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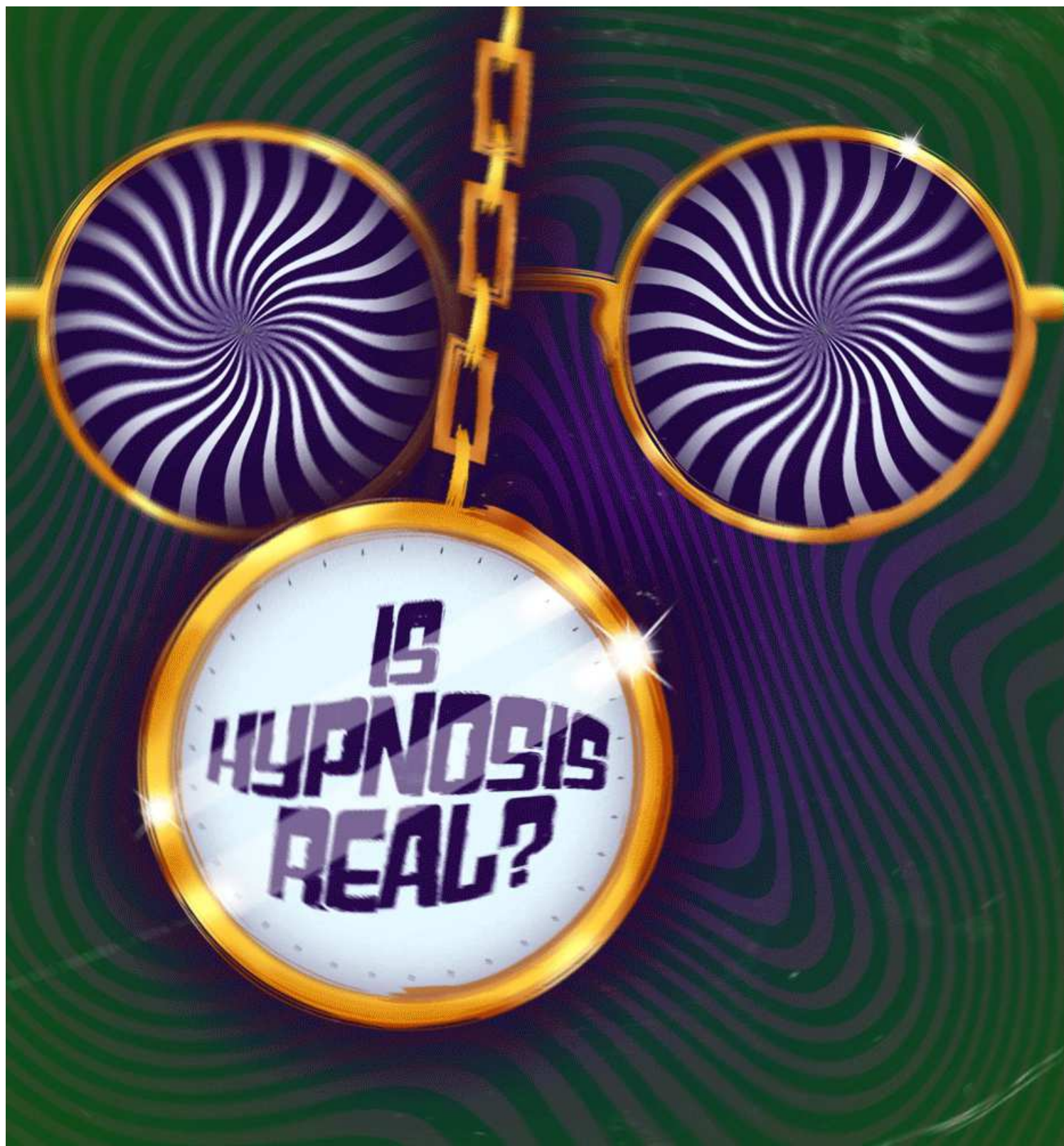


WHEN CAN WILDLIFE
PHOTOGRAPHERS INTERVENE?

WHERE DOES THE IDEA THAT CRYSTALS
ARE HEALING COME FROM?

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WHERE ON EARTH

MYSTERIOUS PATTERNS IN THE WORLD'S LARGEST SALT FLAT

Salar de Uyuni in southwest Bolivia is a photographic playground of a salt flat that turns into a massive mirror when flooded with water.

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Despite a lack of evidence, the world of crystal healing is as popular as ever. Why? Dr Russell Moul investigates.

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OUR COVER STORY

IS HYPNOSIS REAL?

Dr Katie Spalding uncovers what science has to say about the controversial practice.

February 2024

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IFLSCIENCE

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NEWS BITES



Groundhog Day

February 2 is celebrated in the US and Canada each year as Groundhog Day – a day where a small, sleepy marmot predicts if warmer weather and spring are on their way or whether there will be six more weeks of winter, based on whether it sees its shadow. The official groundhog, Punxsutawney Phil, lives at Gobbler's Knob near Punxsutawney, Pennsylvania. If you are not American or Canadian, those are insane sentences. Is there any science to the tiny meteorologist's methods? Of course not. Statistics show the rodents' predictions are **roughly the same as random chance**. Do we like strange traditions featuring fat, furry animals? Yes.



200th Anniversary Of First Dino Name

February 2024 has been dubbed "Megalosaurus Month" to celebrate the 200th anniversary of the first scientific description of a non-avian dinosaur by William Buckland in his paper "Notice on the *Megalosaurus* or Great Fossil Lizard of Stonesfield" on February 20, 1824. "Geological wizard" Buckland was deemed an **eccentric scientist** even by his contemporaries, but we're lucky it was he who officially named the creature that would become known as *Megalosaurus* – before him, a femur bone was referred to as *Scrotum humanum* in reference to its **similarity in looks** to giant human testicles. Sadly, that fossil has been lost – but the toothy jaw of another specimen allowed Buckland to bestow the new moniker. *Megalosaurus* means "great lizard" and it was from this that Richard Owen would then coin the term "dinosaur", meaning "terrible lizard", in 1842 to describe this new group of animals. Expect events and celebrations throughout the year kicking off this month.



STEM Valentine

Whether you're looking for an out-of-this-world romantic gift or some much-needed catharsis, there are some great ideas out there for the STEM nerd in your life. If Valentine's Day is a dish best served cold, then the ever-popular "**name a cockroach after your ex**" or even "feed a roach named after your ex to a meerkat" fundraisers at zoos around the world is for you. From San Antonio and El Paso Zoos in the US to Dartmoor in the UK, your revenge can become international. On the other hand, if you've ever told anyone you love them to the Moon and back, then what better than to send their name literally to the Moon? NASA is inviting people to **send their names to the surface of the Moon** via its first-ever robotic lunar rover, VIPER. And they say romance is dead. It just went extraterrestrial.



Total Solar Eclipse

A total solar eclipse will be visible across a large part of the Northern Hemisphere in April, so if you're planning to see it, you need to get organising now. Total solar eclipses actually happen every 18 months or so but their path of totality is so narrow – only around 150 kilometers (93 miles) across – that it often doesn't line up with inhabited parts of Earth where people can see it. On April 8, that path of totality will cross Europe, North and South America, the Pacific, Atlantic, and Arctic. There hasn't been one visible in the US since 2017, so check out the path and your best viewing options **here**.



Bring On The “Sonic Thump”

2024 is welcoming a new era of supersonic flight as NASA and Lockheed Martin have officially unveiled their experimental **X-59** aircraft, designed to avoid the noisy sonic boom that indicates breaking the **sound barrier** – which ended Concorde’s career and with it, commercial supersonic flight almost two decades ago. X-59, which is due its first flight test this year, is expected to fly at 1.4 times the speed of sound, or 1,490 km/h (925 mph) but has swapped the ear-shattering sonic boom for a quieter sonic “thump” no louder than a car door closing. If successful, the X-59 could reignite dreams of traversing the globe at the speed of sound in mere hours.



Year Of The Dragon

Chinese New Year falls on February 10 this year, so for those who use the lunisolar calendar, welcome to the Year of the Dragon! So, what is a lunisolar calendar? Well, first off, pretty much the whole world uses the **Gregorian calendar** based on the solar cycle, while lunar and lunisolar calendars are used to determine cultural and religious celebrations depending on the Moon’s phase and Earth’s position around the Sun. A standard lunar year comes up short of the solar year with just 353-355 days, and a lunar month is 29.5 days so there are still 12 months in the lunar year, although an extra leap month is added every three or so years. Chinese New Year falls on the second new Moon after the winter solstice, which usually falls between January 21 and February 20, and marks the first day of the new lunar year.

WHAT’S UP?



Birdwatching Bonanza

Grab Your Binoculars Love,
We’re Going Birdwatching

Name: Great Backyard Bird Count (GBBC)

Appearance: A mass of feathers, wings, and beaks

Location: Global

Why are people counting birds?

Scientists might have some pretty cool skills, but they can’t be everywhere all at once, which is a problem when trying to keep track of changing and migrating bird populations. That’s where citizen science projects like the GBBC come in – it’s crowdsourcing for bird data on a global scale.

When is this happening?

Between February 16-19 – just head to your favorite place to watch birds, whether that be the bird feeder in your garden, the park bench where pigeons peck for crumbs, a nature reserve, or your local jungle.

Can anyone get involved?

Birdwatching isn’t just for retirees in questionable camouflaged outfits – anyone around the world can take part.

So, I can count birds and call myself a scientist?

Yes, sort of... welcome to **citizen science**! No, we’re not calling you Dr.

What do I need to do?

The organizers encourage watching, or listening, for at least 15 minutes, then identify and count all the birds you can see or hear. You don’t necessarily need any special equipment for this either, although a pair of binoculars might come in handy.

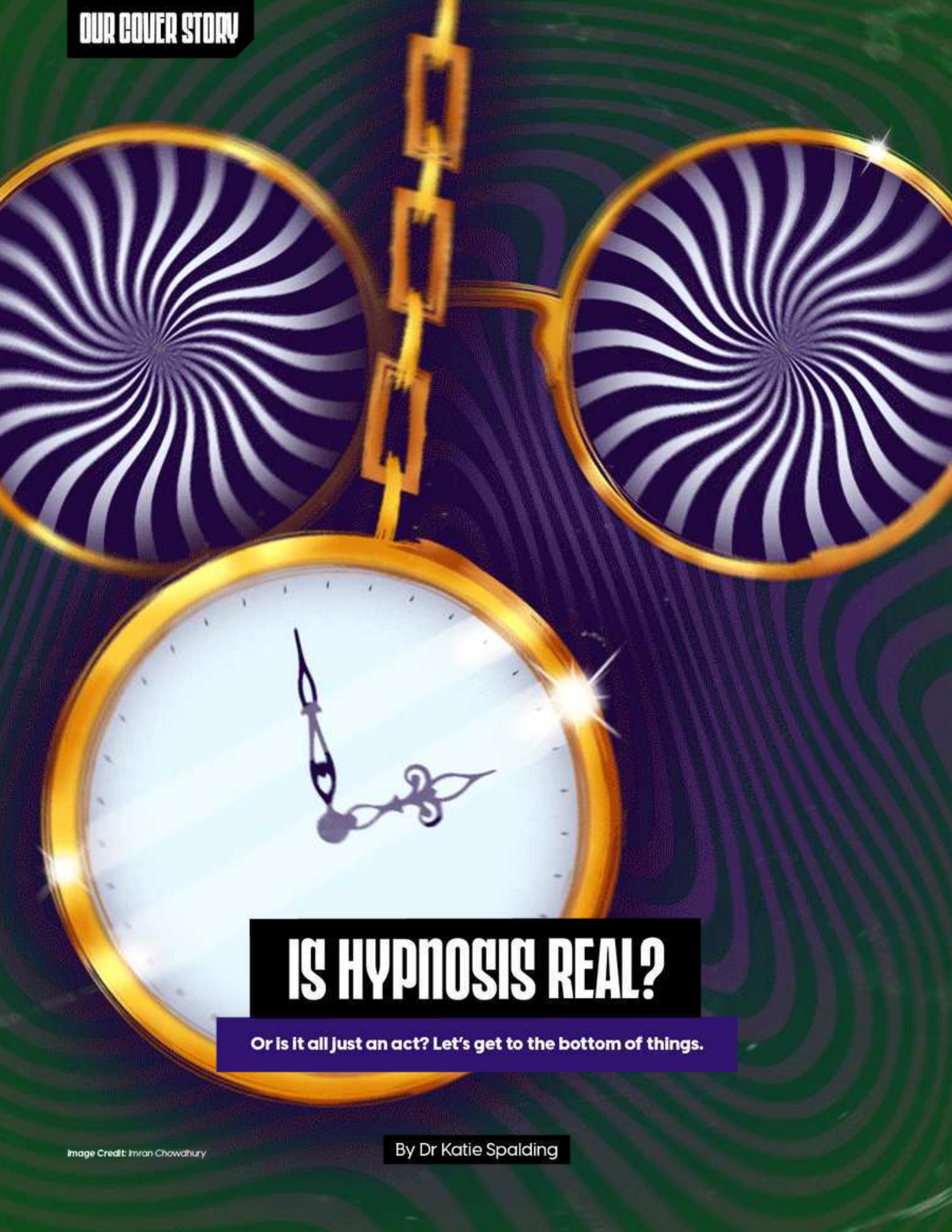
What if I’m not a bird encyclopedia?

If you’re new to birdwatching, don’t worry – there’s an **app** for that. Once you’ve separated your sparrows from your starlings, that data can be submitted to either of **two** apps, or on a **computer** if you don’t have a smartphone to hand.

How do scientists use the data?

It helps them out in two main ways: the data can answer questions about what birds are in a particular area – for example, do some species only live in cities or natural areas? It also allows researchers to keep track of population numbers. Both of these things can change over time, so an annual event like the GBBC can be the first indicator to scientists of new trends or unexpected changes occurring in the natural world.

OUR COVER STORY



IS HYPNOSIS REAL?

Or Is It all just an act? Let's get to the bottom of things.

Image Credit: Miran Chowdhury

By Dr Katie Spalding

Nobody on stage has ever been hypnotised in the history of the world.

– The Amazing Kreskin, veteran mentalist and showman, 1994

It was midnight, in the Palace of Westminster, UK, in December 1994, and hypnotism was in trouble.

"Stage hypnotism has been a long-standing concern of mine since I was alerted to its dangers by one of my constituents," **announced** Colin Pickthall, then British Member of Parliament for West Lancashire, on the floor of the House of Commons.

"Some years ago, her daughter[...] was hypnotised at a club," he told the assembled lawmakers. "At the end of the trance, she was told to come out of it as if she had had a 10,000-volt electric shock. Her husband took her home in a somewhat dazed state, and five hours later she died."

Was this a case of death by hypnosis? The MPs were convinced – enough so to prompt a Home Office investigation into whether laws surrounding the practice should be reformed. But others found the idea laughable: "The whole concept [of hypnosis] is a fantasy," University of Liverpool psychology professor Graham Wagstaff **said at the time**. "A cultural invention."

In fact, Wagstaff went even further. Not only was stage hypnosis bunk, but so were the practice's supposed therapeutic benefits. Hypnosis for pain relief, he said, was probably down to an individual patient's high pain threshold rather than some psychological brain hack; behavioral changes induced by a hypnotist were the product of wishful thinking and the desire to show off, nothing more.

Three decades later, and we're still not sure who was closer to the truth.

You are getting sleepy

Let's be clear: hypnotism, when performed by a trained practitioner who knows their patient, will not kill you. But equally, there's some pretty good evidence that it's more than just the result of exhibitionists looking for an easy answer.

"Hypnosis remains among the most widely misrepresented practices in psychology and allied disciplines," wrote experimental psychologists Steven Jay Lynn, Madeline Stein, and Devin Terhune in the journal **BJPsych Advances** last year. "In particular, there is a pronounced discrepancy between how hypnosis is used in clinical settings and understood within contemporary scientific research and how it is portrayed in popular culture."

So, how is the practice understood in science? Well, to be honest, science isn't exactly sure.

"For over a hundred years, this question has been hotly debated," wrote therapist Claire Jack in a 2022 article for **Psychology Today**. "State' theorists believe that there is a unique state of hypnosis and that achieving this state is integral to a positive therapeutic outcome. 'Non-state' theorists, on the other hand, believe that people 'take on' the role of someone who is hypnotised, in much the same way as someone takes on a variety of other roles in their lives."

It's not that anybody is play-acting, Jack stressed; the person being "hypnotized" really does believe it's happening to them – but non-state theorists would argue that any effects they experience will be due to more prosaic factors than some altered state of consciousness. As Lynn, Stein, and Terhune put it: "[T]here is no robust neurophysiological evidence to demonstrate that hypnosis is a special or unique state [...] It is more parsimonious to consider hypnosis as a set of procedures in which verbal suggestions are used to modulate awareness, perception and cognition, rather than to unnecessarily invoke 'special states'."

When I click my fingers

Whatever the truth of the matter, one thing is for sure: hypnotism is more than just a trick.

"We identified three brain regions whose activity and functional connectivity change during hypnosis," wrote a team led by Stanford Professor of Psychiatry and Behavioral Sciences David Spiegel in **one 2016 paper**. "The findings were evident in the two hypnosis conditions among high but not low hypnotizables, and they were different from the memory and rest conditions."

"HYPNOSIS IS THE OLDEST WESTERN FORM OF PSYCHOTHERAPY, BUT IT'S BEEN TARRED WITH THE BRUSH OF DANGLING WATCHES AND PURPLE CAPES."

Under hypnosis, they had discovered, activity in a region known as the dorsal anterior cingulate – part of the network in the brain responsible for noticing things – is decreased. So, too, are connections between the dorsolateral prefrontal cortex and the **default mode network** – likely representing a disconnect between the hypnotized person's actions and their awareness of those actions, Spiegel suggested.

"In hypnosis, you're so absorbed that you're not worrying about anything else," he said in a **statement** at the time. "When you're really engaged in something, you don't really think about doing it – you just do it."

Meanwhile, connections between the dorsolateral prefrontal cortex and the insula – an area of the brain usually linked to more emotional or sensory functions – increased. Altogether, it paints a picture of a brain happy to go along with external suggestions, and not too concerned with spending time or energy being self-conscious about it – and empirically not of somebody merely strutting around for attention.

"Hypnosis is the oldest Western form of psychotherapy, but it's been tarred with the brush of dangling watches and purple

capacities,” Spiegel said. “In fact, it’s a very powerful means of changing the way we use our minds to control perception and our bodies.”

You will squawk like a chicken

It’s more than just brain scans that hint at the authenticity of hypnotism. While many of us would likely balk at a surgeon who suggested we forgo general anesthetic during surgery in favor of hypnosis, **evidence** suggests that adding the latter option may be a good option in terms of pain relief and healing time.

“It helps patients to reduce anxiety and stress, to alleviate pain and also to promote recovery after the procedure,” **said** Mareike Holler, a student at Jena University Hospital and part of a team performing a **huge meta-analysis** into the potential benefits of hypnosis as a surgical intervention.

“In the evaluation of the studies, hypnosis proved to be an effective intervention,” she confirmed.

SHOULD DOCTORS BE FACED WITH A PATIENT WHOSE SUGGESTIBILITY TO HYPNOTISM IS LOW, THERE ARE EVEN PEER-REVIEWED METHODS TO INCREASE HYPNOTIZABILITY USING DEEP-BRAIN STIMULATION.

Meanwhile, specialist hypnotherapy has been **recognized** for decades now as one of the most efficacious treatment options available for irritable bowel syndrome, alleviating symptoms in **more than half** of those with the condition in one meta-analysis. It can be extremely effective for **relieving chronic pain**, too – and should doctors be faced with a patient whose suggestibility to hypnotism is low, there are even peer-reviewed methods to **increase hypnotizability** using deep-brain stimulation.

“As a clinical psychologist, my personal vision is that, in the future, patients come in, they go into a quick, non-invasive brain stimulation session, then they go in to see their psychologist,” Afik Faerman, a clinical neuropsychology postdoctoral scholar at Stanford University and lead researcher on the latter project, **said in a statement**. “Their benefit from treatment could be much higher.”

And you’re in the room

It’s undeniable, then, that hypnotism is “real” in the sense that it produces observable, measurable changes in the brain and body. But, the skeptics among us may protest, so do sugar pills. Could this not all simply be a manifestation of the placebo effect?

Short answer? Yes, it could. Long answer? It’s... complicated. After all, it’s certainly well accepted that hypnotism has much in common with the placebo response – both rely on manipulating a patient’s expectancies in order to provide a therapeutic effect. And despite the popular image of placebos requiring deception to work, so-called “open-label placebos” – in which the patient is outright told they are receiving a sugar pill – have **repeatedly** been shown to be effective at treating various illnesses.

So what, if anything, does separate the two?

Potentially not much. With the placebo response, “an ineffective drug or therapeutic treatment is beneficial purely because we believe it will work,” write Terhune and Lynn in **The Conversation**. “In this light, perhaps hypnosis isn’t so bizarre after all. Seemingly sensational responses to hypnosis may just be striking instances of the powers of suggestion and beliefs to shape our perception and behavior.”

“What we think will happen morphs seamlessly into what we ultimately experience.”

Click. ●





Image credit: By W Tucker at the English Wikipedia, via Wikimedia Commons, CC BY-SA 3.0

PRECIOUS CAVE PEARLS

Cave pearls are spherical rock formations unique to limestone caves. A type of speleothem (structures formed in caves by the deposition of minerals from water), they're made up of layers of calcite or aragonite, both crystalline forms of calcium carbonate. Just like regular pearls, the calcium carbonate layers are organized in concentric layers because of the way a **sphere** allows for the greatest amount of deposition on the smallest surface. They can also be similarly glossy due to the moving water that keeps them nice and smooth.



Image Credit: BBC Studios/© Rafa Herrero Massieu

WHEN CAN WILDLIFE PHOTOGRAPHERS INTERVENE?

SAVING WILDLIFE IS TYPICALLY FROWNED UPON, BUT WHEN IS IT ETHICAL?

By Rachael Funnell

Fans of the David Attenborough BBC series *Dynasties* may remember a particularly harrowing scene in which a group of **penguins got stuck in a ditch** during a storm and couldn't get out. It was a memorable episode, not only because of the desperate plight of the birds that would die if left to face the elements, but also because the film crew made the difficult decision to break the "never intervene" rule that's considered by some to be the golden principle of wildlife filmmaking.

The idea is that, no matter how upsetting it gets, an animal in danger shouldn't be saved by humans. However, as "wild" environments have become increasingly influenced by human activity, the outlook on if and when it's ethical to intervene has been debated.

Is it following nature's course to let a turtle drown in fishing nets? What about letting fertile nests die during floods made worse by anthropogenically driven climate change? If we as a species are creating new and unnatural threats, is it our responsibility to undo them when presented with an opportunity to save an animal's life?

We spoke to the directors and producers of the BBC's *Planet Earth III*, Matt Brandon, Mike Gunton, and Nick Easton, to see how they approached the tricky subject during filming. Episode one of the series presents the troubling case of Raine Island: a place that's the largest known rookery on Earth for green turtles but is slowly sinking beneath rising sea levels.

First Nations people have been protecting turtles here for thousands of years, and the *Planet Earth III* film crew got involved in helping some stranded turtles that would have otherwise perished on the rocks make it safely back into the ocean.

What has been the rule about filmmakers intervening with wild animals?

Matt Brandon: I think the rules are changing, but one of the golden rules of wildlife filmmaking is that when you're witnessing a natural event, you really try not to get involved. It can be really difficult sometimes when you're watching those things, but that is the rule.

Why are the rules changing?

MB: What we're seeing now is that many of the things that our crews are witnessing around the world are no longer natural. We actually do cover that in one of our "The Making Of" sequences, where [...] Columbus crabs are floating in something like 12 million tonnes of plastic and discarded nets that are thrown into the ocean every year.

How does that trash affect the crabs?

MB: For the Columbus crabs, it's no bad thing, they are actually adapting quite

well. But for turtles, it can be absolutely tragic. Over the period where they were filming, [the crew] found numerous turtles trapped in nets and there was no way those turtles could survive, so they did step in and cut them free.

Were they successful?

MB: I think they were able to save all bar one of them, so that's probably the right choice and a justifiable thing to do.

Do the crews operate alone or are there people on hand to help with these decisions?

Mike Gunton: We work with scientists and field workers so it's not just a crew themselves, it's often monitored or driven by working with scientific teams who make that decision as well.

We saw teams helping out with stranded sea turtles on Raine Island. What was the story there?

Nick Easton: I think to explain that Raine Island situation, there's also cultural sensitivities [at play].

The Wuthathi people's association with Raine Island [as the traditional custodians and owners] goes back 2,000 years at least. So, it's not our place to intervene, it's their place in which we are guests, so we took their lead there and our crews helped.

What can people expect from *Planet Earth III*?

MG: What *Planet Earth III* does; I mean it still has all the DNA of *Planet Earth* [...] the cinematic, extraordinary, visually rich, jaw-dropping visuals, amazing animal dramas, magic carpet ride to the four corners of the planet. But it has this other context, which is that we're now in a new natural history, of a new time in our lives, where the planet is changing and there's this huge force which Darwin would call a selection pressure. And that selection pressure is humanity. ●

Planet Earth III is available now on **BBC iPlayer**.



Image Credit: BBC Studios/Bec Butt, Department of Environment and Science

SCIENCE FACT OR FICTION:

WHERE DOES THE IDEA THAT CRYSTALS ARE HEALING COME FROM?

Despite a total lack of evidence that crystals can “heal”, the trend is on the up. But where does the idea even come from? Dr Russell Moul investigates.





It's a busy Saturday morning in the local New Age store. Everywhere I walk, I have to maneuver around islands of individuals and families eagerly examining everything from candles and Tarot cards, to dream catchers and incense (I had no idea there were so many things to burn and smell). It seems the new year is the perfect time to stock up on your supernaturally charged knick-knacks. But at the back of the store, I find what I'm looking for: two (locked) display cabinets filled with multicolored, iridescent, and, admittedly, beautiful crystals and gemstones.

The objects are of various sizes and prices, some are small and fixed into jewelry, while others are enormous structures that look as though they have just been hewn from the naked earth.

Then there are the novelty pieces, amethyst in the shape of coffins, obelisks, and quartz crystal in the shape of mushrooms (I think they are mushrooms, some look suspiciously like they could be used in the bedroom).

Humans have a long and complex relationship with these naturally occurring minerals or fossilized resins, but today this is big business – and it's not just because the crystals on display are pretty.

The modern enthusiasm for crystals is driven by the belief that they hold healing properties, a concept that has been endorsed by various **high-profile individuals**. In this context, crystal healing forms part of the growing wellness culture offering a range of alternative therapies with **mystical and/or pseudoscientific** festoonery. Despite there being no **evidential** basis for their claims – and there have been plenty of **studies** – the world of crystal healing continues to grow in popularity. So, what's going on here?

It's all about energy or something...

According to their advocates, crystals and other gemstones can promote physical, emotional, and spiritual "healing". Although the supposed mechanisms for this vary depending on who you speak to, the most common explanation is that crystals somehow interact with the body's "natural" energy fields, or "vibrational energy", and help redirect it to clear blockages or disruptions. In this respect, the modern expression of crystal healing blends ideas from multiple Asian cultures, such as chi or qi, the concept of life energy in Chinese traditions, and the concept of chakras, specific energy points distributed through the body, from Hindu and Buddhist beliefs.

But the power of crystal healing is a broad category, as a casual glimpse of the description cards accompanying the crystals in the local New Age store informs me.

ROSE QUARTZ, A SOFT PINK CRYSTAL, PURPORTEDLY PROMOTES LOVE AND RESTORES HARMONY AND TRUST IN A RELATIONSHIP (WHICH FEELS LIKE A LOT OF PRESSURE TO PUT ON A MINERAL).

For instance, **hematite**, a heavy and hard oxide mineral with a black sheen, is apparently effective for memory and increasing focus. Amethyst, a classically purple or lilac colored variety of quartz, can supposedly improve motivation and makes you achieve more "realistic goals in life", while rose quartz, a soft pink crystal, purportedly promotes love and restores harmony and trust in a relationship (which feels like a lot of pressure to put on a mineral). And then there is the star of this show, the simple clear quartz crystal, which is referred to as "the master healer".

Healing how and what?

Today, advocates of crystal healing will refer to the medical or magical traditions of various past cultures, such as in **Mesopotamian** medical remedies or **Ancient Egyptian** religious devotion and funerary rites, as a way to add a veneer of historical prestige to their claims (another example of how "old" seems to be shorthand for "authentic").

However, these claims tend to assume that the appearance of a crystal or gemstone in a given culture automatically means past people shared the same beliefs about the nature of these objects, how they worked, what they could do – and, more importantly, that this is the same as today. In fact, some New Age websites overtly project modern language onto these past examples and talk about "energy" and "healing" in ways that would have been completely alien at the time, all in an attempt to tidy an otherwise messy and textured history.

TO THE GREEK PHYSICIAN, DIOSCORIDES, LAPIS LAZULI WAS ONLY USEFUL FOR “HEALING” WHEN IT WAS GROUND UP AND INGESTED AS PART OF A TREATMENT FOR SCORPION STINGS (DON’T TRY THIS AT HOME).

What do I mean by this? Well, today a practitioner of crystal healing may tell you that lapis lazuli, a popular gemstone among the Ancient Egyptians, can **encourage** “self-awareness” and “reveal inner truth”. But to the Greek physician, **Dioscorides**, lapis lazuli was only useful for “healing” when it was ground up and ingested as part of a treatment for scorpion stings (don’t try this at home).

This does not mean there were no “magic” associations at the time. Dioscorides also described the idea that jasper is effective for

warding off evil and promotes a speedy birth, as well as selenite, which was given to those with epilepsy in powdered form, and was also worn as an amulet for protection. But there is something more “tangible” about the nature of these supposed powers when compared to those promoted by today’s practitioners.

In the Middle Ages, people wore gemstones and crystals in amulets to protect them from demons, malevolent forces, disease, or even lightning strikes – threats that were seen to be in the world. Alternatively, if they were used to promote healing, it was for specific ailments and conditions, or to aid natural processes such as giving birth. Moreover, protective amulets were usually marked with sacred names or incantations, as the specific gemstone was not necessarily sufficient on its own.

Why do we believe in crystal healing?

Today’s enthusiasm for crystal healing largely stems from the New Age spiritual

movement of the 1970s, which is eclectic and unsystematic in its purview. It should not be surprising then that the fixation on crystals as modes of healing borrows and blends ideas and sentiments from various traditions.

For many practitioners, the New Age movement offers spiritual connection and meaning at a time when organized religion is in decline (in the West at least). But these ideas are also easily accessible to anyone; there is no need for any specialist training.

As Professor **Marisa Galvez** from Stanford University explained to IFLScience, “We live in a secular age” where people are “grasping for some kind of spiritual practice. And, there’s something about crystals that kind of entered into the [current] scene in which it was accessible.”

Galvez, who has conducted **extensive research** into the long history of our fascination with crystals, especially clear quartz crystal, has found that there is an



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established history of “folk practice” or popular beliefs surrounding crystals that often depart from contemporary orthodox (philosophical or theological) thinking.

“THERE IS EVIDENCE TO SUGGEST THAT ALL FORMS OF MAGICAL THINKING TEND TO INCREASE AT BOTH THE PERSONAL AND THE SOCIETAL LEVEL AT TIMES OF STRESS AND UNCERTAINTY.”

“When I look at medieval text”, she explained, the authors are “not necessarily reading Aristotle or **Pliny**”, who had complex ideas about the physical and metaphysical properties of various minerals. Instead, she says, there’s a kind of popular belief or “local world knowledge” that runs alongside the official thinking “that to me is more connected to this current resurgence of interest in crystals that have certain properties that are accessible to everyone.”

In addition, the idea that crystals come from “the earth” adds to a sense of authenticity that, Galvez added, “really speaks to people. At the same time, they can create their own spiritual kind of thing, [...] whether it’s a meditative practice, whether it’s a local knowledge that doesn’t require going to school or being part of a religious community.”

It becomes crystal clear

But why is the belief in crystal healing increasing today? Well, in addition to the spiritually flexible nature of New Age philosophy, there are the wider uncertainties within political and economic milieu.

“There is evidence to suggest that all forms of magical thinking tend to increase at both the personal and the societal level at times

of stress and uncertainty – and most people would agree that the last few years have been the most stressful and uncertain for a very long time,” **Christopher French**, Emeritus Professor and Head of the Anomalistic Psychology Research Unit at Goldsmiths University, told IFLScience.

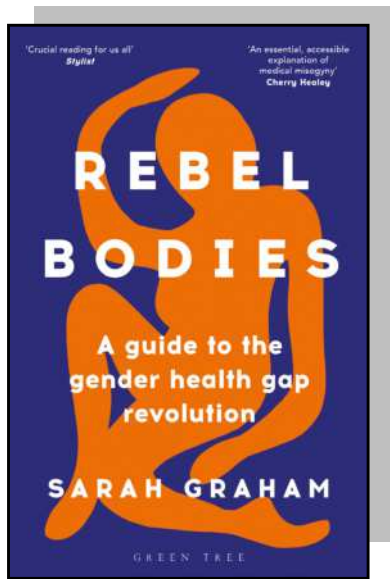
In addition, there are numerous psychological mechanisms that could allow someone to continue believing in the assumed power of a given crystal, even when confronted by evidence that contradicts it. This is essentially how **confirmation bias** operates.

“Confirmation bias is arguably the most pervasive cognitive bias that affects all of us. It refers to the tendency that we all have to pay more attention to evidence that appears to support what we already believe or would like to be true,” French added.

“Thus a believer in crystal healing may pay more attention to those occasions where crystal healing appears to have worked than those where it didn’t. There are numerous ways in which someone might conclude that crystal healing works even if it doesn’t. For example, most ailments clear up on their own without any form of treatment thanks to the body’s natural recuperative powers. But people often attribute any improvement to how they feel to the treatment they tried prior to feeling better.”

So, crystal healing may be on the rise in certain circles, but its latest manifestation is very much tied to our current political and cultural moment. Ultimately, the practice is largely harmless, as far as pseudoscience goes; it only becomes an issue if someone starts using gems instead of tried and tested medical treatments for life threatening illnesses. But then again, “harm” can be interpreted as broadly as the New Age movement defines “healing”, and things start to look less harmless and certainly less sustainable if you consider the **impact** the demand for crystals has on the planet. ●





THE GENDER HEALTH GAP

In *Rebel Bodies*, health journalist Sarah Graham lays bare the massive gender differences in healthcare, sharing the stories of women and people of marginalized genders, as well as those of doctors and campaigners, who are fighting back against medical misogyny.

Endometriosis always feels like the most obvious starting point for any conversation about gender bias and inequalities in healthcare. In fact, it was writing an article on endometriosis that first inspired me to start digging further into these issues, long before I realised quite how deep they go. Endometriosis is the second most common gynaecological condition, after uterine fibroids, and affects an estimated one in 10 women and people assigned female at birth (AFAB). It's a chronic inflammatory condition, where tissue similar to the uterine lining (the endometrium) is found outside the womb, most commonly attaching itself to the other organs in the pelvis.

As such, it can cause symptoms that include agonisingly painful or heavy periods, pain during sex, infertility or fertility issues, and bladder or bowel problems, as well as chronic

pelvic and abdominal pain, bloating (known as "endo belly") and fatigue. These symptoms can be debilitating and, as I mentioned earlier, endometriosis costs the UK economy £8.2 billion a year in treatment, loss of work and healthcare costs.

Despite this, and the fact that it affects roughly as many women as diabetes, medical science still does not know what causes the condition and there is no cure. Endometriosis can currently only be diagnosed via laparoscopic surgery and the gold standard treatment is excision surgery to remove the tissue. Even this is no panacea; relief is often short-lived and there's such a shortage of specialists that access to surgery is typically something of a postcode lottery. Instead, many patients spend years on the contraceptive pill, or other hormonal contraceptives, without even a diagnosis.

Unsurprisingly, a 2020 study into gender disparities in health research funding highlighted that endometriosis and other female-dominant conditions are among the worst funded by the US National Institutes of Health, while health issues that predominantly affect men are, of course, over-funded. This lack of medical knowledge, combined with its association with the womb and "women's troubles", makes endometriosis one of the archetypal "hysterical" conditions.

Its sufferers are dismissed, ignored, disbelieved and fobbed off to such an extent that it takes an average of eight years to

be diagnosed with endometriosis in the UK. As recently as 2017 the National Institute for Health and Care Excellence (NICE), the public body that provides advice on improving health and social care in England, published its first guidance on endometriosis, including advice for doctors to "listen to women". Yet I've heard from women who waited more than two decades for a diagnosis; who were repeatedly told by doctors that their symptoms were "just a bad period" or "all in your head", or else were misdiagnosed with irritable bowel syndrome (IBS), depression or anxiety and sent on their merry way.

Dee Montague experienced all of these and more during her 23-year journey to a diagnosis. Writing for *Hysterical Women*, she draws a comparison between her experiences of asthma and endometriosis. "Fun fact: I was born with asthma and no healthcare professional has ever, ever suggested my asthma symptoms were normal, psychosomatic or something I just had to put up with. Nor have I ever been denied medication or treatment pathways," she says.

"My experience as an asthma patient is brilliant. My treatment is almost entirely patient-led, I have regular reviews, and healthcare professionals almost always understand what asthma is and how it can affect patients. My symptoms and how I deal with them are not viewed as a character flaw. How I wish I could say the same for my menstrual health." •

AUTHOR
Q&ASARAH GRAHAM
AUTHOR OF *REBEL BODIES*

Sarah Graham explores the deep-rooted sexism within medicine in *Rebel Bodies*, an essential guide to understanding and bridging the gender health gap.

What inspired you to write *Rebel Bodies*?

As with most of my work, I was first and foremost inspired by women's stories. I've been writing about women's health, in all its many forms, for the last decade and I was frustrated by the patterns and similarities in so much of what I heard. Whether I was writing about mental health, periods, pregnancy, or menopause, women kept telling me they felt ignored, dismissed, unheard, or even disbelieved; that they'd been misdiagnosed and gaslit for years; that there weren't effective treatments available to treat the common health issues they suffered from. I started my feminist health blog, *Hysterical Women*, in 2018, to curate these stories, and quickly realised how widespread these issues are. They exist across the whole healthcare spectrum, and they affect women and people of marginalised genders from all walks of life. With *Rebel Bodies* I wanted to put these stories into context, exploring why these experiences arise and

what needs to change, as well as celebrating the amazing diversity of patient advocates and campaigners in this area.

What is being done right now to help bridge the gender health gap?

Lots! Which is the really positive side of the gender health gap that I wanted to highlight throughout the book. There are campaigns underway around menopause, menstrual and reproductive health, pregnancy loss, chronic conditions like ME and Long COVID, Black maternal health, trans health, and lots of other issues. More broadly, there are a huge number of conversations taking place, online and off, among both patients and healthcare professionals, which all help to raise awareness, chip away at stigma, and put pressure on the powers that be to do something about it. All of this has helped to put the gender health gap on the political agenda.

Do you have any advice for someone looking to advocate for their health despite systemic medical misogyny?

I always caveat this advice by saying that the onus shouldn't be on patients to get the care they deserve, and it isn't their fault if advocating for themselves doesn't work. But a few general tips include: tracking your symptoms and making notes to prepare for your appointment; taking someone with you for support; and asking for a second (or third!) opinion if you

feel you're not getting anywhere. Doctors are trained to think in terms of ICE: patients' ideas, concerns, and expectations, so this is a good way to frame the conversation – what do you think is going on? What are your main concerns (e.g. what's the impact on your everyday life?) and what do you want to get out of the appointment? (Specific tests/referral/different medication). Remember too that you're entitled to make a complaint if your care isn't up to scratch.

Aside from reading *Rebel Bodies*, how can individuals get involved in the gender health gap revolution?

What I hope *Rebel Bodies* shows is that there are lots of different ways to get involved, whether that's joining an existing campaign or starting your own, and speaking out about your own or other people's experiences. It might be signing a petition, writing to your MP, donating to charities that fund vital research, creating a support group, or sharing information and experiences with your friends, family, social media, and so on. [...] Whatever you're interested in, there are amazing charities, campaigners, and grassroots organisations out there who can point you in the right direction. And of course, with [UK and US] elections on the horizon in the next year, it's vital to keep up the pressure on all political parties.

There's a lot in *Rebel Bodies* that feels pretty bleak, and I always say it's such a complex, deeply ingrained problem that nothing's going to change overnight. I'd love there to be a quick fix, and I do think there are small things individual clinicians can do that make a big difference, but medicine still has a lot of catching up to do. Equally though, I don't want people to despair. I do feel optimistic (more so on some days than others!) that we're heading in the right direction, however slowly. Now is the time to settle in for the long haul and maintain the momentum that's been building over the last decade. ●

***Rebel Bodies* by Sarah Graham is published by Bloomsbury Green Tree and is out now in paperback.**

A photographic playground of a salt flat can be found sprawling across southwest Bolivia. Here, the remains of an ancient lake have created a salty crust that makes for great perspective games in the dry season – and turns into a massive mirror when wet.

MYSTERIOUS PATTERNS IN THE WORLD'S LARGEST SALT FLAT

The world's largest salt flat is transformed into a giant mirror when overflowing lakes nearby flood its surface with a thin layer of water. Salar de Uyuni, as the salt flat (or playa) is known, is completely level and stretches for about 10,582 square kilometers (4,086 square miles), making its reflective surface roughly the same size as the "Big Island" of Hawai'i.

From space, it can be observed as the largest of two neighboring salt flats – the second being Salar de Coipasa, which sits to the northwest. The two landscapes appear otherworldly in photos, but they're largely made up of something you'll find on most dinner tables.

Salar de Uyuni is a sprawling desert of halite – which is your common table salt – and gypsum, which is what some of the **biggest crystals on the planet** are made of. Its salty surface is often marked with a peculiar honeycomb pattern, which got scientists scratching their heads. Why are the patterns so **geometrically perfect**? And why are the tiles so large – always between 1 and 2 meters (3 and 6 feet)?

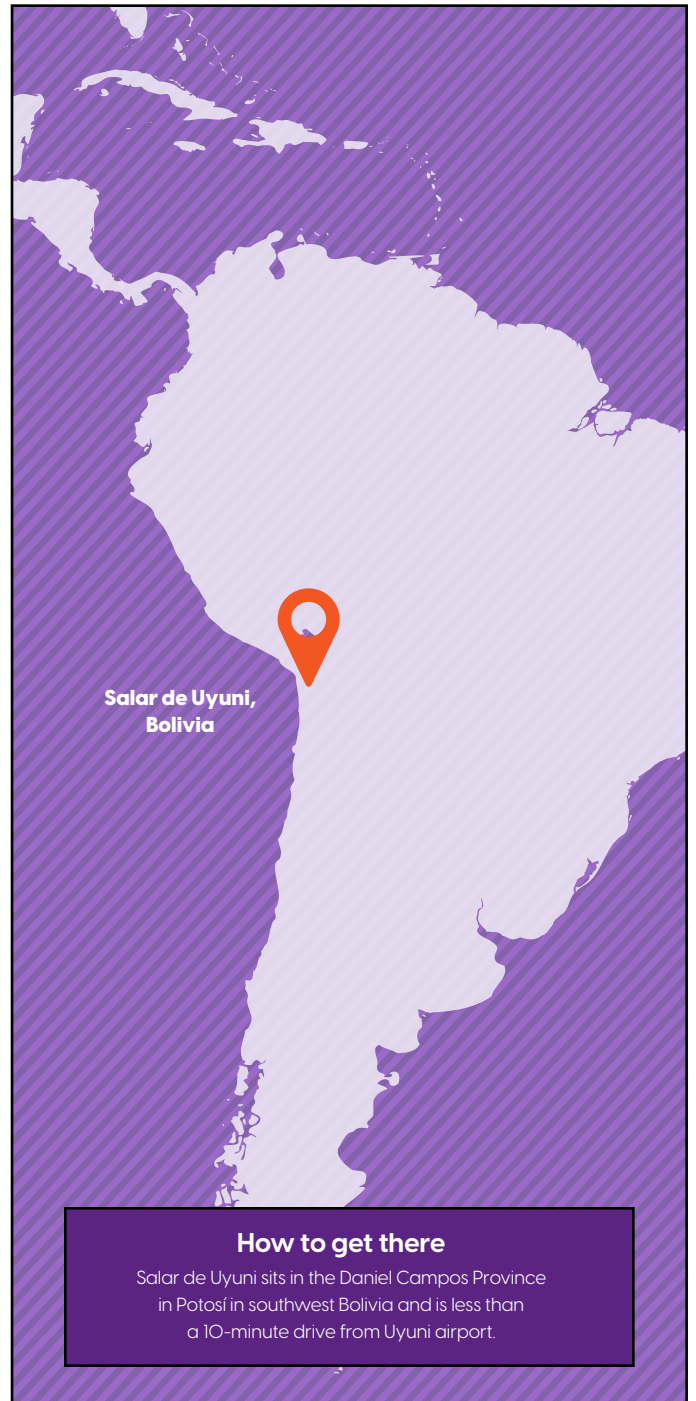
In 2023, a team of researchers finally worked it out.

"In salt deserts, the first thing you see – almost the only thing you see – is an endless patchwork of hexagons and other ordered shapes," said **study** author Dr Lucas Goehring, Associate Professor in Physics at Nottingham Trent University's School of Science and Technology, in a **statement**.

"What we've shown is that a simple, plausible explanation is there, but hidden beneath the ground. The surface patterns reflect the slow overturning of salty water within the soil, a phenomenon somewhat like the convection cells that form in a thin layer of simmering water."

Salar de Uyuni sits in the place of the large and ancient Lake Minchin that covered the plateau thousands of years ago. According to **NASA Earth Observatory**, it shrunk significantly around 15,000 years ago, creating an ever-shrinking briny pool that eventually evaporated, leaving in its wake the vast deposit of halite and gypsum.

The salty crust that attracts millions of tourists each year can be as thick as 10 meters (33 feet) in some places and creates a featureless backdrop that allows photographers to play around with perspective. During the short rainy season (usually December to April), the flat only receives a few inches of rain annually – but with nowhere to go, it sits atop the salt, creating a breathtaking mirror image of the sky above. ●



DISCOVER



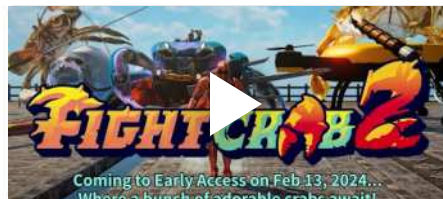
Older Than Trees

Film from Save Our Seas Foundation

Discover the story of shark scientist Dr James Lea in this film about hope for the future of sharks and rays. Created in collaboration with Sea Change Project and directed by Pippa Ehrlich, co-director of the Oscar- and BAFTA-winning *My Octopus Teacher*, it celebrates Lea's work with silky sharks in the Red Sea where these animals are under threat from overfishing.

Available now on **YouTube**.

FIGHT



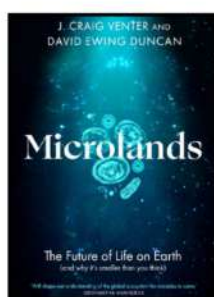
Fight Crab 2

Game from Calappa Games

Fight Crab 2 brings humans and crabs together as you mount a giant crustacean like a trusty steed and head for war. You can take on mighty foes in Career Mode or challenge your friends to battle in Online Multiplayer Mode. Frankly, it's about damn time we saw more crabs with scythes at war.

Available now on **Steam**.

READ



Microlands: The Future of Life on Earth (and Why It's Smaller Than You Think)

Book By J. Craig Venter and David Ewing Duncan

When J. Craig Venter

completed the Human Genome Project in 2002, he set out to sequence the genetic code of all life on Earth. And so began a 15-year quest in search of DNA that would carry him over 104,600 kilometers (65,000 miles) across the globe, sampling ocean water to see what microscopic life was hiding within. Read all about it in this captivating tale of research and exploration co-authored by science writer David Ewing Duncan.

Available **February 8**.

WATCH



You Are What You Eat: A Twin Experiment Series from Netflix

Twin studies offer a unique way to test the effects of lifestyle on near-identical bodies, something scientists have taken advantage of in *You Are What You Eat: A Twin Experiment*. Chronicling the recent Stanford University study of identical twins, it follows twin pairs: one went vegan, and one stayed an omnivore. What happened next surprised even the Stanford research team.

Available now on **Netflix**.

SCIENCE IN MEDIA



MEET



The Giant Sea Monster Mini-doc from IFLScience

Have you met the 150-million-year-old "Giant Sea Monster" yet? The story that's gripped the world was at the center of a new documentary from David Attenborough and the BBC, and IFLScience's own Rachael Funnell got to meet the beast IRL alongside fossil experts Steve Etches and Christopher Moore. Find out how they got the skull out of a cliff, and where they think the rest of the body is in our exclusive interview.

Available now on **YouTube**.



DATES TO REMEMBER

As well as being the month of love, February boasts plenty of science celebrations – and not a big red heart in sight. This year, we’re treated to an extra day, will get the opportunity to honor prominent Black scientists, alongside women and girls in science, and remember the work of Charles Darwin on what would have been his 215th birthday.

FEBRUARY

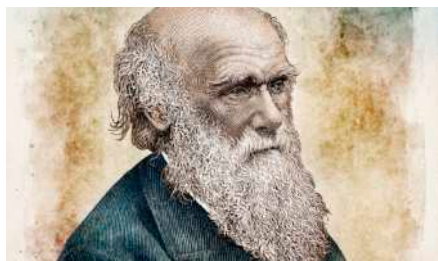
Black History Month

In the US, February is Black History Month, an annual observance dedicated to celebrating the achievements, contributions, and rich history of African Americans. This month was chosen as it contained the birthdays of Abraham Lincoln and Frederick Douglass, both important figures in US history who played a significant role in the abolition of slavery.



4 World Cancer Day

Every year, around 10 million people die from cancer, making it the second-leading cause of death worldwide. To raise awareness and encourage advancements in its prevention, detection, and treatment, February 4 is World Cancer Day. “We know that every single one of us has the ability to make a difference, large or small, and that together we can make real progress in reducing the global impact of cancer,” the organization states on its [site](#).



12 Darwin Day

Darwin Day, a celebration of the renowned British naturalist and father of evolutionary theory, is February 12 (Charles

Darwin was born on this day back in 1809). As well as highlighting Darwin’s contribution to science, the day strives to promote the discipline in general and “inspire people throughout the globe to reflect and act on the principles of intellectual bravery, perpetual curiosity, scientific thinking, and hunger for truth as embodied in Charles Darwin.”

11 International Day of Women and Girls in Science

There is still a gaping gender gap in science, technology, engineering, and mathematics (STEM), one which the **International Day of Women and Girls in Science** is striving to close. The annual observance aims to promote full and equal access to and participation in these fields for women and girls the world over.



29 Leap Day

2024 is a leap year, meaning this February will be 29 days long instead of the usual 28. As it takes Earth slightly longer than 365 days to orbit the Sun, we need this extra day every few years to keep synchronized with the astronomical or seasonal year. How will you spend yours?



ARE YOU DRAWN TO THE DARKER OR LIGHTER SIDE OF SCIENCE?

Choose how you end each issue. For those who prefer the darker side, Holly Large explores the dream device that could get us working overtime in our sleep. If you like your science lighter, discover the unexpected link between some Nobel Prize winners, the father of the periodic table, and Charles Darwin.

NIGHTMARE CAPITALISM

As if 40 hours at your desk wasn't enough, a tech startup is now developing a device that could allow people to work in their sleep.

The "Halo", a headband-like device designed by startup **Prophetic**, is described by the company as "a non-invasive neural device to stabilize and induce lucid dreaming." That's the kind of dream where a person is aware that they're asleep and dreaming and often, they have some control over what they're dreaming about.

Given that we spend around a third of our lives sleeping, the ability to simply pop on a teched-up headband and take control of our dreams could be an appealing idea to those who feel like there aren't enough hours in the day.

According to Prophetic's technology **roadmap**, the Halo uses "EEG [electroencephalogram] feedback to intelligently spatially generate ultrasonic pulses to mimic naturally occurring neural activation patterns from a training set of fMRI [functional magnetic resonance imaging] data of lucid dreamers."

It's claimed that the strategic use of this transcranial focused ultrasound (tFUS) can stabilize the lucid dream state, which occurs during rapid eye movement or REM sleep. At present, the company is working with researchers at the Donders Centre for Cognitive Neuroimaging at Radboud University in the Netherlands to refine this.

IF THE HALO SUCCESSFULLY REACHES MARKET AS PLANNED IN THE SPRING OF 2025, IT'LL COME WITH A HEFTY PRICE TAG.

Although a 2019 **study** suggested that tFUS "has the potential to be used both as a scientific instrument to investigate brain function and as a therapeutic modality to modulate brain activity," there's a healthy level of skepticism as to whether it can be used to stabilize lucid dreams.

If the Halo successfully reaches market as planned in the spring of 2025, it'll come with a hefty price tag that's expected to sit somewhere between \$1,500 to \$2,000. That's a pretty big price to pay for potentially working an extra 8 hours a day – only time will tell if that bad dream will become a reality.

BIRTHDAY BOOM

If your birthday happens to be in February, you're in good company – not only do you share a birth month with IFLScience's award-winning editorial whizz Katy Evans, but a whole host of geniuses of the scientific variety too.

The second month of the year marks the birth of multiple Nobel Laureates in scientific fields. Biochemist Tim Hunt, born on February 19, 1943, was the joint winner of the Nobel Prize in Physiology or Medicine in 2001 for discovering one of the key proteins regulating the cell cycle. Keeping him company is Otto Stern (February 17, 1888), a physicist nominated for a Nobel Prize a whopping **82 times**, although he didn't win one until 1943.

When it comes to chemistry, we also have February to thank for Dmitri Mendeleev, best known for putting together the first widely accepted periodic table. Born on February 8, 1834, Mendeleev would go on to devise the table that ordered the elements according to their atomic weights, leaving gaps for undiscovered

elements and predicting what their properties might be. Coincidentally, Mendeleev made his discovery in the same month as his birthday.

POPPING OUT A BABY IN FEBRUARY IS NO GUARANTEE OF SCIENTIFIC SUPERSTARDOM FOR YOUR POTENTIAL OFFSPRING.

And who could forget Charles Darwin? By the time the naturalist was born on February 12, 1809, scientists had already started to bounce around some ideas that could resemble evolutionary thought. However, it was Darwin's theory of evolution by natural selection, presented in his book *On the Origin of Species*, that would eventually go on to blow those early ideas out of the water – and inspire the world's least desired set of honors, the **Darwin Awards**.

Whilst popping out a baby in February is no guarantee of scientific superstardom for your potential offspring – correlation doesn't always mean causation, after all – the number of smart cookies born in this month might just be convincing enough to make it worth a punt.



The Darker Side of Science



THE LIGHTER SIDE OF SCIENCE