are good reasons why so many people were thrilled to hear the voices of the astronauts from 250,000 miles away and were captivated by the image of the one Canadian and three American astronauts inside the Orion capsule – which is roughly the size of a camper van – taking photographs from the moon's far side, where contact was cut off from their mission control centre in Houston for 40 minutes.

They have seen more of the moon, and travelled further away from Earth, than anyone before them. The adventure of their return and landing in the Pacific Ocean still lies ahead.

## Document 18 How NASA's new space telescope could help solve mysteries of dark energy and dark matter

https://www.youtube.com/watch?v=tmFZ-lnQumY (see CdP)

# The Scientist's Hubris

It was on a dreary night of November that I beheld the accomplishment of my toils. With an anxiety that almost amounted to agony, I collected the instruments of life around me, that I might infuse a spark of being into the lifeless thing that lay at my feet. It was already one in the morning; the rain pattered dismally against the panes, and my candle was nearly burnt out, when, by the glimmer of the half-extinguished light, I saw the dull yellow eye of the creature open; it breathed hard, and a convulsive motion agitated its limbs.

How can I describe my emotions at this catastrophe, or how delineate the wretch whom with such infinite pains and care I had endeavoured to form? His limbs were in proportion, and I had selected his features as beautiful. Beautiful! Great God! His yellow skin scarcely covered the work of muscles and arteries beneath; his hair was of a lustrous black, and flowing; his teeth of a pearly whiteness; but these luxuriances only formed a more horrid contrast with his watery eyes, that seemed almost of the same colour as the dun-white sockets in which they were set, his shrivelled complexion and straight black lips.

The different accidents of life are not so changeable as the feelings of human nature. I had worked hard for nearly two years, for the sole purpose of infusing life into an inanimate body. For this I had deprived myself of rest and health. I had desired it with an ardour that far exceeded moderation; but now that I had finished, the beauty of the dream vanished, and breathless horror and disgust filled my heart. Unable to endure the aspect of the being I had created, I rushed out of the room and continued a long time traversing my bed-chamber, unable to compose my mind to sleep. At length lassitude succeeded to the tumult I had before endured, and I threw myself on the bed in my clothes, endeavouring to seek a few moments of forgetfulness. But it was in vain; I slept, indeed, but I was disturbed by the wildest dreams. I thought I saw Elizabeth, in the bloom of health, walking in the streets of Ingolstadt. Delighted and surprised, I embraced her, but as I imprinted the first kiss on her lips, they became livid with the hue of death; her features appeared to change, and I thought that I held the corpse of my dead mother in my arms; a shroud enveloped her form, and I saw the grave-worms crawling in the folds of the flannel. I started from my sleep with horror; a cold dew covered my forehead, my teeth chattered, and every limb became convulsed; when, by the dim and yellow light of the moon, as it forced its way through the window shutters, I beheld the wretch — the miserable monster whom I had created. He held up the curtain of the bed; and his eyes, if eyes they may be called, were fixed on me. His jaws opened, and he muttered some inarticulate sounds, while a grin wrinkled his cheeks. He might have spoken, but I did not hear; one hand was stretched out, seemingly to detain me, but I escaped and rushed downstairs. I took refuge in the courtyard belonging to the house which I inhabited, where I remained during the rest of the night, walking up and down in the greatest agitation, listening attentively, catching and fearing each sound as if it were to announce the approach of the demoniacal corpse to which I had so miserably given life.

Oh! No mortal could support the horror of that countenance. A mummy again endued with animation could not be so hideous as that wretch. I had gazed on him while unfinished; he was ugly then, but when those muscles and joints were rendered capable of motion, it became a thing such as even Dante could not have conceived. [...]

Adapted from Frankenstein or the Modern Prometheus, Volume I, Chapter 5, Mary Shelley, 1818

**THE CREATURE'S REACTION**

"Another circumstance strengthened and confirmed these feelings. Soon after my arrival in the hovel, I discovered some papers in the pocket of the dress which I had taken from your laboratory. At first I had
neglected them; but now that I was able to decypher the characters in which they were written, I began to study them with diligence. It was your journal of the four months that preceded my creation. You minutely described in these papers every step you took in the progress of your work; this history was mingled with accounts of domestic occurrences. You, doubtless, recollect these papers. Here they are. Every thing is related in them which bears reference to my accursed origin; the whole detail of that series of disgusting circumstances which produced it is set in view; the

minutest description of my odious and loathsome person is given, in language which painted your own horrors, and rendered mine
ineffaceable. I sickened as I read. 'Hateful day when I received life!' I exclaimed in agony. 'Cursed creator! Why did you form a monster so hideous that even you turned from me in disgust? God in pity made man beautiful and alluring, after his own image; but my form is a filthy type of your's, more horrid from its very resemblance. Satan had his companions, fellow-devils, to admire and encourage him; but I am solitary and detested.' […]

"Cursed, cursed creator! Why did I live? Why, in that instant, did I not extinguish the spark of existence which you had so wantonly bestowed? I know not; despair had not yet taken possession of me; my feelings were those of rage and revenge. I could with pleasure have destroyed the cottage and its inhabitants, and have glutted myself with their shrieks and misery. […]

"And now, with the world before me, whither should I bend my steps? I resolved to fly far from the scene of my misfortunes; but to me, hated and despised, every country must be equally horrible. At length the thought of you crossed my mind. I learned from your papers that you were my father, my creator; and to whom could I apply with more fitness than to him who had given me life? Among the lessons that Felix had bestowed upon Safie geography had not been omitted: I had learned from these the relative situations of the different countries of the earth. You had mentioned Geneva as the name of your native town; and towards this place I resolved to proceed. But how was I to direct myself? I knew that I must travel in a south-westerly direction to reach my destination; but the sun was my only guide. I did not know the names of the towns that I was to pass through, nor could I ask information from a single human being; but I did not despair. From you only could I hope for succour, although towards you I felt no sentiment but that of hatred. Unfeeling, heartless creator! you had endowed me with perceptions and passions, and then cast me abroad an object for the scorn and horror of mankind. But on you only had I any claim for pity and redress, and from you I determined to seek that justice which I vainly attempted to gain from any other being that wore the human form. […]

Adapted from Frankenstein or the Modern Prometheus, Volume II, Mary Shelley, 1818

**TO CONTINUE ON THE TOPICS**

https://www.sciencehistory.org/stories/distillations-pod/the-crispr-babies/

https://www.theguardian.com/news/audio/2026/jun/25/the-dawn-of-the-designer-baby-podcast

https://eu.usatoday.com/picture-gallery/news/nation/2026/02/17/colossal-biosciences-dire-wolves-pictures/88717914007/

https://colossal.com/

**BOOKS TO READ**

Frankenstein or the Modern Prometheus, Mary Shelley (1818)

The Strange Case of Dr Jekyll and Mr Hyde, Robert Louis Stevenson (1886)

The Island of Doctor Moreau, HG Wells (1896)

Brave New World, Aldous Huxley (1932)

2001: A Space Odyssey, Arthur C. Clarke (1968)

Orbital, Samantha Harvey (2023)

**FILMS TO WATCH**

Gattaca, Andrew Niccol (1997)

In Time, Andrew Niccol (2011)