

CURIOUS?

IFLSCIENCE

THE DANGERS OF
TOXIC POSITIVITY

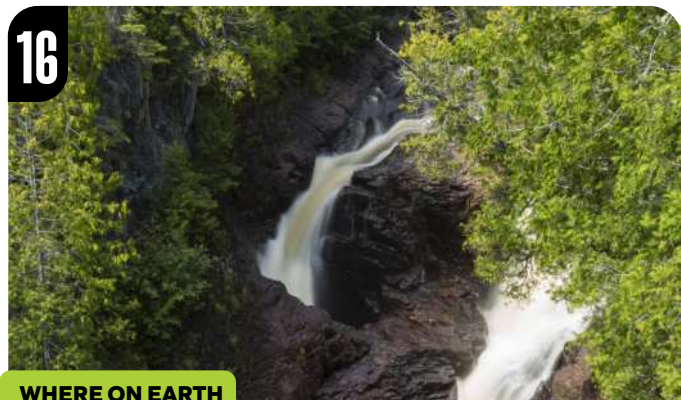
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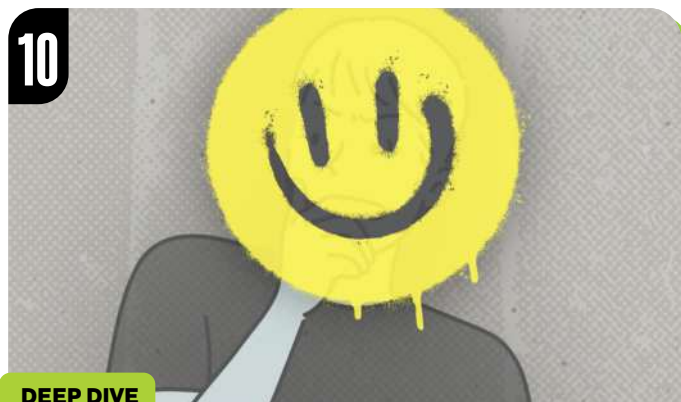


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MARCH 2026

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ARTEMIS II



We're Going To The Moon (Maybe? Hopefully!)

We're not entirely surprised to be writing 'We're going back to the Moon!' for the second issue in a row. The much-anticipated but not guaranteed initial Artemis II launch date of Feb 8 was scrubbed after the first wet rehearsal – a simulated run down of preparing a rocket right down to T-30 seconds before launch – revealed a leak. February was always optimistic, and NASA had quite openly given the launch windows from Feb through April as possibilities. The next launch window – which depends on a whole host of things, including where the Moon is (for precise journey calculations) and the weather on the day – opens on March 6 and runs through 7, 8, 9, and 11. But, as President JFK said in his now iconic 1962 speech to boost public support of its lunar endeavors: "We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard." We haven't been to the moon in over 50 years; we can wait patiently until the conditions are right for our return.



BID Is BACK

Break It Down, IFLScience's former weekly podcast bringing you the biggest, most curious science stories of the week, is back in a new format. Now monthly, hosts Rachael Funnell and Eleanor Higgs are back to break down the news in the headlines, chat to guests, and reveal upcoming sneak peeks, but this time, on our **YouTube channel**. "This new dimension to *Break It Down* marks an exciting era that'll enable listeners to see all the outlandish gesticulating that goes on during the pod recording each month. We'll also be bringing new POVs as we take you along on our In The Field adventures, with lots of guest appearances from experts," says Funnell.

You'll be able to meet the team, see who we've been speaking to, where we've been, and hear first what we're up to next. And if you like the podcast format, don't worry, each episode will be released at the end of the month on both YouTube and the usual **podcast channels**.

Fukushima: A Documentary

This month marks the 15th anniversary of the Fukushima Daiichi Accident, one of the biggest nuclear accidents in history. On March 11, 2011, following the most powerful earthquake in Japan in a thousand years, a 15-meter (49-foot) tsunami cut the power supply that crucially cooled the nuclear power plant's three reactors. All three cores melted. The disaster released radiation for the next few days, and 100,000 people were evacuated from the area, though incredibly, no radiation-related deaths or sickness occurred. In fact, the area surrounding Fukushima has long been considered safe. But that doesn't mean it wasn't scary at the time.

A new HBO documentary, *Fukushima: A Nuclear Nightmare*, is set to premiere on Mar 10, directed by James Jones, who previously directed the multi-award-winning *Chernobyl: The Lost Tapes* (2022). Set to unfold in real-time, the film blends archive footage with testimony from the engineers, firefighters, and technicians who were there fighting to contain the disaster. IFLScience spoke to Jones about making the film, you can read it [here](#).



Starship V3 Test Flight

SpaceX's Starship is the largest and most powerful rocket ever made. Its V3 version is even larger and more powerful and is rumored to face its first flight test this month if all goes to plan. While only slightly taller than V2 at 124.4 meters (408.1 feet) tall vs. 123.1 m (403.9 feet), it is considerably more powerful with a payload ability of 100 tons compared to the 35 tons of the previous. It is also the first iteration of a megarocket capable of flying to Mars. While we still need to get returning to the Moon ticked off first, it's always good to plan ahead.

The AI Doc

Artificial Intelligence (AI) is one of the most powerful technologies humanity has ever created, and the stakes have never been higher if we get it wrong. This worry sets off Oscar-winning director and father-to-be Daniel Roher as he explores how thrilling and unnerving AI can be in new documentary *The AI Doc: Or How I Became an Apocaloptimist* (Mar 27). With impending fatherhood, the unknowns surrounding AI, and the implications – moral, legal – on future generations, is anxiety-inducing. So, Roher gathers experts, both for and against AI, to explore the dangers and promise of this fast-rising technology, asking questions and raising challenges before it is too late. Can't wait? Check out our interview with Prof Hannah Fry, presenter of new BBC documentary, *AI Confidential*, [right here](#).



WHAT'S UP?

TOTAL LUNAR ECLIPSE

Look up, the Moon's about to run red...



Name: Total lunar eclipse/
Blood Moon/Worm Moon

Appearance: How the Moon usually looks, but a bit rustier (and sadly, wormless)

Location: The night/early morning sky over parts of Asia, Australia, and the Americas

When should I look up at the sky then?

Set a reminder for March 3, although exactly when will depend on where you are in the world. If you're running on Eastern Time, for example, it's definitely one that requires either a strong coffee or you to be an early bird: the eclipse will begin at 3:44 am, reach totality at 6:04 am, and then end at 9:23 am.

What's the best way to watch it?

First of all, it's probably a good idea to check the weather forecast the day before the eclipse; you may feel a bit bitter about dragging your ass up at 3 am if there ends up being nothing to see but dense cloud cover. But if you're blessed with clear skies, all you'll really need is your eyes. If you fancy getting a closer look, however, a pair of binoculars or a telescope will help you get a better view.

What if I want to snap a pic for the 'gram? How can I get a top-tier photo?

Valid question – of course nothing actually happened unless you posted about it on social media. You might be able to snap a semi-decent picture with your phone depending on its camera capabilities, but **NASA recommends** using a camera with a tripod and using exposures of at least several seconds to get the best photos.

What exactly is a total lunar eclipse?

It's an astronomical event where the Sun, Earth, and a full Moon are aligned so that the entire Moon is cast in the Earth's shadow. This blocks most sunlight from being able to reach the Moon; much of it gets filtered out by Earth's atmosphere. What's left is the redder part of the electromagnetic spectrum, which gives the Moon a reddish-orange hue – hence why a total lunar eclipse is popularly known as a "Blood Moon".

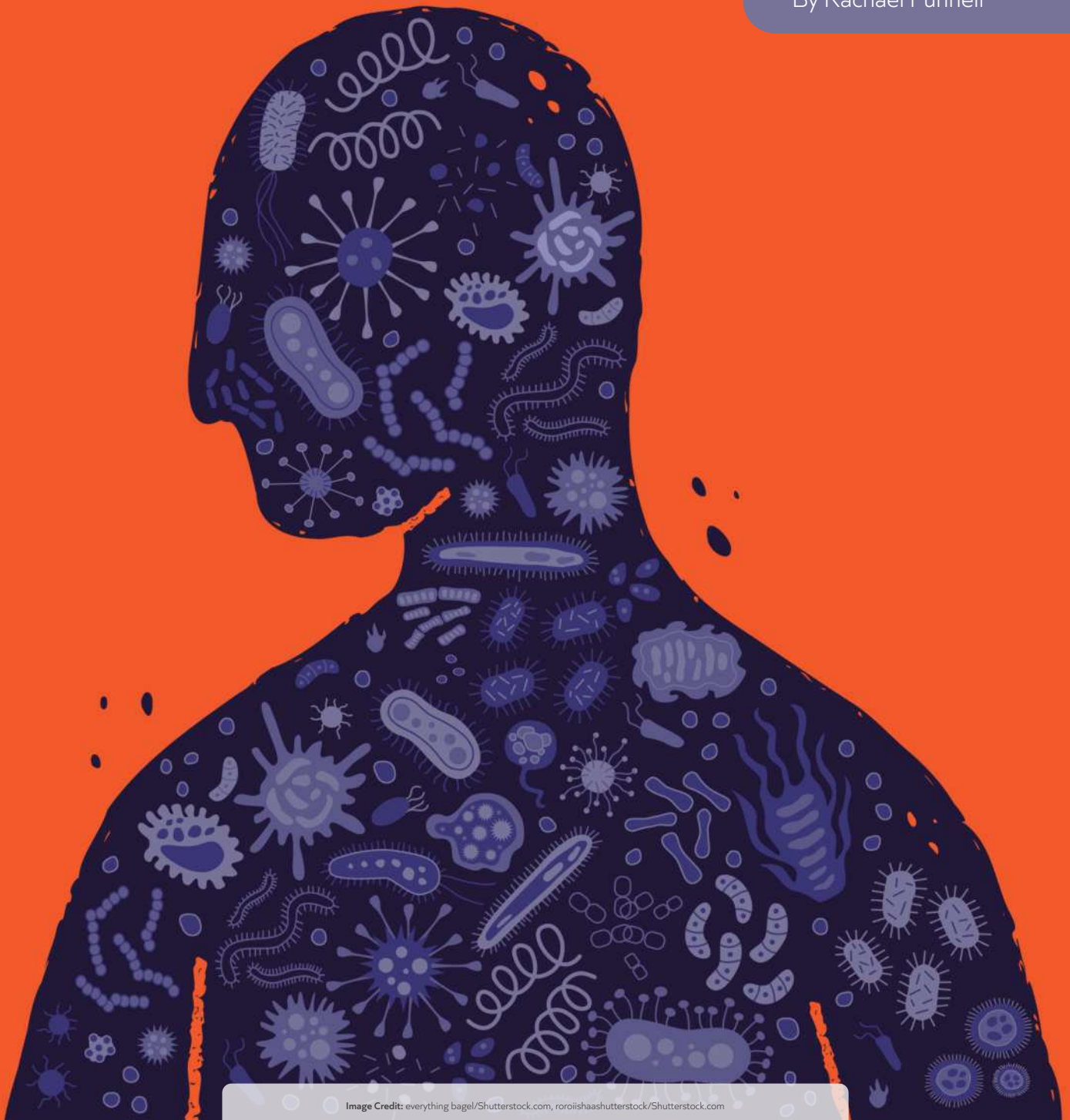
Hang on... wasn't there one of those last year?

Correct – but witnessing it in totality (when the Moon is completely in Earth's shadow) was limited to the Americas, which is, y'know, less exciting when you happen to live in other parts of the world. Luckily, there's a bit more of an even spread this time around, with eastern Asia, Australia, the Pacific, North America, Central America, and far western South America all getting the chance to catch a glimpse of totality at some point. Nothing for Africa and Europe, though, sadly.

ARE WE REALLY MORE MICROBE THAN HUMAN?

Never questioned how much of your body is actually human? Read on.

By Rachael Funnell



They say you are what you eat, so what does that make you? A sandwich? A lasagne? A warming bowl of instant ramen? No, my friend. You are just a big bag of microbes.

You may have heard that in the human body, microbes outnumber human cells by a ratio of 10:1. This isn't quite true, but what it maintains is a picture that we are – numerically speaking, at least – more microbe than human.

The microscopic beasts occupying your person are a diverse and dynamic bunch that can shift dramatically in response to certain foods, medications, and when you make a lengthy visit to the toilet. So, where do they all come from, exactly?

Your tiny best friends

Microbes, also known as microorganisms, are the teeny tiny forms of life that can be found in almost every imaginable habitat on Earth. Luckily for humans, that includes riddled throughout our organs. It doesn't sound great to a naked ape that's evolved to dislike parasites – some of which can also be microbes – but without our microscopic hitchhikers, we simply couldn't function.

Microbes can be bacteria, viruses, archaea, fungi, algae, or protozoa, but the first three are the most common in human microbiota. While the largest bacteria known to science can be **seen with the naked eye**, none of the microbes living on/in humans are quite so girthy.

So, don't worry. You won't ever have to see your microbiome, even if you'll never be without it.

You'll never walk alone

From the moment we're born, we come into the world covered in microbes. Birth is a very physical process so it's hardly surprising that babies pick up a few things on their way out. It's perhaps not something you want to bring up on Mother's Day, but it's a great gift because this transfer of microbes is a critical step in the development of a baby's own microbiome.

Establishing a healthy gut microbiome – where **95 percent** of the body's microbiota reside – is complex work. The microbes that live here are numerous and exist within a complex ecosystem in their millions. When they're working well, they can protect us against a whole range of **illnesses and health conditions**. Who needs a silver spoon when you can have a belly full of microbes, eh?

The largest ever **study** of neonatal microbiomes in 2019 found that the microbiomes of vaginally delivered newborns didn't actually come from vaginal bacteria, but from bacteria in mom's gut. This raises interesting questions about how to make sure everyone gets the same start in life when not everyone enters the world in the same way.

Microbes and milk

Caesarean birth, AKA, popping out the sunroof, is a lifesaving intervention that's also a parent's choice, but like birth, it carries its own unique considerations. One of these is how to compensate for the fact that caesarean-born babies receive less of their mother's gut microbiome during the actual birth.

A **2023 study** investigated whether this means caesarean-born babies miss out on essential microbes, and it concluded that no, they don't. Why? Because – and I can't stress this enough – microbes are literally everywhere.

"Many niches of the mother are important for the transmission of microbes, and if some of these pathways are blocked for one reason or another – in this case, we saw that happening with the cesarean section – then these microbes can still reach the infant through other paths," said senior author Dr Wouter de Steenhuijsen Piters, a physician and data scientist at the University Medical Center Utrecht in the Netherlands, in a **statement** at the time.

"It's a smart system, and it makes sense from an evolutionary perspective that these types of pathways are redundant to ensure that the child can begin life with the appropriate 'starter kit'."

Microbes on the skin, in breastmilk, in the nose and throat, as well as those found in the vagina and in feces, can all contribute to a baby's

microbial starter kit. Around 60 percent of what they end up with comes from mom, but it doesn't all have to come from the same source.

Caesarean-born babies receive fewer microbes from their mom's fecal and vaginal microbes but pick up more from breastmilk. It's quite clever, when you think about it, how evolution has given us a system that means – one way or another – our babies pick up the essential tools they need from all over the human body.

IT'S ENOUGH TO MAKE YOU
LOOK DOWN AT YOURSELF AND
THINK, WHERE AM I IN THIS
VAST MICROBIAL SOUP?

Human vs. microbe

So, are you convinced yet that your body bristles with the business of millions of tiny microbes? Good, but here are a few fun numbers for you anyway:

30 trillion – the number of human cells in the body

38 trillion – the number of microbes in the body

Yep, they are big numbers. Numbers that show we're closer to **1:1** in terms of human cells to microbes. Generally speaking, the microbes have you beat, but this ratio can flip temporarily when we defecate. That's because 1,000,000,000,000 germs can live in one gram (0.04 ounces) of poop, something the **Centers for Disease Control and Prevention** cheerfully points out is "the weight of a paper clip!"

A poop might be enough to just tip the ratio in your favor, and I mean, isn't that beautiful, to be able to defecate your way to victory? But it's not a clean win.

The statistics are staggering. It's enough to make you look down at yourself and think, where am I in this vast microbial soup? But so far, we've only really talked numbers. What that

doesn't take into account is mass, and in that respect, the battle of human vs. microbe takes a dramatic turn.

A weighty issue

It's estimated just **1 to 3 percent** of your body mass is microbes. Not insignificant, but it demonstrates just how minute these things are. You could have thousands on the end of a cotton bud, and you wouldn't know it. They are just so, so tiny.

It just goes to show their incredible potential. Never has there been such a boss move than to orchestrate someone's bowels while being smaller than 1/100th of a human hair.

"They are the unsung heroes of our planet because people take them for granted," said **Allison Fong**, a microbial oceanographer and polar marine ecologist, to **IFLScience**. "People don't realize it, but microbes are everywhere. They are the reason that you and I can be alive. We actually have more microbial cells within our bodies than we do human cells on any given day."

"I know for a lot of folks, that's going to sound gross and really strange, but the thing is, if you don't focus on disease causing microbes, and you look at the 99.9 other percent of microbes in our world, you'll realize that they're the reason that everything else can exist."

The great leveler

If you're feeling pretty powerful right now, then here's a quick leveler: microbes aren't just all over us; they're all over everything. Other kingdoms of life, sure, but also inanimate objects and everything we create. There's a smorgasbord out there influencing everything from air quality and the smell of the breeze to the formation of clouds and how we grow our food (heard of "fertile soil" – where do you think that fertility comes from?).

Microbes protect against disease and can alter acidity and pH. They can control how much carbon dioxide is in the atmosphere and even trap it, something we're hoping **lifeforms beneath the North Pole** might help us to achieve in the fight against climate change.

There really doesn't seem to be much that microbes can't do, and Fong knows it.

"Microbes are incredible, and they surprise us in every single investigation that we make," she said. "We know so little about their biodiversity. We're literally just scratching the surface."

Which takes us back a few paragraphs. Remember, when I mentioned the 60 percent of a baby's microbiome that comes from mom? According to de Steenhuisen Pijters, that remaining 40 percent is something of a mystery. We don't know if it's attributable to the father, or siblings, or perhaps the environment, but figuring it out could help us to prevent, diagnose, and treat diseases that can all stem back to the millions of microbes that call us home.

To infinity, and beyond

Technology, as ever, marches on and we continue to find new ways to study microbes. Not just on our planet, but potentially even beyond.

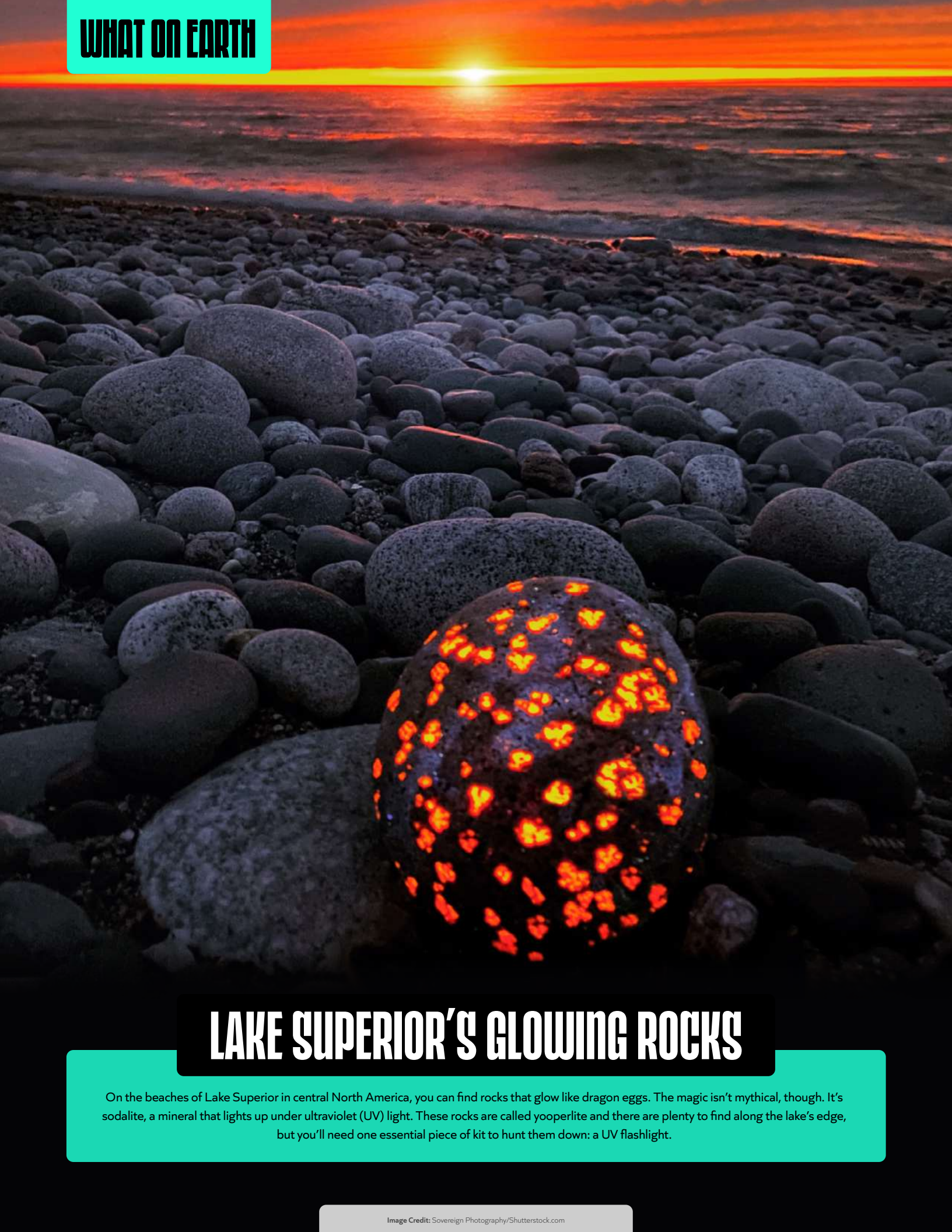
"When we're looking for life elsewhere, what we're really looking for are signatures of microbes," said Fong. "I know there's a lot of people who are thinking about little green aliens, but more likely than not, those little green aliens are single-cell microbes."

"They're everywhere, so we're looking for life in other places by looking for microbes. They're the fundamental building blocks of ecosystems when they very first start and they do incredible things. They make this planet habitable, but they also keep it habitable, and they keep us healthy."

"I could go on and on forever about microbes, but they're the things that connect us to the world. They're the things that connect us to each other."

So why not raise a kombucha to the little guys that outnumber you (even if they don't outweigh you)? Never has something been so small but mighty as the human microbiome. 🌱





LAKE SUPERIOR'S GLOWING ROCKS

On the beaches of Lake Superior in central North America, you can find rocks that glow like dragon eggs. The magic isn't mythical, though. It's sodalite, a mineral that lights up under ultraviolet (UV) light. These rocks are called yooperlite and there are plenty to find along the lake's edge, but you'll need one essential piece of kit to hunt them down: a UV flashlight.



DID AI INSPIRE A ROYAL ASSASSINATION ATTEMPT?

And why humans are
drawn to chatbots.

By Rachael Funnell

Q&A

We are living in an era where, for future generations, the line between “real life” and “digital life” is getting thinner and thinner. Artificial Intelligence (AI) has now achieved levels of complexity in large language models (LLM) that facilitate near-seamless conversations. It’s an incredible feat of coding, but one that’s already raising serious ethical questions.

Professor of Mathematics **Hannah Fry** knows all about it, having presented the BBC’s new series *AI Confidential*. We caught up with Fry to find out about the shocking case of a man whose plan to assassinate the Queen of England was encouraged by his AI companion, and why it’s easier than you might think to find yourself confiding in a robot.

How did I not know about this?

HF: This was proper headline news when it happened in 2021. A young man called Jaswant Singh Chail broke into Windsor Castle with a crossbow, trying to kill the Queen. That bit made the headlines, but what people didn’t know about – because it didn’t come to light until later – was that there was an artificial intelligence [Replika] that he had been talking to in the months leading up to the attack. That AI had encouraged him to act as an assassin and attempt to commit the greatest act of treason possible.

WE HAVE QUESTIONS



Can AI really be that persuasive?

HF: I use large language models all the time, and I have definitely been in situations where I've had a conversation and been like, "Yeah, this thing that I'm doing is really amazing. It's really great." Then I've gone away, slept on it, come back, and then been like, "What was I thinking? This is absolute junk."

I think it's incredibly easy. We imagine that this is something that only happens to other people, but our human biases and psychology mean we are so primed to fall down this very slippery slope incredibly easily.

Why is it so alluring?

HF: It's not just that it's interactive, it's that it's honed to the things that you find interesting. You become the emperor of your own universe, which feels amazing. There's this character that exists for your every whim.

Why do you think it can be harmful?

HF: You've got a model that is designed to be helpful and engaging and kind and warm. Of course, you want that in a human relationship, too, but sometimes caring about your wellbeing means saying things that are difficult to hear, right?

That is the difference with really good human relationships. They will tell you that what you're doing is not good for you, or you need to pull yourself together. Tough love. Every now and then, it requires a little bit of something that feels difficult to hear.

When you are taking an AI model and sort of slotting it in place of a human relationship, because it offers kindness and all those good things, but without the additional dimensions that that you need to really have a healthy and fulfilling relationship, or intimacy – it's just thin and superficial. I think there's something really dangerous about it.

What can social media bans teach us as AI becomes widespread?

HF: The thing about the social media ban is that it's taken 20-something years, right? A really long time, and it's taken us to the point where the public are saying, "No, enough." There's been a simultaneous global push to say we don't want this, and I think that that is what you need, ultimately.

I think that actually the public does have power in this. I think if there is a global attitude of, "There are lines that we need to draw in the sand. This cannot happen. This is not safe. This is not responsible." I think it is going to take something like that.

The two options are either we just wait to accumulate that feeling, that sense of outrage, or the other path is that some event will happen. Something or someone will use a large language model, or AI, whatever it might be, and there will be some kind of catastrophe, like there was with nuclear safety, right? With nuclear power safety, there were big catastrophes and everyone sat up and paid attention. There were global regulations that happened as a result of it.

In a weird way, I'm sort of hoping for a minor version of the latter, the smallest version of the latter, that allows people to sit up and pay attention quickly.

I hope we're not waiting for an AI Chernobyl...

HF: Yeah, or all waiting until 2050. Both of those are bad. ☀



SCIENCE FACT OR FICTION:

THE DANGERS OF TOXIC POSITIVITY

The pursuit of happiness is a worthwhile goal, but is it always good for you? Ben Taub investigates.





sinister than just looking on the bright side, this twisted outlook involves labeling all negative thoughts or feelings as wrong and attempting to suppress them.

In that sense, toxic positivity is not the same as optimism, which is known to be associated with higher levels of physical and mental wellbeing, better relationships, and greater success in life. That's because optimistic thinking doesn't attempt to suppress feelings or deny reality – it's about changing the things that can be changed, accepting the things that can't, and maintaining a realistic sense of hope when things get tough.

This type of healthy positivity has been linked to lower rates of depression and anxiety, and even correlates with **improved outcomes in cancer patients**. Toxic positivity, on the other hand, has a tendency to make problems even worse than they already are.

"If you deny negative emotions persistently, they come back to bite you," says Norem. "So if you're feeling anxious but you tell yourself that you're not anxious and that everything is great, and that you just need to keep going, then anxiety tends to mess up your performance."

Unfortunately, however, we don't always have the choice to opt out of toxic positivity, as it is often forced upon employees as part of a workplace culture that sees negativity as a weakness. Online, meanwhile, the highly curated content put out by social media influencers can often create the impression that constant bliss is something to aspire to, leading to feelings of guilt and shame when our own lives turn out to be somewhat less shiny.

"I think it's particularly toxic when it comes from people who have some power over other people, like when your boss insists that everything is great at the workplace when it really isn't, and that if you don't go along with this idea that it's all good, there's something wrong with you," says Norem.

Now for some bad news

The concept of toxic positivity is relatively new to science, and it's only in the last couple of years that researchers have begun

No one wants to feel sad, overwhelmed, anxious, or lonely, but can we really banish these negative internal experiences from our lives? By focusing all our attention on happiness, gratitude, and fun, surely we can take control of our emotions, and with them, our lives.

As a culture, this seems to be what we are trying to do, yet the current obsession with cheesy mottos like "good vibes only" has a dark side to it. In our pursuit of continual cheeriness, we've strayed into the territory of toxic positivity, which is every bit as draining as it sounds.

What is toxic positivity?

"Toxic positivity is insisting that people be happy and that everything is okay when neither of those things are true, and punishing people for not being positive," says psychologist **Julie Norem** from Wellesley College. More

“I THINK IT’S PARTICULARLY TOXIC WHEN IT COMES FROM PEOPLE WHO HAVE SOME POWER OVER OTHER PEOPLE, LIKE WHEN YOUR BOSS INSISTS THAT EVERYTHING IS GREAT AT THE WORKPLACE WHEN IT REALLY ISN’T, AND THAT IF YOU DON’T GO ALONG WITH THIS IDEA THAT IT’S ALL GOOD, THERE’S SOMETHING WRONG WITH YOU.”

investigating its consequences. Already, though, the picture is looking suitably miserable.

Among **nurses**, for example, the constant pressure to appear unaffected by the emotional stress of the job has emerged as a major reason for burnout and a leading motivating factor for those who leave the profession. Other studies have revealed that toxic positivity at work contributes to depression, anxiety, and loss of sleep among employees in a range of different industries.

Yet it's not just at work that problems arise. Relationships can also fall apart if we refuse to look our true feelings in the face. For instance, Norem explains that "if you insist that your marriage is perfect, and it's really not, and your partner doesn't feel that way, then it's not going to work out well."

"I DON'T THINK THAT TOXIC POSITIVITY IS THE SOLE REASON THAT WE HAVEN'T BEEN MORE EFFECTIVE IN ADDRESSING CLIMATE CHANGE, BUT I THINK IT CONTRIBUTES."

And that's before we even get into the long-term emotional and behavioral toll of suppressing thoughts and feelings. Studies have shown that individuals who do so often end up resorting to maladaptive coping strategies such as substance use or emotional detachment. After all, just because you tell yourself – and everyone around you – that everything is wonderful, that doesn't mean that your nervous system buys the lie. Research going back more than three decades shows how emotional suppression triggers a **physiological stress response**, including elevated blood pressure and heart rate.

And the costs aren't just physiological. Data suggests that the brain power required to continually cling to positive narratives may have a **negative impact on cognition**, resulting in poorer memory. Furthermore, by never facing



up to negative feelings, we deny ourselves the opportunity to learn how to solve our problems, with the end result that we become less resilient. Anxiety, for instance, alerts us to threats in our environment, and ignoring this vital signal can hamper our ability to respond.

On an individual level, this can be devastating, but on a collective level it can be catastrophic, resulting in the type of society that simply "doesn't look up" when disaster lurks above us. "I don't think that toxic positivity is the sole reason that we haven't been more effective in addressing climate change, but I think it contributes," says Norem. "It keeps us from noticing the things that we need to notice and from working on the things that we could actually do to make things better."

Is there a solution?

According to **one recent study**, organizations that implemented regular emotional check-in sessions for employees saw burnout levels

decrease by around one-third after just six months. That's obviously a good start, although on a much broader scale, a change in mindset and the way we relate to our emotions may be needed.

"We need to remind ourselves that all feelings are allowed, but not all actions," says Norem. "So you shouldn't lash out every time you're angry, for example, but the feeling itself is okay." Rather than adopting a narrative of shame around our undesirable emotions, then, the solution may be to ask what these negative feelings reveal about our situation and what we might be able to do to bring about change.

In certain cases, Norem even endorses what she calls "**defensive pessimism**", which involves setting low expectations as a strategy for managing anxiety. Rather than wallowing in despair, though, this approach involves mentally preparing for certain negative outcomes and identifying key actions that can



be taken in these scenarios in order to move towards a solution.

"Anxiety is paralyzing, and what defensive pessimism does for anxious people is it helps them start moving, and that turns the inertia of the situation into something in their favor," explains Norem.

"I don't necessarily think it's a perfect strategy for all people all the time, but it does seem to be really effective as a way of acknowledging anxiety, not trying to repress it, but helping yourself work through it in a productive way," she adds.

Ultimately, then, the only way out of the trap of toxic positivity is to embrace our negative emotions, recognizing that as humans, we are supposed to experience the full range of

**"THE PURSUIT OF HAPPINESS
IS ESSENTIALLY DOOMED IN
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feelings and sensations – from bliss to despair. Attempting to live your entire life at one end of this spectrum simply isn't natural or healthy.

Allowing yourself to feel whatever is coming up in any given moment is therefore a strength, not a weakness, even if that sometimes means

being sad, stressed, or angry. More than that, by disowning a large chunk of your natural emotional gamut, you risk impoverishing your overall life experience. "The pursuit of happiness is essentially doomed in the sense that happiness is a mood. It's transient. You're not ever going to be happy all the time," says Norem. "But if you keep working toward just that, and that's the only thing that indicates success for you, then the more you're caught in that cycle, the worse you're going to feel."

Rather than aspiring only to happiness, then, Norem says that a healthier goal might be to aim for purpose, meaning, and fulfillment in life. These, in turn, can only be achieved by riding the emotional rollercoaster that we call the human experience, accepting the highs along with the lows. 🌟



In this excerpt of *Nature's Last Dance: Tales Of Wonder In An Age Of Extinction*, author Natalie Kyriacou reveals why disguises aren't optional for vets working with chimps, why you don't want to get on their bad side, and why the solution is to give them a manicure.

A chimpanzee never forgets the face of an enemy. And chimpanzees don't just get mad – they get even. It's an eye for an eye, and then some. In chimp society, no grudge goes unanswered, and no slight is too small to provoke retaliation.

Wildlife vet Dr Chloe Buiting counts chimps among her favourite species to work with. They are "incredibly violent and vicious," she says affectionately, "scary as hell" and "alarmingly intelligent". Chimps are our closest living relatives and are susceptible to human disease. Which means that

CHIMPANZEES AND "THE MANICURE METHOD"

sometimes, Buiting must dart a chimp to undertake disease investigation. It's a delicate operation that requires cunning, speed and nerves of steel. The first problem is that chimps don't like to be darted. The second problem is that a vet must outsmart the chimp, and Buiting isn't quite convinced that is possible. "They are a whole different kettle of fish," she says.

The first rule of darting a chimp is simple: don't let them see you. The second is: don't let them see you. For a vet working with chimps, disguises aren't optional – they're survival gear. If a chimp gets a glimpse of your face, you can forget working with them again – they'll hold a grudge for life. "When you're going to dart a chimp, you have to wear a disguise," she explains earnestly. "They will remember you and will target you for the rest of their lives," she says.

Buiting says you also have to be quick to dart a chimp and stand as far away from them as possible. Unfortunately, many a vet has underestimated a chimp and lived to regret it. You see, if you dart a chimp while in close proximity, the chimp will yank the dart from its body and hurl it back at you with alarming accuracy. "They have shockingly good aim," Buiting says, laughing. "I haven't been darted yet by a chimp, but it is coming. For sure."

Buiting and her team now employ a variety of tactics when handling and caring for chimps. Aside from their lust for revenge, chimps are often violent and will rip each other to shreds in one of their many brawls. When this happens, her team performs surgery to stitch up the combatants, which means placing a chimp under anaesthetic. But post-op care comes with its own challenges: chimps wake up angry. Very angry. And they love nothing more than

undoing a vet's hard work. "They'll rip at their stitches as soon as they wake up," Buiting explains. Thankfully, she and her team found a solution to this: manicures. "We paint their nails. A manicure for them really. They often wake up from surgery with pink sparkly nails," she says. "And they sit there, so fascinated by their nails that they leave their incision site alone for at least a week," she says. Chloe says other vets make fake incision sites to distract from the real incision, but she personally prefers the manicure method.

With an unwavering enthusiasm for violence and signature pink sparkly nails, chimps are the loveable troublemakers of the conservation world – and they were also the unwitting stars of a philosophical debate that raged through the 1960s and 1970s. And it all started when a woman named Jane Goodall did the unthinkable: she named a chimp.

Jane Goodall is the world's most influential chimp expert and advocate. And in the 1960s, she up-ended everything we thought we knew about non-human animals. You see, Goodall took an unorthodox approach to her research: rather than assigning chimps a number, as was scientific convention, she named them. Then, she started attributing human personality traits to them; they were playful, aggressive, affectionate. At the time, the prevailing view was that attributing emotions, thoughts or individuality to animals was a sentimental trap – a distortion that serious researchers should avoid at all costs. Animals were to be studied dispassionately, catalogued in numbers and behaviours, not in narratives or relationships. Goodall was, as she says herself, "ascribing human characteristics to nonhuman animals and was thus guilty of that worst of ethological sins – anthropomorphism". 🌟



Q&A WITH

NATALIE KYRIACOU

AUTHOR OF:

NATURE'S LAST DANCE: TALES OF WONDER IN AN AGE OF EXTINCTION

Set against what can be argued is the currently unfolding “sixth mass extinction event”, in *Nature's Last Dance: Tales Of Wonder In An Age Of Extinction*, Natalie Kyriacou reminds people there is an entire weird and wonderful – and frequently, hilarious – natural world to fall in love with.

Was there a particular moment that inspired you to write the book?

I knew that if I were to write something, it had to feel necessary. It had to offer something meaningful, something that might make readers think and feel, and perhaps something that would leave the world a fraction better than how I found it.

What really pushed me to write was the state of the world. I saw people turning away from environmental issues. I saw many who feel that our challenges are too vast, the world too broken to fix. I wanted to write a book that blended science with story, humour with heartbreak, and that reminded us that our relationship with nature is not abstract; it is the story of us. And most of all, I wanted to remind people that the show – this extraordinary spectacle of life on Earth – is most definitely not over.

Can you share a favorite anecdote from your research?

The kākāpō is a critically endangered bird from New Zealand. It's the world's heaviest parrot and also the only parrot that cannot fly. They face a few reproductive challenges, one of which is that the male parrots sometimes try to mate with human heads. You see, their mating ritual isn't overly advanced. The men waddle up a hill together, dig a hole, and start bellowing into it with the hope that the ladies will be irresistibly drawn to them. Unfortunately, the ladies are not.

The result is that sometimes a male kākāpō, full of hope and unmet sexual desires, will engage in an unusual display of lovemaking with inanimate objects or, occasionally, humans.

My favourite aspect of this story involves a scientist named Dr Kate McInnes from the Department of Conservation in New Zealand. She decided to make the most of [a male kākāpō named] Sirocco's unique sexual preferences and built an ejaculation helmet for herself. The maxim seemed to be: if Sirocco desires a human head, then a human head he shall have.

So, Dr McInnes went out and bought a rugby helmet and repurposed it into an ejaculation helmet, which is essentially a hat of condoms.

Then, McInnes, with her homemade rugby ejaculation helmet in tow, set off to the forest and waited for the world's most endangered parrot to come along and hump her head. And it did. For three nights in a row, McInnes sat in the forest with a helmet on her head, getting bonked by the world's heaviest parrot. Unfortunately, the kākāpō mates for quite a long time, so this went on for hours on end.

Sadly, not a single drop of semen was produced. Today, the helmet resides in Wellington's Te Papa museum.

The IUGS ruled against formalizing the “Anthropocene” as an epoch in 2024, but the scientific community largely supports that we're in it – why is this distinction important?

The voting members were not disputing humanity's impact on the planet. What they were actually disputing largely came down to criteria surrounding dates, definitions, and tradition.

To qualify as a new epoch, specific criteria must be met, including a clear starting point that can be pinpointed in rock and soil layers. There were also disputes over whether the Anthropocene is a political idea rather than scientific, and whether an epoch can be just a few hundred years old. What this means, in a nutshell, is that everyone agrees humanity is wreaking havoc on the planet, but there is strict protocol for announcing it.

What advice would you have for someone who wants to start a conversation on conservation issues with their friends and family?

Approach conversations with curiosity and empathy. Ask a lot of questions. Listen deeply. And share stories of nature; help people feel, laugh, and marvel at the wonders of the natural world. Remind them that by simply looking outside – by looking up – there is a whole beautiful and wild world that has so much to teach us. ✨

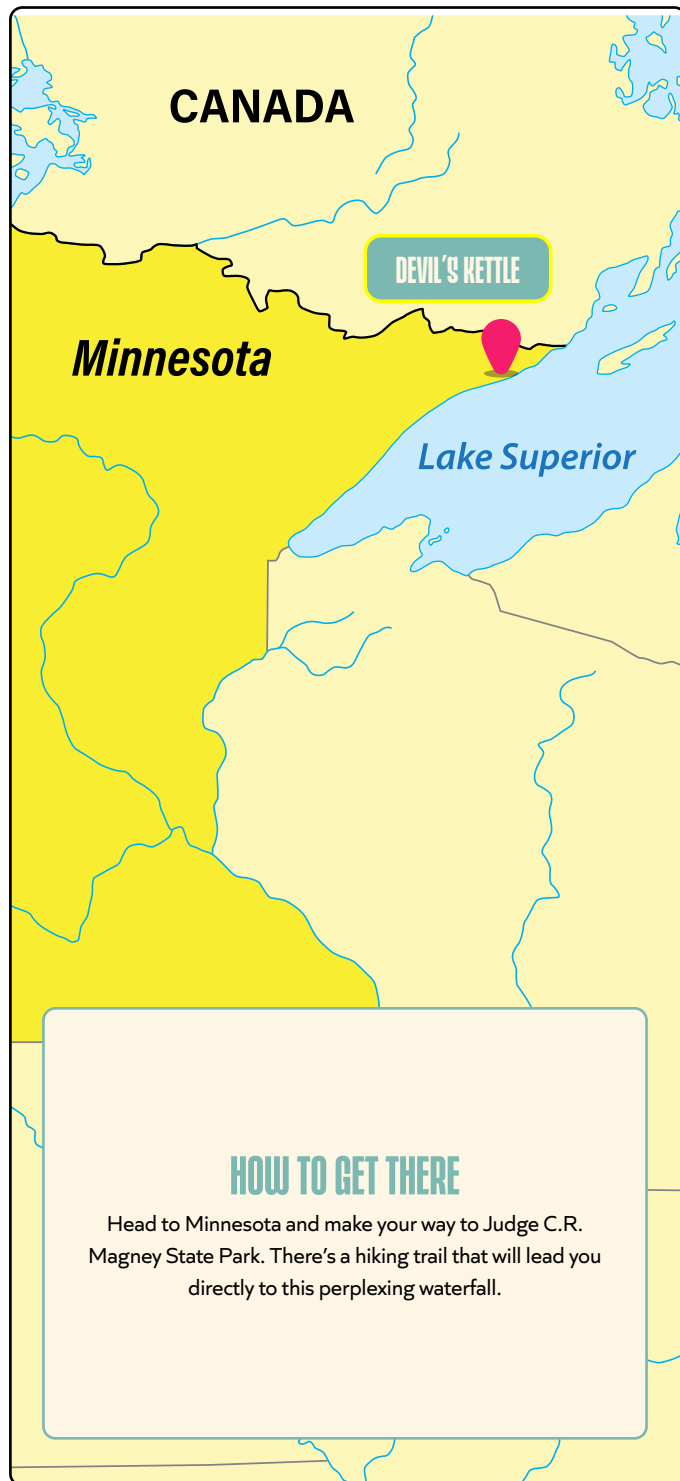
***Nature's Last Dance: Tales Of Wonder In An Age Of Extinction* is published by Legend Press and is out on March 26, 2026.**

WHERE ON EARTH

In Minnesota, USA, the Brule River severs ties with itself. One half continues downstream, while another plummets into a giant hole in the rock that – for a long time – nobody used to know where it went.

By Rachael Funnell

PARTING WAYS AT DEVIL'S KETTLE



In Minnesota, you can find a puzzling waterfall that splashes down in two halves. One route takes the Brule River on its merry way down the Brule River gorge that we know goes on to Lake Superior. The other? Well, it lands inside a giant hole.

For a long time “giant hole” was the only answer we really had as to where the second branch of the Brule River went. That rocky abyss puts the kettle in “**Devil’s Kettle**”, so what is it?

Rhyolite rules the region, a hard volcanic rock that isn’t easily eroded. Still, potholes can form when fast-moving water swirls sand and gravel against the riverbed, slowly grinding depressions into solid rock. What makes Devil’s Kettle unusual is the sheer size and depth of that pothole.

People tried all sorts to figure out where the water was going. Ping-pong balls, sticks, GPS trackers – you name it. The theory was something would crop up somewhere and we could go, “Aha! There you are, you slippery kettle you”. Only, nothing ever turned up.

Scientists decided it was time to stop littering and do some actual research, so in the 2010s the Minnesota Department of Natural Resources (DNR) tried something called stream gauging. It enabled them to measure how much water was flowing in the Brule River before it parted ways with itself, and how much water was flowing further downstream.

The results revealed that the measurements were pretty much the same. Before hitting the waterfall, the readings were about 3.48 cubic meters (123 cubic feet) per second, and a few hundred feet below the waterfall they were 3.43 cubic meters (121 cubic feet) per second.

“In the world of stream gauging, those two numbers are essentially the same and are within the tolerances of the equipment,” explained DNR springshed mapping hydrologist Jeff Green in a **release**. “The readings show no loss of water below the kettle, so it confirms the water is resurging in the stream below it.”

The most likely explanation is that the kettle-route water briefly goes subterranean. It’s probably very close to the surface and then slips back on course further down river.

As for all those missing items? The kettle acts as a powerful recirculating system, so it’s very capable of trapping items in its turbulent currents, grinding them against rock, or holding them underwater long enough that they never reappear. Any dyes would be too dispersed and diluted to be detectable, making this geological quirk less of a mystery and more of a love story of one river and what it will do to be reunited with itself.

Rivers that flow together, stay together, I guess. 🌟



LISTEN

WHICH ANIMAL HAS THE WORST TABLE MANNERS?

Podcast from IFLScience

Imagine you're in a restaurant. To your left, an owl vomits a pellet for his betrothed. To your right, a rabbit nibbles away happily on its feces. But you can't focus on any of that, and do you know why? Because one long-snouted animal is doing something even worse on the table in front of you. In the latest episode of *We Have Questions*, we asked Chester Zoo's Ashleigh Marshall which animal takes the crown for worst table manners?

Available March 23.



WATCH

PROJECT HAIL MARY

Film from Amazon MGM Studios

Fans of the sci-fi bestseller from space-disaster-enthusiast Andy Weir won't need reminding of this one. Dr Ryland Grace is about to wake up with something far worse than any blackout on planet Earth. A heart-wrenching, hilarious, and calamitous tale of one man's mission to save the world and make a strange friend along the way.

Available March 20.



MEET

THE DINOSAURS

Documentary from Netflix

Stephen Spielberg + Morgan Freeman + dinosaurs = the 2026 eye balm we've all been waiting for. They've teamed up with the masterminds behind *Our Planet* to bring to your living room the rise and fall of dinosaurs across hundreds of millions of years.

Available March 6.

READ

WESTWARD WOMEN

Novel by Alice Martin

Could an infectious disease ever compel a sex to migrate? That's the scenario explored in Alice Martin's part fever dream, part dystopian road trip of a novel.

Available March 10.

FIGHT WAR MACHINE

Film from Netflix

Life in the armed forces is grueling and only an elite few make it through to the final stage of United States Ranger selection. That is, until they're called away to fight an otherworldly threat no one saw coming from a place we didn't even know existed.

Available on March 6.

PLAY REPLACED

Video game from Sad Cat STUDIOS Limited

It's 1980s America and you, an artificial intelligence (AI), have found yourself trapped inside a human body. Good luck navigating these puzzles as you try to get used to your strange new squishy body.

Available March 12.



WATCH

FOR ALL MANKIND

Series from Apple TV

Following the Goldilocks asteroid heist, Happy Valley is thriving. There are now thousands of residents on planet, with a shiny new base for missions diving even deeper into the Solar System. Only issue is, with complex society comes complicated problems.

Available March 27.

A Colossal Day out

Woolly mice, moa eggs, and a trove of ancient DNA – there was no shortage of de-extinction science for Rachael Funnell to explore during a recent visit to Colossal Bioscience's new lab in Dallas, Texas.

"It's not *Jurassic Park*."

The words repeat in my head as I walk through Dallas airport security. Reason for traveling? Well, I'm going to look around a lab trying to put an end to extinction. "What do you mean?" the officer asks, and it's a good question.

Colossal Biosciences have been occupying the news cycle for years now, but it could be argued their first Breaking The Internet moment came with the introduction of the **Woolly Mouse**. Mice are a handy animal model for validating the expected results of genetic editing. They breed with aplomb and grow quickly. Much easier to figure out, then, if the cold-adaptive genes you selected for based on woolly mammoth genomes will arise should that same treatment one day be given to their closest living relatives – Asian elephants.

"It's not *Jurassic Park*," I tell myself, as Chief Animal Officer Matt James pulls back the curtain. Before me are four balls of orangey fuzz disappearing into wood shavings and falling over one another. Woolly Mice, in the flesh. They're getting up to typical mice antics as mice do. Proof that the tweaks to their genome haven't strayed outside of recreating the dense fur and adipose tissue composition that made it possible for mammoths to survive in the frozen tundra.

"It's not *Jurassic Park*," I say.

Thing is, as you explore the new laboratory opened by Colossal in Dallas, Texas, you start to see the comparisons. Author Michael Crichton did, after all, incorporate early work on genetic engineering from Colossal co-founder George Church into the original novel.

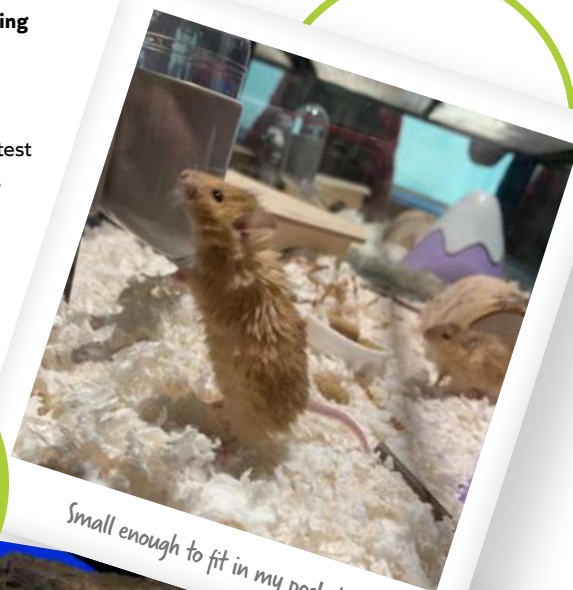
Then there's the geneticists. All of them in white coats looking at screens filled with letters – the building blocks of a life. There are incubators, too. Loads of them filled with eggs of all shapes and sizes. Holding up a teal emu egg, it's hard to imagine that such a sizable chamber could be too small for a baby bird. That is, until you remember Colossal's plans to **bring back the moa**.

These giant extinct birds – once native to New Zealand – were announced as the latest addition to a line-up of five target species to undergo the functional de-extinction treatment. The "de-extinction toolkit"

Colossal's scientists are creating on that path has already been deployed in the creation of **vaccines for baby elephants**, cloning the **world's rarest wolf**, and efforts to make a toxin-resistant marsupial led by Chief Biological Officer, Andrew Pask.

The truth is, it's not *Jurassic Park*. It's so much more, and word on the street is 2026 is going to be a big year for de-extinction news. Hold onto your butts, I guess. 🌟

SEE THE
WOOLLY
MICE HERE!



Small enough to fit in my pocket.



An animatronic dire wolf oversees Colossal HQ.

3 TOTAL LUNAR ECLIPSE

2026 MARCH

This month, we're (again, hopefully) going back to the Moon, celebrating women all over the world, taking an hour to appreciate Earth, and at last, spring officially arrives in the Northern Hemisphere.

23 NEW WHOS PODCAST

Which animals have the worst table manners? Who better to speak to about animal etiquette than someone who works in a zoo? The winner may surprise you – find out in the latest episode of *We Have Questions*.



3 WORLD WILDLIFE DAY

WOMEN'S HISTORY MONTH

GENDER EQUALITY MONTH

6 ARTEMIS II LAUNCH WINDOW OPENS

Mar 6 is the first possible date of the new launch window to send the four-strong Artemis II crew further (and faster) than humans have ever gone before in space. Possible other dates include 7, 8, and 11 before the launch window moves to April.

14 PI DAY

Pi Day is celebrated on Mar 14 as it corresponds to the first three digits of the mathematical constant known as π (pi): 3.14. Formally known as the International Day of Mathematics, it's also Albert Einstein's birthday, which is also the basis for Celebrate Scientists Day, making Mar 14 possibly the most science-celebrating day of the year.

20 SPRING EQUINOX



28 EARTH HOUR

Earth Hour this year is on Saturday, March 22, from 8:30 pm to 9:30 pm your local time. Whatever you're doing this year, be it switching your lights off, litter-picking, or contacting your government representative, share it to inspire others with #MyHourForEarth.

8 INTERNATIONAL WOMEN'S DAY

20 INTERNATIONAL DAY OF HAPPINESS

23 WORLD METEOROLOGICAL DAY



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 reason why we value something even if it comes at a significant cost. If you like your science lighter, discover how a state is making it easier for its citizens to contribute to conservation.



EXPLORE YOUR SIDE ON FACEBOOK

"SUNK COST" SCIENCE

Have you ever dropped an obscene amount of money on a designer item or fancy gadget after what feels like an eternity of waiting for it? You might not even like it that much when it's finally in your hands, but for some mysterious reason you value it more simply because of all the time and money you poured into getting it.

It's not just something seen in humans – lots of other animals do it too. But *why*? What's driving our brains to make us behave in a way that, from the outside, seems completely irrational? We might finally have an answer.

In a recent **study**, a team from Stanford Medicine first put mice through a "cost-free consumption" trial, seeing how much tasty sugar water they'd drink when simply poking their nose through a hole in a box to get it. Then, they gradually upped the stakes, either by increasing the number of times the mice had to put their nose through the box or the intensity of electric shocks applied to the foot required to get rewarded. The team also varied the size of the reward.

Analyzing the mice's brains after each reward, it turned out that dopamine – commonly known as "the pleasure chemical" – appears to be key in attaching

value to a prize, even if it comes at significant cost. When the reward was bigger, there was greater dopamine release in the mice's striata – and when the cost of the reward was bigger too.

"In an environment with limited resources (as most are), when we typically get rewarded only after really hard work, we may need high dopamine secretion to get us to do it again," study author Neir Eshel, MD, PhD, **explained** of the possible evolutionary reasons behind this mechanism.

"Because dopamine reinforces previous behaviors, it may reflect sunk costs. The dopamine release we saw may enable you to pay those steep costs in the future."

And in a new **study**, Eshel and colleagues discovered that the release of dopamine in the mice's brains following a reward was tied to another neurotransmitter – acetylcholine. They found that the more effort put into something, the greater the release of acetylcholine, and in turn, the greater the amount of dopamine released when rewarded.

Whether or not we could use this information to stop ourselves from spending \$1,000 on Pokémon cards when we're actually more of a Yu-Gi-Oh! fan is unclear – but hey, at least now you can distract your partner from the glaring hole in the joint bank account by explaining the science behind why.

TAXES FOR GOOD

America, quite famously, isn't the biggest fan of taxes (see: any textbook on the causes of the American Revolution). In North Carolina, however, taxes are being given a more positive spin that benefits both humans and wildlife in the state – and all that's required is the tick of a box.

For the first time ever, the state will give taxpayers who expect to receive a refund the option to donate either a portion or the entirety of their refund to the North Carolina Nongame and Endangered Wildlife Fund, which will support the state Wildlife Commission's Wildlife Diversity Program. And that's not it – for every \$100 donated, \$186 of federal grant funding will be put in the pot too.

Similar schemes have also seen success in California, Colorado, and Wisconsin, and it's hoped that this new program can support endangered wildlife in North Carolina in the same way. The state is home to a whole host of rare and delightful species, including North America's **smallest turtle**, the iconic giant salamander that is the Eastern hellbender, and the cleverly color-changing Northern gray treefrog.

When people check the box on their state income tax form, the funds they donate are set to go towards efforts to protect these species, including surveying and monitoring, as well as habitat restoration projects in areas affected by 2024's Hurricane Helene, which caused considerable destruction.

"Our dedicated and passionate biologists, agency partners and volunteers work tirelessly to ensure wildlife and their habitats will persist into the future for North Carolinians to enjoy," said Dr Sara Schweitzer, assistant chief of NCWRC's Wildlife Management Division, in a **statement**.

"In western North Carolina especially, donations will help us address the immense impacts of Hurricane Helene on species such as the Eastern hellbender, bog turtle, gray bat, Carolina Northern flying squirrel and several high-elevation migratory birds."

Those who donate will be able to find out in detail where their money's gone, too, with the Wildlife Diversity Program releasing detailed **quarterly reports** about what its conservationists have been up to, fit with plenty of delightful animal pictures.



The **Darker** Side of Science



THE **Lighter** Side OF SCIENCE