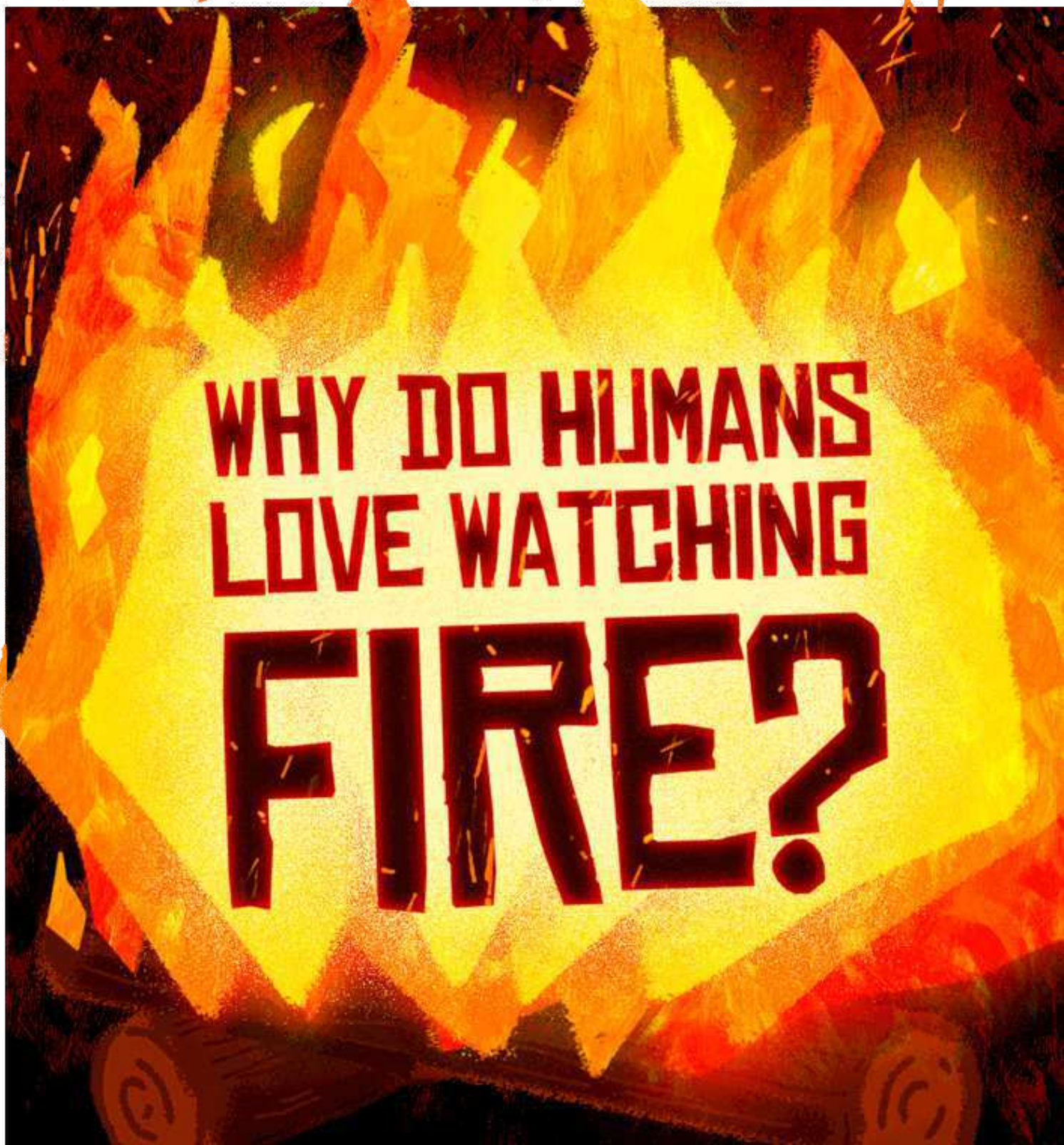
CURIOUS

WHY ARE YAWNS CONTAGIOUS?

WHAT DOES FINDING MICRO-PLASTICS IN THE BODY MEAN FOR OUR HEALTH?



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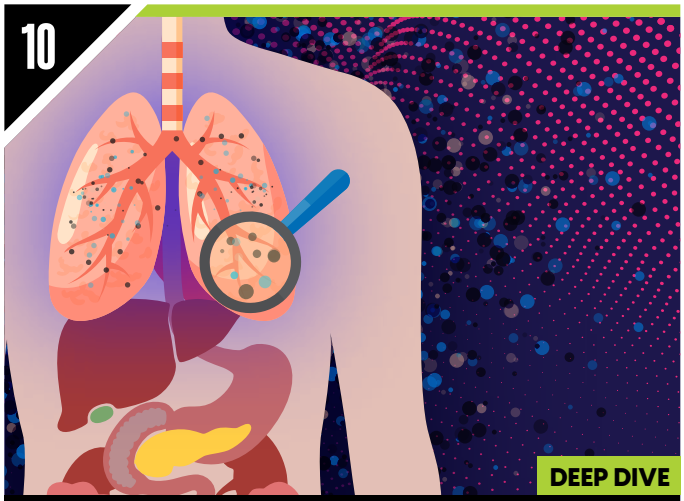
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IFLSCIENCE

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NEWS BITES



Science Fiction Day

Start the year off by embracing your inner nerd and celebrating Science Fiction Day on January 2, supposedly famed science fiction writer Isaac Asimov's birthday. As relevant today as ever, science fiction deals with the impact of real or imagined science on society, and has even inspired real-life science and technological progress. So, how to celebrate? You could start with Mary Shelley's *Frankenstein*, considered to be the first sci-fi novel, kicking off the genre in 1818. Or how about watching the classic 1954 movies *Creature From the Black Lagoon* or *20,000 Leagues Under The Sea* in celebration of the year science fiction was first shortened to "sci-fi"? Or delve into the latest sci-fi offerings by checking out this month's **Science in Media** for inspiration. However you do it, let your geek flag fly by sharing the #NationalScienceFictionDay with millions around the world.



Six Planet Parade

This month you can see a rare lineup of six planets on parade all at once, and you won't even need a telescope for most of them. On January 21, Mars, Jupiter, Uranus, Neptune, Venus, and Saturn will align their orbits meaning they appear gathered closely on one side of the Sun as seen from Earth. The best time to see them is before sunrise. You'll need a telescope or binoculars to see Neptune and Uranus, but the other four will be visible to the naked eye. So, how to tell if you are looking at the planets or stars? Venus is the brightest thing in the sky after the Sun and Moon, so it's best to start there.

Become A Blood Donor

January is National Blood Donor Month in the US – but you don't have to be in the Americas to start off your year by giving one of the greatest gifts we can offer. A single donation can help more than just one patient; and who knows, maybe you'll save a life this month. The most needed blood type the world over is type O negative, known as the universal blood type as all blood types can receive it, but all are needed and all are welcome. Donating blood is a simple and safe process, you will just need to register, fill out a health survey, and book an appointment. Blood donation centers are often looking for donors from ethnic minorities or those with rarer blood types like B negative, so contact your nearest one to find out more.

What To Watch In 2025

2025 is a year of capitalizing on existing IP – not all of it unwelcome. It depends on how you feel about another *Superman/Captain America/Predator/Fantastic Four/Avatar/Tron* etc because they are all happening. However, we will be first in line for *Jurassic Word: Rebirth*; sue us, we love dinosaurs on the big screen. And the small screen to be fair, as we are just as excited that after 25 years, *Walking with Dinosaurs* makes its triumphant return to stomp across tellies, giving *Prehistoric Planet* a run for its money as the most up-to-date and realistic depiction of our prehistoric pals yet. Oh and for those with the patience of a saint, *28 Years Later* hits the screens in the summer.

Image Credit Top Left: CSA-Printstock/iStock, **Top Right:** Nick Bramhhall via **Flickr** (CC BY-SA 2.0)



2025 In Space

2025 should be an interesting year for space exploration if even some of these long-awaited missions finally get off the ground. Are we looking at you, Artemis II? Yes, we are.

This year, the world's largest digital camera for studying the skies will come online and is set to be a game-changer for astronomy. The Vera C Rubin Observatory, based atop a mountain in Chile, will record the southern sky in high definition never seen before, hunting and tracking Solar System bodies and cosmic objects. It is expected to increase our catalog of these objects by at least five times that of the last 200 years.

NASA's SPHEREx mission is set to make the "most colorful" cosmic map ever. The space telescope will detect over 100 colors from millions of stars and galaxies invisible to the human eye because it will see them in infrared. These colors will help reveal the properties of these objects, from composition to distance from Earth.

The first-ever commercial space station is planned for launch possibly in August 2025. Haven-1, developed by private space company Vast, is offering 30-day orbital stays for civilians and astronauts.

And finally, Artemis II, the first crewed mission to the Moon in 52 years, is still currently scheduled for no earlier than September, launching on NASA's SLS megarocket. Already delayed once, if it goes ahead, Christina Koch and Victor Glover will become the first woman and person of color, respectively, to visit the Moon and we'll be a step closer to setting humans down on the lunar surface again since 1972.

WHAT'S UP?



The Quadrantids

One of the best meteor showers of the year

Name: The Quadrantid meteor shower
Appearance: Shooting stars, but loads of them
Location: Anywhere in the night sky

What are the Quadrantids?
Fair question – the name doesn't exactly give much away. It's a meteor shower that takes place once a year roughly between the end of December and mid-January.

Earth gets loads of meteor showers – what's so special about this one?
We appreciate all meteor showers here at IFLScience, but the Quadrantids are particularly spectacular just because they're so rich; at their peak, you can see up to 120 meteors streaking across the sky per hour. There's also a good chance that you'll see some fireballs.

Fireballs? Go on...
We thought that might catch your eye. Fireballs are meteors with a brightness greater than that of Venus, and they stay that bright and colorful much longer than your average meteor. This is because they originate from bigger objects that can be even bigger than 1 meter (3.3 feet).

Okay, you've persuaded me – when can I see it?
The Quadrantids actually started in December, so you might have accidentally caught a glimpse of them already during all those late-night festivities. If not, don't worry – the peak of the shower is on January 4, though it lasts just a few hours. However, the shower will continue to be active until January 12.

What's the best way to watch it?
The shower is best viewed from the Northern Hemisphere, but can be seen at latitudes north of 51 degrees south – which includes pretty much everyone. The other good news is that this is one of those astronomical events where you don't need any fancy equipment, just a good ol' pair of eyes.

With those – and your glasses if you need them – head outside at night to a wide, open space away from streetlights or other sources of light. It'll take your eyes a little while to adjust to the dark, but after they have, you'll be able to spot meteors in any part of the sky.

Image Credit Top Left: NASA, *Top Right:* m-gucci/iStock



WHY DO HUMANS LOVE WATCHING FIRE?

As a species, we're drawn to the flames – is it about warmth, food, or something deeper?

By Tom Hale

Image Credit: *Imran Chowdhury*

There are few greater joys than standing around a campfire, gazing at its colors and shapes, feeling its warmth on your body, hearing its crackles and roars, and smelling the oddly comforting odor of smoke.

It's a pleasure that's as near universal among humans as it comes. Among the vast spectrum of cultures, you'll find very few individuals who don't get a fuzzy feeling when gathered around a campfire in good company.

At a glance, our love of flames seems obvious: fire = warmth and, hopefully, food. However, if you dig deeper, you'll discover that this connection goes far beyond simply satisfying our basic animal instincts.

Fire, I'll take you to learn

Christopher D. Lynn is a Professor of Anthropology at the University of Alabama who has looked very closely at the biocultural relationship between humans and campfires. In 2014, he led a **study** that investigated whether camp and hearth fires help to relax people on a physiological level. It might sound like an obvious question, but the research was one of the first attempts to scientifically investigate it.

"I did that study basically as a way to put empirical data down and have something that people can cite when they go around saying that fires are relaxing," Lynn told IFLScience.

"I always joke that my expertise is providing empirical data to support things that are already widely known and accepted," he added.

The results were just as you'd expect: people who viewed a pleasant campfire, accompanied by its natural sounds, experienced significant decreases in blood pressure, indicating they were chilled out by its presence.

Some subtler points were also unearthed by the experiment. The fire's relaxing effect was significantly reduced when the participants watched a visual of the flames without sound, suggesting that noise is an important part of the fire's immersive qualities.

Interestingly, the participants who scored higher for personality traits like prosociality – the tendency toward cooperative and social behavior – tended to experience even greater relaxation responses to the fire stimulus. For Lynn, this emphasized his suspicion that our infatuation with flames has a deeply social element.

"IF YOU'RE GOING TO CONTROL [FIRE], IT WOULD ASSUME THERE'S SOME SORT OF COMMUNICATION GOING ON. IT'S A PRETTY SOPHISTICATED TECHNOLOGY THAT NO ONE PERSON ALONE COULD MANAGE."

C'mon, baby, light my fire

Some researchers propose that *Homo erectus* – the long-lived, extinct relative of *Homo sapiens* – was controlling fire as early as 1 million years ago, **as evidenced by** microscopic traces of wood ash found at the Wonderwerk Cave in South Africa. More conservative assessments place this closer to 700,000 years ago. Either way, this is long before our species – *Homo sapiens* – evolved around 200,000 to 300,000 years ago.

This time frame within the past 1 million years was a vitally important chapter in the evolution of the human genus. Between 800,000 to 200,000 years ago, hominin brains expanded rapidly, allowing for more complex behavior. Some scientists speculate that it's no coincidence this period of evolution was also when we began to tame flames.

"If you're going to control [fire], it would assume there's some sort of communication going on. It assumes that language is developing and the kind of prefrontal cortical development that would facilitate a level of executive control, [as well as] short and long-term memory," Lynn contends.

THE ACT OF SITTING AROUND A CAMPFIRE RELAXED US, MAKING IT EASIER TO FORGE DEEPER RELATIONSHIPS AND "EXPAND" OUR MINDS.

"It's a pretty sophisticated technology that no one person alone could manage," he notes.

While our bigger brains afforded us the ability to domesticate fire, the flames helped to open more parts of our potential. Fire allowed early humans to cook food, which made it easier to chew and digest, unlocking more calories and nutrients to fuel our burgeoning brains. Simultaneously, fire unlocked more hours in the day, creating more time to socialize and exchange ideas.

"We're trying to understand if [fire] influences pro-sociality, bringing people together, calming them down in a context where they can exchange ideas," Lynn explained.

"If you're sitting around an evening fire and it's dark everywhere else, it's really hard to sort of sneak off and do your own thing, It's not like they have an iPhone to play with, right? They are more likely to sit in the common area that's lit and continue whatever daytime activities, whether that's flint knapping, making a pot, whatever it is," he continued.

"It's extending the day at a time when people's circadian rhythms are also calming down."

In this vein of thought, fire could be seen as a catalyst that made us into truly social beings. The act of sitting around a campfire relaxed us, making it easier to forge deeper relationships and "expand" our minds.

Some researchers have dived even further into this idea of campfires promoting complex social behavior. Sociologist James McClenon **has argued** that *Homo erectus* may have fallen into altered states of consciousness through the hypnotic influence of watching campfires. Perhaps, he claims, this could have been the origins of shamanism, spirituality, and religion – powerful forces that have made human networks immensely more engaged and connected.

"I'VE STARTED THINKING ABOUT FIRE AS ANALOGOUS TO TELEVISION. THE FLICKERING LIGHTS, THE SOUND. IT'S THE LEVELS OF IMMERSION. SINCE OUR VISUAL SENSE IS OUR PRIMARY SENSE, IT'S THE EASIEST ONE TO GRAB A HOLD OF."

Lynn thinks this hypothesis is enticing, although he believes it's likely only part of the story.

"I'm not a total skeptic... I think it's part of a mosaic of behaviors. It's not just religion that's developing. It's social life, it's language, it's cooperation. I find it to be a cool story to get people interested, but I think there's more to it," he told IFLScience.

Let me stand next to your fire

In the modern era, not many humans can say they finish their day while surrounded by a small cohort of trusted loved ones, ogling a comfortable display of flames. However, it could be argued that technology has created another way to achieve a comparable effect: television.

TV is often derided as an anti-social, unhealthy pastime that rots our brains and turns us into cultureless couch potatoes. To be sure, watching sitcom re-runs for eight hours a day isn't likely to boost your well-being. However, maybe we've been too unfair to the pro-social properties of television. Just like huddling around a campfire, a television-watching session involves storytelling, engaging visuals, and time unwinding with loved ones.

"I've started thinking about fire as analogous to television. The sort of flickering lights, the sound. It's not necessarily fire itself, but it's the levels of immersion. Since our visual sense is our primary sense, it's the easiest one to grab a hold of," Lynn ponders.

In more recent times, even the once-sacred institution of TV isn't safe. The collective ritual of watching televised shows with your close confidants is dying amid the unstoppable rise of social media and hyper-personalized streaming services.

Social media gives us the surface-level impression of community and sociality; our brains are clearly deceived by this facade, administering a dose of serotonin every time we gaze into the smartphone's glow. However, it never truly quenches our appetite for interaction, nor does it have the relaxing esthetic of a fire. Far from satisfying our social urges, **recent studies have strongly hinted** that social media can often leave us feeling lonely and disengaged from the world.

If watching a movie on a sofa with your friends or family is a modern parallel of the ancient campfire, perhaps doomscrolling through your smartphone is the psychological and spiritual equivalent of staring at a plastic lighter, alone.



Image Credit: *Imran Chowdhury*



Image Credit: Anetam/Shutterstock.com

A FROZEN FROG

The wood frog, *Lithobates sylvaticus*, looks like any other frog in summer. However, they survive the harshest winters on the planet by doing something incredible: they freeze, before thawing out again come spring like it's no big deal. Freezing in this way would kill **most other animals**, but wood frogs' livers release large amounts of glucose into their bloodstream before hibernation to prevent their cells from freezing. So, while they appear to turn to ice, the sugary conditions inside their bodies prevent the kind of freeze-thaw damage that would otherwise prove fatal.

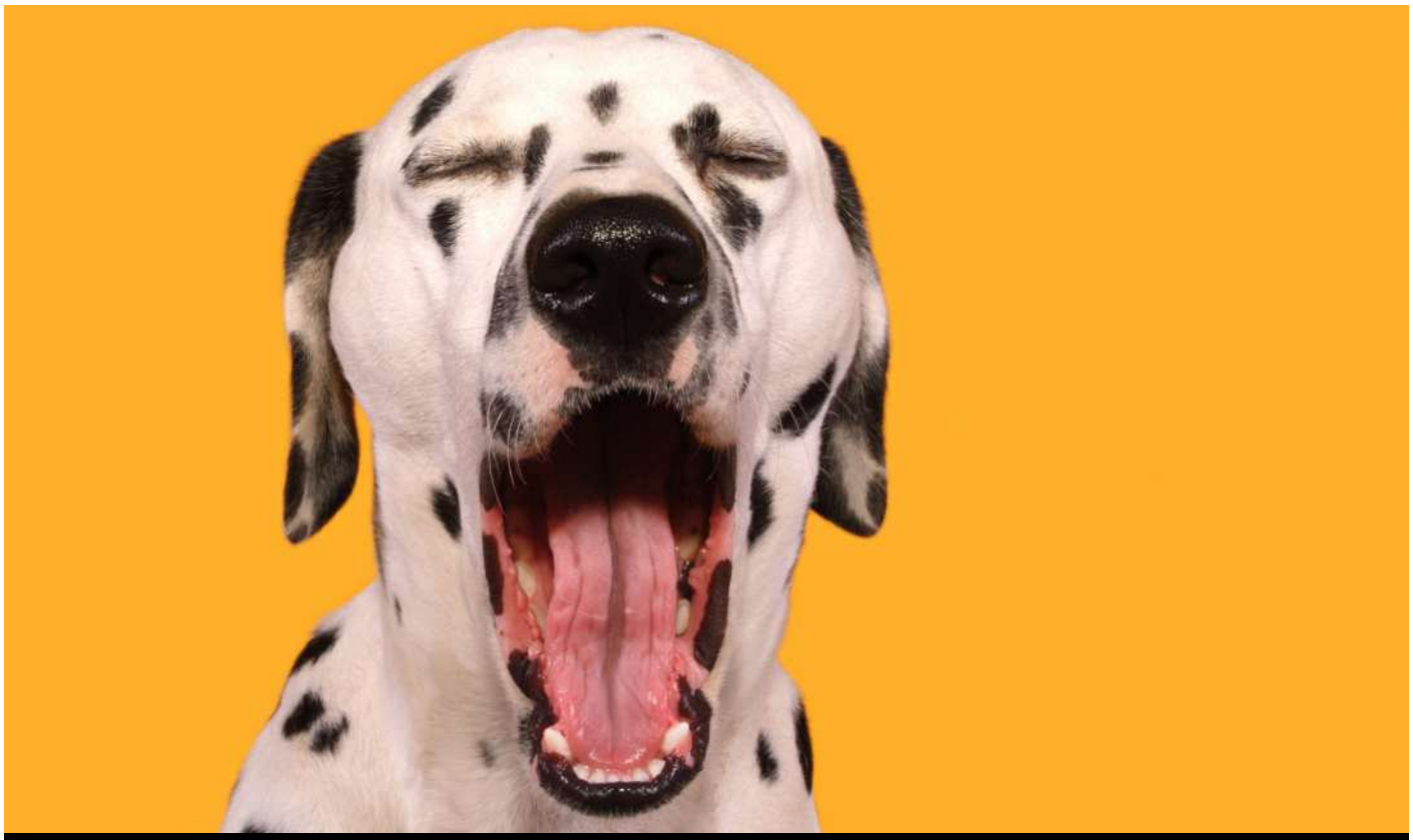


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WHY ARE YAWNS CONTAGIOUS?

AND HOW TO STOP ONE.

Q&A

By Rachael Funnell

It's perhaps one of the greatest injustices of human bodily functions that the yawn has become so stigmatized in social settings. Crack one out and you'll likely receive accusations of being bored or rude. It seems ironic, really, because the science of yawning tells us that, if anything, it's a sign you're trying harder to pay attention.

That's what we discovered when we sat down with **Dr Andrew Gallup**, Teaching Professor of Behavioral Biology at Johns Hopkins University and a bit of an expert in yawning. We wanted to find out why this open-mouthed action seems to be so incredibly catching, and discovered along the way that there's a hell of a lot going on when we yawn.

What is yawning?

AG: Yawning is an extended stretch that's localized to the skull, and what that does is it functions to increase blood flow to the brain. It introduces arterial blood supply while simultaneously flushing away venous return, and this likely has important functions in arousal and transitions in behavioral states across diverse species.

Do all animals yawn?

AG: Not all animals yawn, but it seems that all vertebrates yawn or show very similar yawn-like gaping patterns with their jaw. This yawning behavior has been documented in fish, amphibians, reptiles, birds, and mammals. So, it seems that it likely evolved initially within jawed fish, and that subsequently it has been conserved within the vertebrate lineage.

Why is yawning contagious?

AG: We are only really beginning to uncover why yawning is contagious, but we do know that in humans – and a growing number of non-human animals – that seeing or hearing other individuals yawn increases the tendency for observers to yawn. So, the proximate or underlying mechanisms for contagious yawning are merely detecting this action in others and in humans. This can even be initiated by thinking about yawning or reading about yawning.

Now, why that takes place remains unclear. It could be, for example, that contagious yawning is simply a byproduct of the evolution of other highly sophisticated mechanisms associated with social cognition in group living, where we pay really close attention to the behaviors of conspecifics, or the members of our own species, and we would begin to mimic them and copy these responses in an unconscious way to facilitate collective behavior, synchronization, and group movement.

Or, it could be that contagious yawning is, in fact, adaptive in the sense that again, it may facilitate those processes of coordinated movement and synchronization within a group, perhaps in ways that enhance survival and reproduction by, for example, potentially enhancing vigilance to potential outside threats. Or, again, just synchronizing group behavior and promoting safety within groups.

Why are we more likely to catch yawns from people we know?

AG: The most notable interpretation is that contagious yawning may be linked with empathy. If empathy is defined in part by our tendency to be affected by and share the emotional and behavioral states of others, then perhaps contagious yawning is a very basic form of empathic processing.

A number of studies have examined this connection and found support for it in varying degrees. Initial studies showed that the tendency to yawn contagiously among humans was, in fact, positively correlated with how people scored on different measures of empathy, and the fact that we're more likely to yawn in response to close friends and family members is consistent with that view.

However, an alternative explanation for these biases in contagious yawning as a function of social closeness comes down to attention. So, we're much more likely to attend to and look at members of our family and our close friends when we're in close proximity to them. However, we have a tendency to avert our gaze and avoid social attention towards individuals that we don't have a strong relationship with.

Do you yawn all day learning about this stuff?

AG: I used to when I first began to study yawning and I was writing papers about yawning and thinking about it a lot. I found myself yawning excessively by myself, but I've kind of grown a habituation to it. I'm less sensitive to contagious yawning, at least in those contexts of reading about it and thinking about it. I don't think my tendency to yawn in response to others has changed in real-life interactions.

Why do you think people get funny about yawning?

AG: Studying the social stigma of yawning is fascinating to me. It doesn't make any sense why anyone should be insulted when someone yawns in front of them. To me it's spontaneous, it's uncontrollable. You certainly aren't insulted if someone hiccoughs or someone sneezes in front of us, as long as they cover their mouth when they do so.

Can yawns be stopped?

AG: There are a few ways that you can stifle yawns if you find that it's socially appropriate to do so. One, if you feel a yawn coming on, if you take a deep nasal inhalation and then maybe another one after that, this has been shown to inhibit the yawning response. Another behavior that reduces the incidence of yawning is chewing on gum.

We have Questions with IFLSCIENCE

Hungry for more CURIOUS questions? Head to the We Have Questions podcast for new episodes monthly.



Image credit: Martin Gallagher/iStock

SCIENCE FACT OR FICTION:

WHAT DOES FINDING MICROPLASTICS IN THE BODY MEAN FOR OUR HEALTH?

We know they're just about everywhere, but do they do anything? Rachael Funnell investigates.

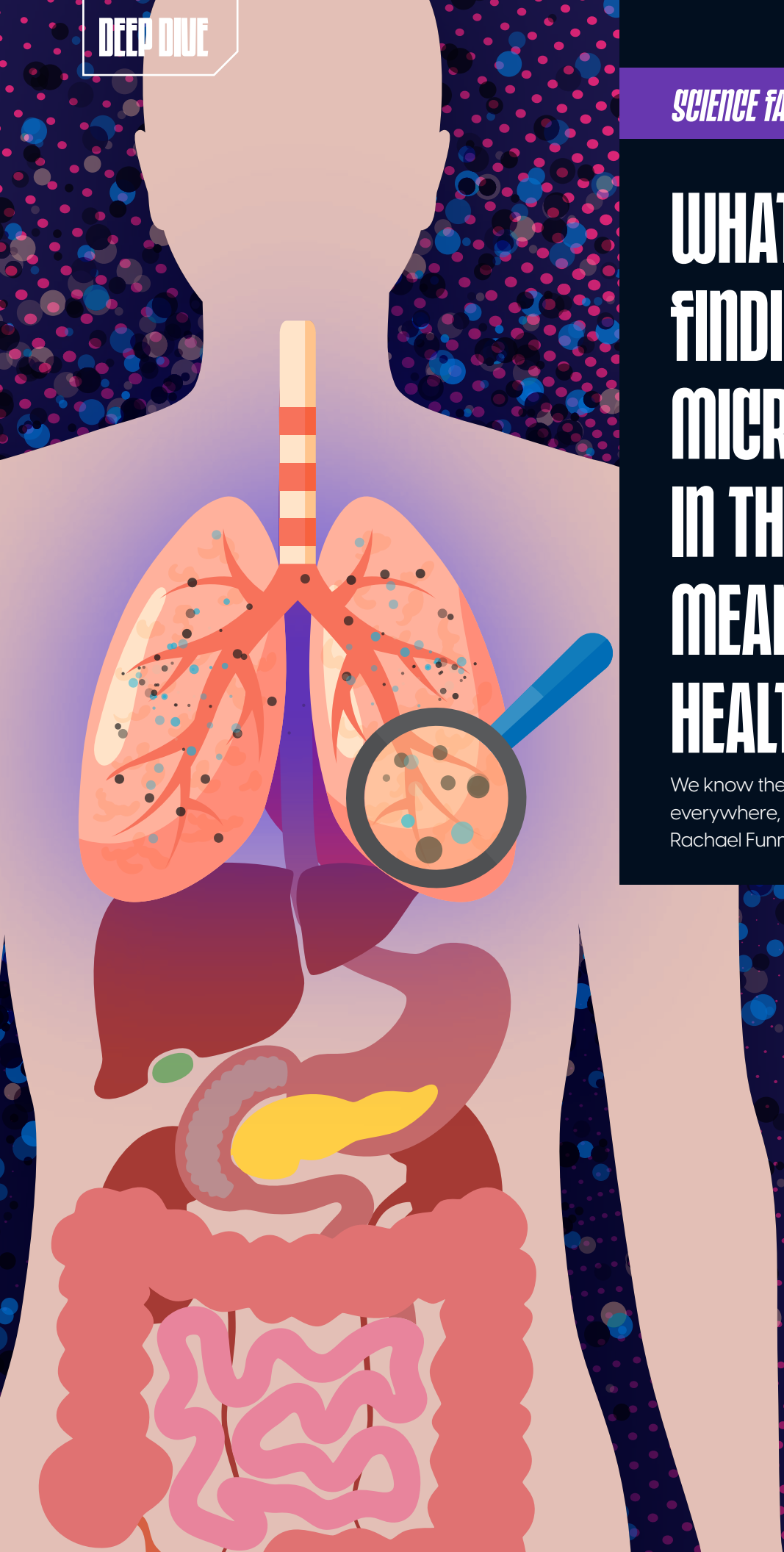


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For the Bingo card that is microplastics in the human body, it feels as if we must surely have reached, well, Bingo! We've checked off the **brain**, **heart**, and **lungs**. Hell, they've even reached the **placenta** – that precious vascular bag that helps bring new life into the world. The reach of these tiny flecks is enormous, but do we actually know yet what they're doing to our health?

THEY MAY ONLY BE SMALL, BUT THEY GET ABSOLUTELY EVERYWHERE.

What are microplastics?

In 1907, Belgian chemist Leo Baekeland won the plastic race. He'd been up against Scottish rival James Swinburne in the battle to patent a fully synthetic plastic, crossing the finishing line with "**Bakelite**", a material made from formaldehyde and phenol. It was a popular choice in the electrical industry, but eventually made its way into everything from telephones and radios to jewelry and billiard balls.

IT SEEMS WE'VE CREATED A WORLD IN WHICH HUMANS ARE EXPOSED TO PLASTIC FROM THE MOMENT THEY'RE BORN, IF NOT BEFORE.

The best recipe for plastic has changed over the last century, and as its varieties increased, so too did the reach of this tough, durable, and washable material. Unfortunately, as it's spread, it's left behind a trail of breadcrumbs that are equally long-lasting. Some are microplastics, measuring between 1 micrometer to 5 millimeters in length, while other shards fall into the category of nanoplastics at less than 1 micrometer long.

Some of these we created to be small, like the regrettable era of putting microbeads in cosmetics (a trend that was, thankfully, banned in the US in 2015), but microplastics also escape into the environment when bigger lumps of plastic break down in places like the ocean. They may only be small, but they get absolutely everywhere.

How do microplastics get into our bodies?

A **2024 study** used an imaging technique called stimulated Raman scattering (SRS) microscopy to investigate the presence of plastic particles in bottles of water. It revealed that an average liter-bottle of water contained around 240,000 fragments, 90 percent of which were nanoplastics – something we hadn't previously been able to easily detect. Technologies like this are lifting the lid on how widespread micro- and nanoplastics are, but oral ingestion is only one of the ways they can get into our bodies.

Research has shown that microplastics can also get inside us through our skin. Add to that the fact that it's been detected in **breast milk**, and it seems we've created a world in which humans are exposed to plastic from the moment they're born, if not before.

Plastic in the placenta

Every placenta sampled in a **2024 study** was found to contain microplastics, ranging from 6.5 to 790 micrograms per gram of tissue. That included **polyethylene**, the main culprit in plastic bags and bottles, as well as **polyvinyl chloride** (PVC), nylon, and even polystyrene. It's not yet been proven if micro- or nanoplastics can pass from a placenta to a fetus, but if they can, the problem would be widespread.

"If the dose [of microplastics] keeps going up, we start to worry," said lead researcher Dr Matthew Campen in a **statement**. "If we're seeing effects on placentas, then all mammalian life on this planet could be impacted. That's not good."

Are microplastics harmful to our health?

Whatever route a microplastic takes into the body, it can continue to spread once inside through certain **cellular pathways**. This includes two known as the clathrin and caveolae-dependent pathways that lead to the sub-cellular environment. Here, they can interfere with the epigenetic

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control of gene expression, inflammation, and the balance of redox reactions within cells.

They can also interfere with cell-cycle proteins, which are the mediators of cell division, and when this happens, we can get uncontrolled growth potentially leading to tumors and possibly even cancer. A further contributor to cancer risk is that microplastics may mimic certain hormones, which in turn could encourage the growth of hormone-related cancers, like breast and prostate cancer.

We've seen in **rats** how the inhalation of microplastics may impair blood pressure, blood vessel dilation, and reproductive hormone levels, suggesting that exposure had disrupted endocrine function. We've seen in **mice** how microplastics can cross the blood-brain barrier just two hours after ingestion, which one researcher behind the study said could potentially increase the risk of inflammation, neurological disorders, and even neurodegenerative disease.

Ethics prevent us from carrying out similarly controlled experiments on humans, but there have already been studies that point to a trend in the fate of people found to be contaminated with microplastics deep within their cardiovascular system.

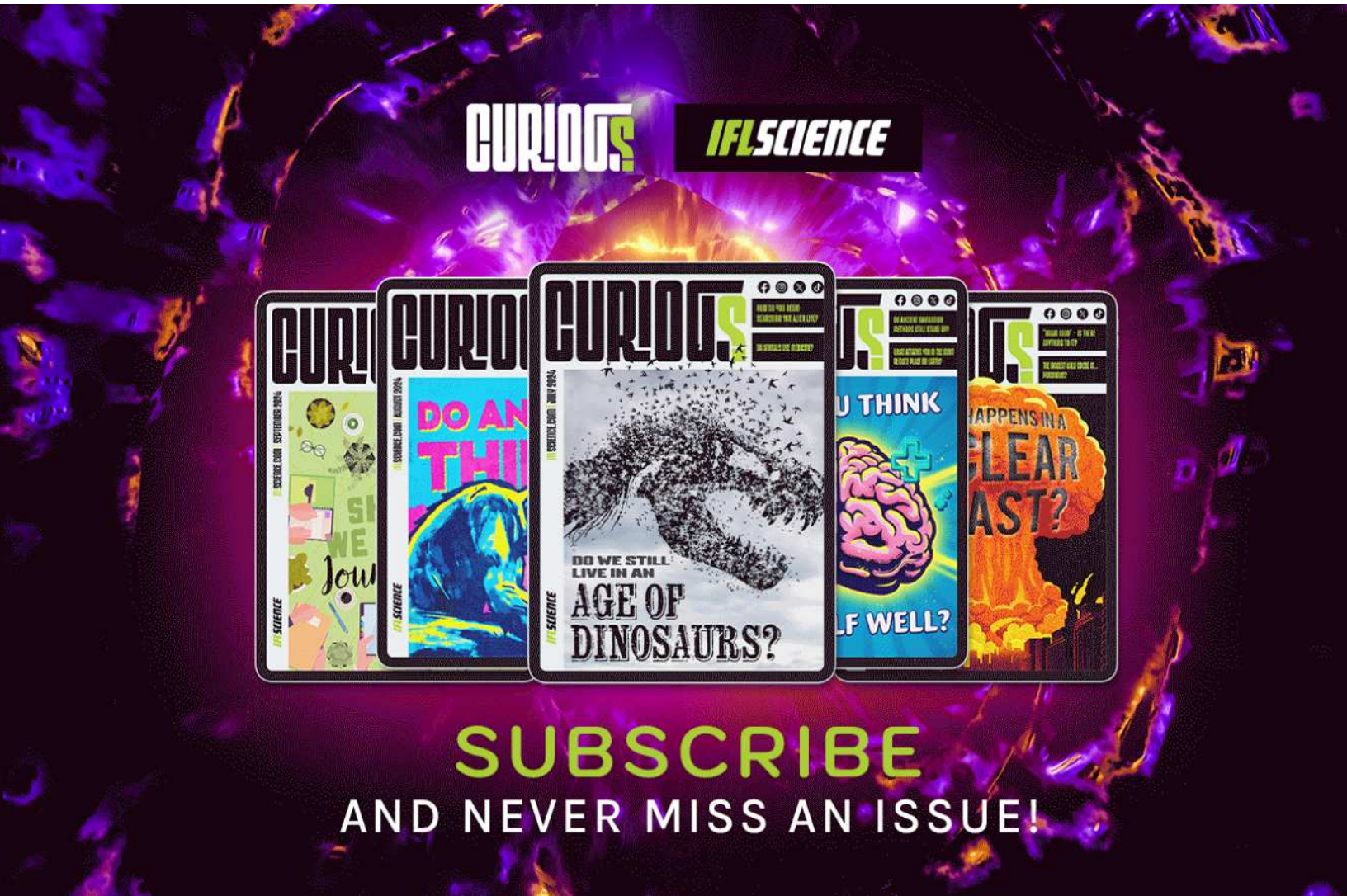
Can plastic in the body be deadly?

In March 2024, we received the worrying news that microplastics had been found in the fatty deposits that clog up human arteries. These kinds of blockages in major blood vessels can lead to heart attacks when made up of plaque, which got scientists asking a grim new question: could we soon be suffering from "**plastic attacks**"?

The study analyzed plaques that had been scraped out of the carotid arteries – those that supply blood to the brain – of 257 people. It found that 150 of them had plaques containing polyethylene, while 31 patients' plaques had PVC.

Almost all of the plastic pieces were nanoplastics smaller than a micrometer in size, which – for context – is less than one-50th the diameter of an average human hair. They might be small, but there was no denying they were there. We come back to that crucial question again: what is the *actual* translated effect of it on our health?

The scientists wanted to find out, so they followed up all of the patients from the study for around three years. From what they observed, it didn't look good, as the people with microplastics in their plaques had a 2.1 times greater risk of **heart attack**, stroke, or death from any cause compared to those who didn't.



"The report [...] provides evidence that microplastics and nanoplastics are associated with cardiovascular disease outcomes in humans," **wrote** epidemiologist Dr Philip Landrigan of the study. "Although we do not know what other exposures may have contributed to the adverse outcomes among patients in this study, the finding of microplastics and nanoplastics in plaque tissue is itself a breakthrough discovery that raises a series of urgent questions."

WE MIGHT NOT KNOW WHAT ALL THE EFFECTS ARE JUST YET, BUT WE KNOW ENOUGH ABOUT THE HARMS TO START DOING SOMETHING ABOUT IT.

"Should exposure to microplastics and nanoplastics be considered a cardiovascular risk factor? What organs in addition to the heart may be at risk? How can we reduce exposure?"

Life in plastic? Not fantastic

Science has continued asking these and many more questions about the harmful effects of microplastics, and the answers are finally driving a clear message: we might not know what all the effects are just yet, but we know enough about the harms to start doing something about it.

That was the take-home message from a new report in the journal **Science** penned by an international group of experts, marking 20 years since the term "microplastics" was first used. It reviewed what we've learned about the dangers they pose to human health, as well as the wider environment, and what chance we have of ever getting on top of the problem.

"After 20 years of research there is clear evidence of harmful effects from microplastic pollution on a global scale," said Professor Richard Thompson, Head of the International Marine Litter Research Unit at the University of Plymouth, and a co-coordinator of the Scientists Coalition for an Effective Plastics Treaty, in a **statement**. "That includes physical harm to wildlife, harm to societies and cultures, and a growing evidence base of harm to humans."

"Added to that is the fact that microplastics are persistent contaminants, and once in the environment, they are virtually impossible to remove. There are still unknowns, but during the 20 years since our first study the amount of plastic in our oceans has increased by around 50 percent, only further emphasising the pressing need for action."

Thompson was an author on both this most recent paper, and the first to ever point a finger at microplastics 20 years ago, with his work having bookended an estimated 7,000 studies into microplastics and their impacts. The body of research has recognized microplastics in more than 1,300 aquatic and terrestrial species, and found them to be present in every corner of the planet, as well as in our food, our water, our organs, and our tissues.

MICROPLASTICS ARE A GLOBAL PROBLEM THAT WE QUITE LITERALLY INVENTED, BUT THE SAME SMARTS THAT GOT US INTO THIS SITUATION ARE JUST WHAT WE NEED TO INNOVATE OUR WAY OUT OF IT, TOO.

It's the view of Thompson and his fellow authors that the need for worldwide action to tackle the continued spread of plastic pollution has never been more pressing, as while the science will likely continue to highlight precisely what all this exposure is doing to our bodies, all the knowledge in the world won't help us if we can't find a way to stop it getting inside us in the first place. Microplastics are a global problem that we quite literally invented, but the same smarts that got us into this situation are just what we need to innovate our way out of it, too.

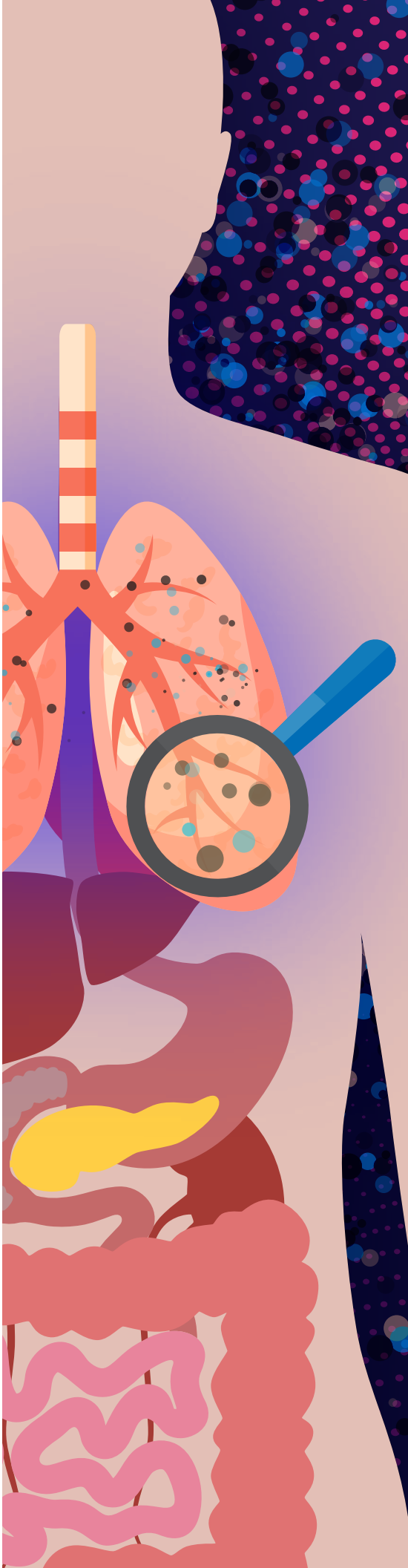
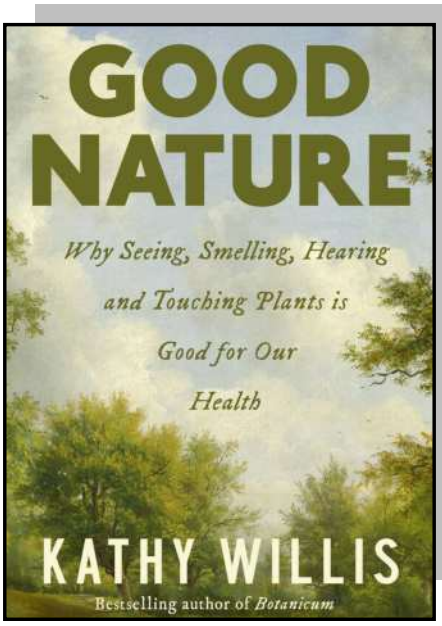


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CONNECTING WITH NATURE

In this excerpt from *Good Nature: Why Seeing, Smelling, Hearing, And Touching Plants Is Good For Our Health,* author Dr Kathy Willis talks about how connecting with nature a bit less scientifically actually enabled her to get more out of the experience.

I originally trained as a palaeoecologist.

That's a statement that can stop the conversation dead at parties, since not many people know what it is (never mind how to spell it).

Actually, it's a fascinating branch of science that uses the fossilised remains of plants to reconstruct vegetation changes over time in response to climate change, human impact, and other environmental drivers. The results provide important scientific knowledge, for example on past landscapes and on plant responses to climate change. However, it meant that I was dealing only with plant parts that were long dead. My work was largely microscope-based, often looking at plant material thousands of years old that had lost its original colour, shape, and smell. Although fossilised plant material can be beautiful, especially fossil pollen (my favourites include daisy pollen, which, under a microscope, looks like a volcanic landscape; knotweed pollen grains, which are cratered like the moon; and the spiky asters and triangular myrtles), my day-to-day interaction with live plants amounted to little more than tending the sorry pots of basil on my kitchen windowsill or enjoying the trees that whizzed by as I cycled to work.

My professional relationship with plants expanded considerably when I became the founding director of Oxford University's Biodiversity Institute. The Institute – now part of the wider Oxford Biodiversity Network – used science to help provide the evidence for policy to protect the Earth's incredible biodiversity. My perspective became global: we were working to understand which ecological and evolutionary processes create the right conditions for resilience, persistence, and the prevention of irreversible changes in ecosystems. And yet, my daily interaction with living plants did not increase significantly.

This all changed in 2013 when I went on secondment from Oxford to be Director of Science at the Royal Botanic Gardens, Kew in London. For those five years, I was surrounded by living plants, from the lawns and borders of the public gardens outside my office window and the glasshouses containing palms from all over the world to the Japanese and Mediterranean gardens, and many more. I could travel the world in plants in a single lunch break. These daily interactions with plants changed the way I thought about them. I began to see plants in a totally different light from looking at them flat on the academic page or as large, abstract ecosystems. This was a parallel universe, all around me. And I was struck by how many visitors didn't just look at the plants or walk along beside them, but stopped to inhale their fragrances, bask in their shade, or reach out to touch leaves or stroke bark, ignoring those stern English signs telling them "Do Not Touch" or "Keep Off The Grass". I ignored them too.

Over time, I ceased to seek out the Latin names for plants during my forays around the gardens at Kew or to try to determine which plant family they were in (not that I don't still enjoy this level of detail). Rather, I began to classify them in my own mind according to their stature, leaf shape, colour, scent, texture, and even the sound the plant made in the breeze. I was no longer only seeing plants through a microscope lens, and with my attention focused on their complex role in an ecosystem, plants had become "alive" to me, affecting all my senses. •

Image Credit: Pegasus Books

AUTHOR Q&A



DR KATHY WILLIS

AUTHOR OF *GOOD NATURE: WHY SEEING, SMELLING, HEARING, AND TOUCHING PLANTS IS GOOD FOR OUR HEALTH*

The start of a new year is a great time to think about practices you do and don't want to take into 2025, and here, might we offer the words of Dr Kathy Willis? We caught up with her to find out how learning to see (smell, hear, and touch) nature with a new outlook can be good for your health.

Why did you write this book?

This book emerged from my own curiosity. I kept coming across a **paper**, published in a top science journal, that showed that people recovering in hospital from a gallbladder operation recovered faster and needed less pain relief if they looked out from their hospital bed window onto trees rather than a brick wall.

I was intrigued and, as a sceptical scientist, wanted answers. In particular, I wanted to understand what happens in our bodies when we look at nature to bring about these positive health outcomes. This one study set me off on a pathway of discovery. I found a wealth of clinical studies and research, much of it carried out by the medical profession over the past 10 years, to show that when our senses of sight, sound, smell, and touch interact with certain aspects of nature, changes are automatically triggered in our nervous and hormonal systems, and in our psychological state, resulting in significant and long-lasting positive health outcomes.

Favorite fact from your research?

When you inhale a plant scent, such as the smell from pine trees, the molecules that cause this smell pass across the lung membrane and into your blood. People who have walked in pine-scented forests, for example, have greatly elevated levels of pinene in their blood. Once in your blood, these molecules can interact with the same biochemical pathways and bring about the same results as some prescription drugs.

Lavender, for example, makes you sleep better, pine scent reduces anxiety, and rosemary makes you more awake. Possibly my most favorite reaction linked to scent, however, is that related to the Japanese cypress trees – some studies have shown that when we inhale the scent from these trees, it can cause a significant rise in natural killer cells in our blood. These are cells we want more in our blood because they attack cancer and virus cells.

Any advice for those who want to spend more time connecting with nature?

You don't need to wait to be "prescribed" nature by a medical practitioner – you can do this yourself – starting now. Just try 20 minutes, three times a week, walking around the local park – and fill every spare space in your house with green leafy plants, yellow and white flowers, and diffuse plant scents such as cedar, cypress, lemon, and pine. It really will make you physiologically and psychologically calmer and bring a whole host of other health benefits!

Do you practice what you preach?

Every room in my home and office now have plants in them – to the point that my husband has asked if there is still space for him...!

Joking apart, I now take time to look out of my window onto greenery, or at a plant on my desk, or even a leafy photo on my computer screensaver, as often as possible and especially when feeling stressed. This is because clinical studies show that doing this, even for as little as 90 seconds, can lower your blood pressure, enhance heart-rate variability associated with physiological calming, and reduce psychological anxiety.

How would you like to see attitudes towards health and nature change?

People (particularly city planners and politicians) need to change their attitude to nature in cities. Far too often nature in cities is seen as "nice to have" but expendable in the face of new buildings, roads, railways, etc. Instead, nature in cities should be viewed as critical for our physical and mental well-being and as important as any other infrastructure.

What do you hope people take away from *Good Nature*?

I hope that people will come to the same conclusion as me – that interacting with nature on a daily basis – both inside and outside of our homes, offices, colleges, and schools, is essential for our health and wellbeing. •

Good Nature is published by Pegasus Books and is available now.

Image credit: © John Cairns



The volcanic black sands at Diamond Beach in Iceland make for a dramatic backdrop when huge chunks of ice wash ashore after calving off of the Breiðamerkurjökull glacier tongue. The glacial gems grow more beautiful as they age, being polished off by the wind and waves until they melt out of existence.

Image credit: *Lukas Gojda/Shutterstock.com*

FIRE AND ICE AT DIAMOND BEACH

Iceland has many tongues, and by that, we mean of the glacier variety. Glacier tongues are defined as narrow, elongated extensions of a glacier that flow into water beyond the glacier's lowest grip on the Earth's crust. They act like slow-motion rivers, releasing small icebergs from the glacier into the water, setting them free to bob where the tide takes them.

One of Iceland's longest icy tongues is the Breiðamerkurjökull glacier. It flows into the Jökulsárlón glacier lagoon, and from here the icebergs travel out to the Atlantic Ocean via the Jökulsá River. Along their journey, they can melt and smooth off into jewel-like lumps, and while some travel out to sea, others can wash up on the black sands of Diamond Beach.

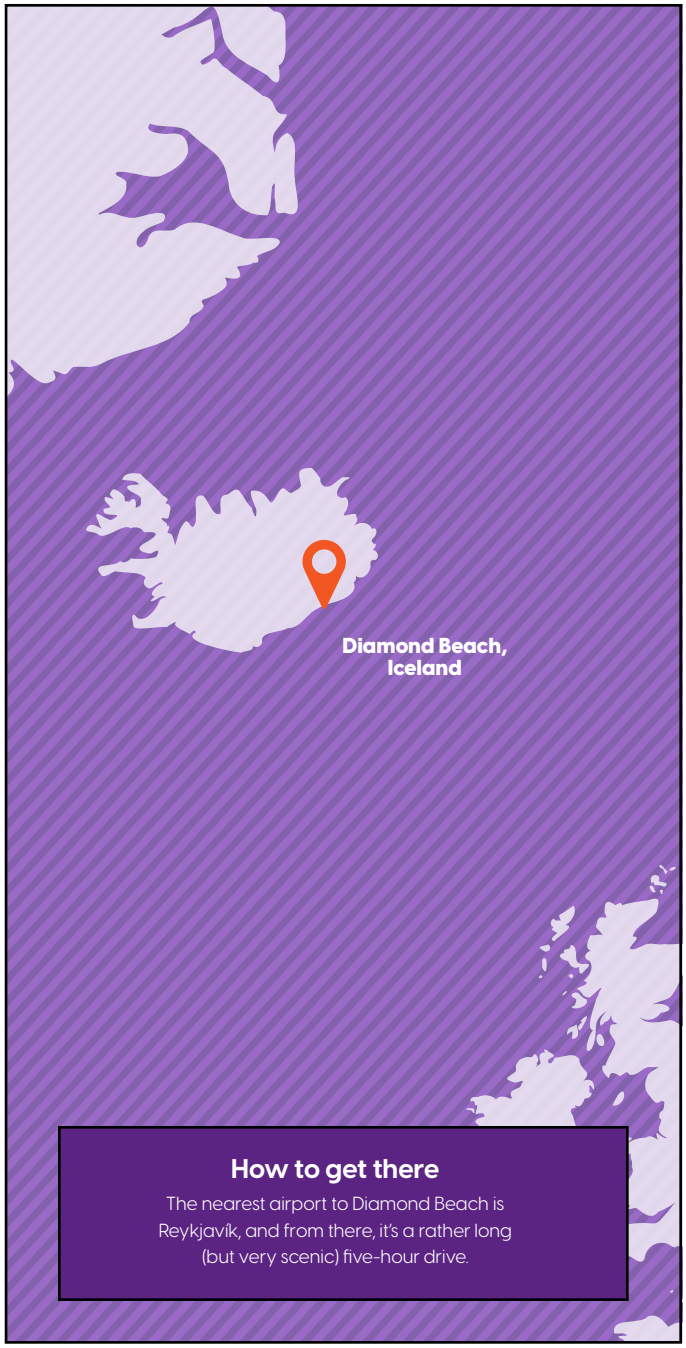
Also known as Breiðamerkursandur, Diamond Beach is located on Iceland's south coast where the ground is blackened by volcanic materials including basalt. These black sand beaches are common across Iceland's coastlines because it sits on the volcanically active Mid-Atlantic Ridge.

Volcanic eruptions release lava flows, and over time those flows solidify and get broken up. They crumble into smaller and smaller pieces, until eventually they're little more than grains of sand that get strewn across beaches like Breiðamerkursandur, giving them their characteristic black coloration.

The volcanic sands are an impressive esthetic all on their own but throw in a few giant hunks of polished glacier ice, and it makes for a dramatic postcard. The glacial gemstones can be white or crystal clear – a quirk of glacier ice as its immense pressure squeezes the air bubbles trapped within (which is also why **Iceland's glacier caves** come in such impressive hues of Fox's glacier mint blue). The icy diamonds on Breiðamerkursandur may also have bands of black running through them due to **volcanic ash deposits**.

Diamond Beach is a dynamic natural spectacle that's always changing, meaning no two visits will look the same as each day the icebergs melt, and new ones arrive. In the same breath, there's no guarantee Diamond Beach will be living up to its name on the day you visit, what with its temporary gems being dependent on the activity of the Breiðamerkurjökull glacier and the tides.

Fortunately, it's not the only spectacle to be enjoyed here. At the right time of year, it's a good spot for seeing the aurora borealis, or Northern Lights, and you may even be blessed with a visit from a few seals and orcas. Not bad for a day at the beach.



How to get there

The nearest airport to Diamond Beach is Reykjavík, and from there, it's a rather long (but very scenic) five-hour drive.

ESCAPE



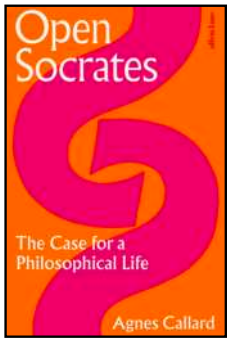
Human Within

Game from Signal Space Lab

Join cyber engineers Nyla and Linh as they develop the ultimate supercomputer by harnessing the processing power of the human brain. They succeed in transferring human consciousness into a digital form – but things take a turn when they try to back out as it's revealed the technology will be used for nefarious purposes. They are held against their will, but your decisions could help get them out. This interactive virtual reality experience responds to your choices, meaning you can shape where the story goes, leading to different endings.

Available **Jan 9**.

THINK



Open Socrates: The Case For A Philosophical Life

Book by Agnes Callard

In *Open Socrates*, philosopher Agnes Callard presents a fresh perspective on Socrates, exploring his radical approach to philosophy and enduring relevance. She examines how he earned the title "father of Western philosophy", delving into his ideas on love, mortality, politics, and youth – ideas some view as both revolutionary and arrogant. Callard argues that Socratic dialogue remains vital today, offering a method to question deeply and think critically. Through this lens, she charts a path toward a new ethical framework for leading a thoughtful and examined life..

Available ***January 14***.

WATCH



George A. Romero's Resident Evil

Documentary from Uncork'd Entertainment

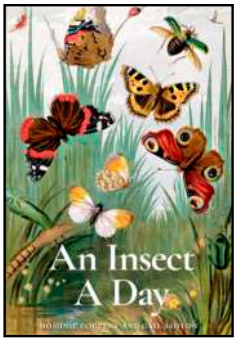
There are more *Resident Evil* movies out there than you can shake a stick at, but what we don't have is one directed by arguably the creator of the modern zombie himself, George A Romero (*Night of the Living Dead*). But we nearly did. This documentary explores how this '90s match made in heaven never got off the ground. Think *Lost in La Mancha*, but with zombies. Previously unseen scripts, archival footage, and new interviews will reveal the mystery of why the man who inspired the games ultimately never got to direct an adaptation.

Streaming on digital platforms from ***Jan 7***.

SCIENCE IN MEDIA



DISCOVER



An Insect A Day

Book by Dominic Couzens and Gail Ashton

In this month's Book Bites we learned about the healing nature of, well, nature, so why not get to know the wild world with *An Insect A Day*? Nature experts Gail Ashton and Dominic Couzens embark on a deep dive into the world of creepy crawlies. From a gnat with wings that beat at 1,000 times a second to sacred scarab beetles once worshipped in ancient Egypt, it tells the stories of hundreds of insects with information about behavior, migration, folklore, history, and more.

Available ***now***.

PLAY



Dune Awakening

Game from Funcom

Tackle the most dangerous planet in the universe in this open world survival game, set in an alternate timeline in which Paul Atreides was never born. A War of Assassins is raging between houses Atreides and Harkonnen, creating an unstable world that leaves just enough wiggle room for you to worm your way from nameless prisoner to the top of a Great House. Will you control the flow of spice itself? Your journey begins in the desert. Find the Fremen, wake the sleeper, and watch out for those worms.

Available ***early 2025***.

Image Credit Top Left: *Signal Space Lab,* ***Image Credit Top Right:*** *Batsford,* ***Bottom Left:*** *Allen Lane,* ***Bottom Right:*** *Funcom*

DATES TO REMEMBER

Shake off those January blues, science fans – we're kicking off the new year with a bang. There's Veganuary, of course; a so-called "Wolf" Moon; Earth will reach its closest point to the Sun; and we'll have the chance to celebrate education and learn all about clean energy. What a way to start 2025, eh?

JANUARY



Veganuary

Since 2014, Veganuary has encouraged and supported millions of people to try going vegan for the month of Jan – will you join them? The idea is that people forgo animal products for 31 days – that means swapping meat, eggs, and dairy for plant-based alternatives – to promote a healthier future for our planet. To find out more about taking part – including how you can get your hands on a celebrity e-cookbook along with meal plans, nutrition tips, and more – check out the **Veganuary website**.



4 Perihelion

Earth orbits around the Sun in an elliptical trajectory, meaning it's not always the same distance away from its star. On January 4, it will be at its closest point to the Sun – still a mammoth 147 million kilometers (91.4 million miles) away – and we call this perihelion. Stay tuned for aphelion – when Earth will be most distant from the Sun – on July 3.

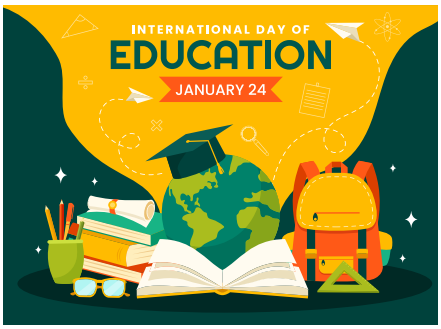


13 Wolf Moon

The first Full Moon of the year will take place on Jan 13. Also known as the Wolf Moon – an ode to the howling of hungry wolves protesting the scarcity of midwinter – it is expected to rise at 10:27 pm UTC.

24 International Day of Education

"Education is a human right, a public good and a public responsibility," writes the **United Nations**. That's why January 24 is International Day of Education, to recognize the crucial part that learning has to play in peace and development and help make sure that education becomes more accessible around the globe.





26 International Day of Clean Energy

January 26 is International Day of Clean Energy. Adopting clean energy is integral to the fight against climate change, but also for helping to provide equitable access to power – even today, **675 million people** live in the dark. For the sake of people and the planet, the day strives to raise awareness and spark action for the transition to clean energy.

Image Credit Top Left: Krasyuk/iStock, *Top Right:* JuSun/iStock, *Middle Left:* slowmotiongli/iStock, *Middle Right:* wongmbatuloyo/iStock, *Bottom Right:* Mimadeo/iStock





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 reasons not to get on a crow's bad side. If you like your science lighter, discover more about the two newest members of the "Shellowship of the Ring".

GRUDGE-HOLDING CROWS

Don't piss off a crow – research has suggested that not only are they capable of remembering a dangerous face, but their pals and children will remember it too. And if they see you again, well, you'd better watch out.

It took a slightly bonkers **study** conducted by a group of researchers from the University of Washington to find this out. It involved the team capturing, banding, and releasing seven to 15 crows at five study sites, all while donning some very creepy masks.

Then, the researchers tested whether the crows remembered the "dangerous" masks over time – and they reacted not just over the first two weeks after the trappings, but even nearly three years later.

The reaction was a behavior called scolding, which the researchers defined as a "harsh, alarm 'kaw' directed repeatedly at the observer accompanied by agitated wing and tail flicking". If a different, "neutral" mask was worn, scolding rarely happened.

Sometimes, scolding involved a group of crows, known as mobbing, which occasionally turned into the birds diving at or following the researcher.

It would be impressive enough if it was just the trapped crows reacting in this way, indicating they were able to remember faces associated with danger – but other crows that hadn't been trapped were found to scold the researchers too.

This included not just crows that had witnessed others being trapped, but also young crows that weren't even around when the trappings had occurred; they witnessed their parents scolding the researchers in the masks and learned to do the same all by themselves.

The crows that had been trapped had a more discerning eye, however, better able to tell the difference between dangerous and neutral masks than those who were never captured.

But just how long can you expect a crow's grudge to last? In this case, as study author Dr John Marzluff told the **New York Times**, it took 17 years before he had peace and quiet on campus again.

TOLKIEN TROGLOBITES

One of the advantages of being a biologist is that, upon discovering a new species, you have the chance to name it anything you want. You could be sensible, of course – or you could name them after two of your favorite *Lord of the Rings* characters.

That's what researchers Rodrigo Brincalepe Salvador and Maria Elina Bichuette did upon **discovering** two new species of freshwater snail.

The slimy critters were discovered in Gruna do Pedro Cassiano, a limestone cave found in northeastern Brazil. It's thought they live in just this single cave, making them not just troglobitic, but perhaps a bit travel-wary.

This cave isn't an easy place to live – not because it's dark and dingy, but because its unique ecosystem is under threat from the extraction of its waters, which are filling back up less and less due to the effects of climate change.

The two snail species are, however, well-adapted to their surroundings, with translucent shells and unpigmented bodies, though they also have some thorn-like structures on their shells not seen in many other Brazilian freshwater snails.

You'd think then, given the whole cave thing, that they'd be named after Misty Mountains cave-dweller Gollum – but no. The two new snail species have been named *Idiopyrgus eowynae* and *Idiopyrgus meriadoci*, in honor of dynamic battle duo Éowyn and Merry Brandybuck.

"I tend to use lots of pop culture references in my species names – from books, comics, *Dungeons & Dragons*, and video games. If we think about it, there is a long-standing tradition in taxonomy of using names from mythology and literature to name species," said Salvador, explaining the reasoning behind the names in a **blog post**.

"Granted, in the old days, those names mostly came from Greek and Roman myths and Shakespeare. Today, we have newer mythologies and literature classics, so in a way, we're just continuing that tradition."