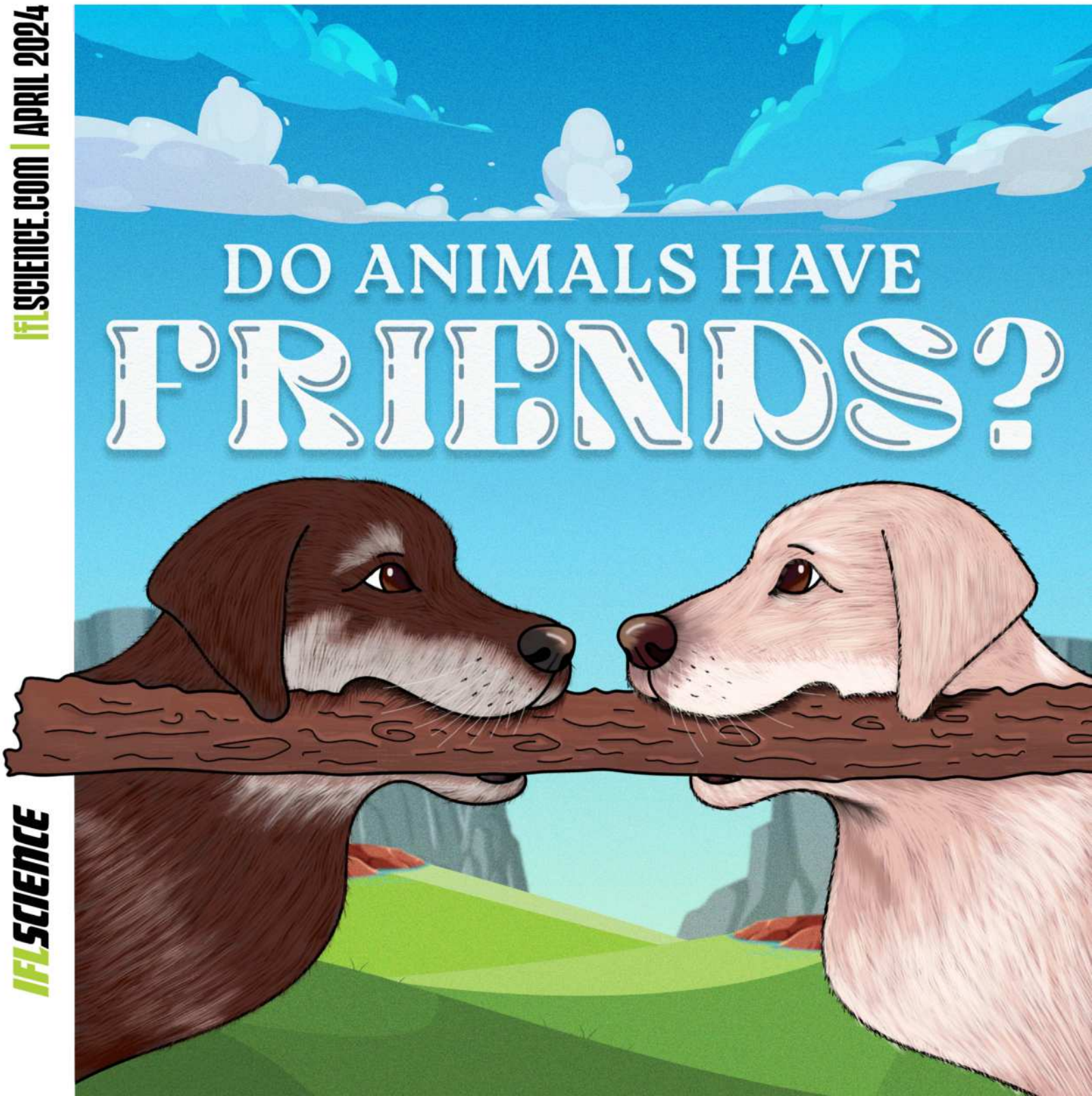
CURIOUS

WHAT WAS THE FIRST WORK OF "ART"?

WHAT'S IT LIKE WORKING IN A HUMAN TISSUE BANK?

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200-MILLION-YEAR-OLD TREES MAKE UP ARIZONA'S PETRIFIED FOREST

Arizona is home to an ancient forest – the largest concentration of petrified wood anywhere on the planet.

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NEWS BITES



Dream Chaser

The first half of 2024 should see the start of a new era in launching and returning astronauts from space. Sierra Space's Dream Chaser – a private space plane set to take over where the space shuttle left off – could even carry out its first-ever launch in April. It may look like a flying orca, but Dream Chaser is made up of two elements: the spacecraft and the cargo module. It will operate as part of NASA's commercial resupply service to the International Space Station (ISS). The first flight is set to be an uncrewed demonstration mission to the ISS – many years in the making – that should take place soon following the successful launch of the United Alliance's Vulcan rocket, its carrier, in January. The reusable space plane, named Tenacity, is designed to be used 15 times, taking off on a rocket, docking with the ISS, and landing on a shuttle runway back on Earth, just like the space shuttles. The crewed version should be ready by 2025, and then the new era will really begin.



Swimming Spinosaurus Saga

In the seemingly never-ending back and forth over whether the iconic *Spinosaurus* was a true aquatic dinosaur – making it the only one we know of – or an overgrown **heron from hell**, scientists are poking holes in a **previous study** that came down pretty hard on the idea the largest predatory dinosaur ever found submerged itself to hunt underwater due to its incredibly dense bones. Due to its curious anatomical features that suggest a watery lifestyle but few actual specimens, the lively debate rages on. "[W]as it a fast swimming predator that chased fish like a sea lion? Or an ambush predator at the water's edge, grasping with its clawed hands like a giant version of a brown bear chasing salmon, or plunging its head into water like a 7-ton heron from hell?" as the authors **put it**. Who knows, stay weird, *Spinosaurus*.



Spring Superbloom

As parts of the US experience their annual spectacular superblooms, officials in California have a specific message for anyone hoping to view these majestic wonders: keep the "Beauty in the Bloom". Or, as they also put it: take photos not flowers. California State Parks has announced they expect an "impressive" spring wildflower bloom this year thanks to the specific conditions of rainfall, temperatures, and a sufficient seed bank from last year, which creates the iconic rainbow carpet, most famously the orange poppies of the Antelope Valley Poppy Reserve. Of course, these iconic natural phenomena look great on the 'gram, which is why officials are begging people to **bloom responsibly** if they visit. Stay on the paths, don't pick the flowers – and bringing a drone? Don't even think about it.

Citizen Science Month

We're in a golden age of citizen science, where people around the globe can contribute to the knowledge of the world around us – and a little further afield – more easily than ever before from the comfort of their own homes. This Citizen Science Month, if you've never taken part (or have no idea what projects are even open) have a look **here** and take your pick, from counting iguanas to searching the cosmos for new planets. You can even help NASA study the effects of this month's total solar eclipse on wildlife. Citizen science is helping **change the world** and you can be a part of it.

Image Credit Top Left: Sierra Space , *Top Right:* Daniel Navarro, *Bottom Right:* Erin Donalson/iStock



Mammals' Success

David Attenborough is apparently not letting up his astonishing pace of wildlife documentary releases, despite being 97. His latest collaboration with the BBC takes on one of the most successful animal groups: Mammals. Never-before-seen behaviors will be revealed from the tiniest shrew to the undisputed largest animal that ever lived, the **blue whale**, while exploring the intelligence, sociability, and incredible adaptability that allowed their rise. Of course, with all nature shows these days, the problems they face, most often down to the most successful mammal of all – us – are also highlighted. The six-part series starts now on BBC UK and BBC America later this year.



Devil Comet Eclipse Photobomb

A heads up, literally, that should you be planning on watching the total solar eclipse on April 8, you may get a devilish intruder photobombing your experience. Comet 12P/Pons-Brooks, known as the "devil comet" because it sprouted "**horns**" last summer, is currently racing towards Earth. If it erupts before totality, when the Sun is completely blocked, it could be visible to the naked eye. Just remember to put your eclipse glasses on to view that spectacular event – no comet is worth your eyes.

WHAT'S UP?



Total Solar Eclipse

Dust off that Bonnie Tyler vinyl on April 8!

Name: Total Solar Eclipse (not of the heart)
Appearance: Kind of cool, kind of apocalyptic. Please don't look at it without special glasses though (seriously, don't)
Location: The US, Canada, and Mexico

Now that song is stuck in everyone's head, what actually is a solar eclipse?
First, we'll make no apologies for that. Second, a solar eclipse is when the Moon passes between the Sun and Earth, briefly blocking our view of the Sun – that's why it can get darker when it happens, even if it's the middle of the day.

Why are people so interested in the next one?
Because it's a total solar eclipse, which is one of the rarest types. On April 8, the Sun, Moon, and Earth will line up exactly, causing the Moon to completely block out the Sun and cast a shadow on Earth. Places within that shadow will be temporarily plunged into near-darkness.

How can I watch it?
To see the total solar eclipse, you'll first need to be within a narrow band of land across North America known as the **path of totality**. And you'll need to move quick; in some places the totality only lasts for about 2 minutes. Make sure you've got special eclipse glasses too.

Do I really need to wear those silly glasses?
Unless you fancy permanently damaging your eyes, yes.

Is there another one soon if I miss it?
We're sorry to be the ones to break it to you, but unless you're willing to travel, you're going to be waiting a while. Total solar eclipses happen roughly every 18 months, but the next one visible from the US won't be until 2044.

Is it true that they're a bad omen?
The Ancient Greeks thought it meant a god was angry, but thankfully the world probably won't end on a random day in spring. However, the switch from day to what seems like night can make birds fall silent and **animals act weirdly**, which definitely gives a vibe of impending doom.

Image Credit Top Left: BBC Studios/Jo Haley, ***Bottom Left:*** Comet Chasers Education and Outreach Project, ***Right:*** Robert Michaud/iStock

DO ANIMALS HAVE FRIENDS?

Two great whites travel thousands of miles through the ocean together. Are they friends, or is it just a coincidence?

By Rachael Funnell

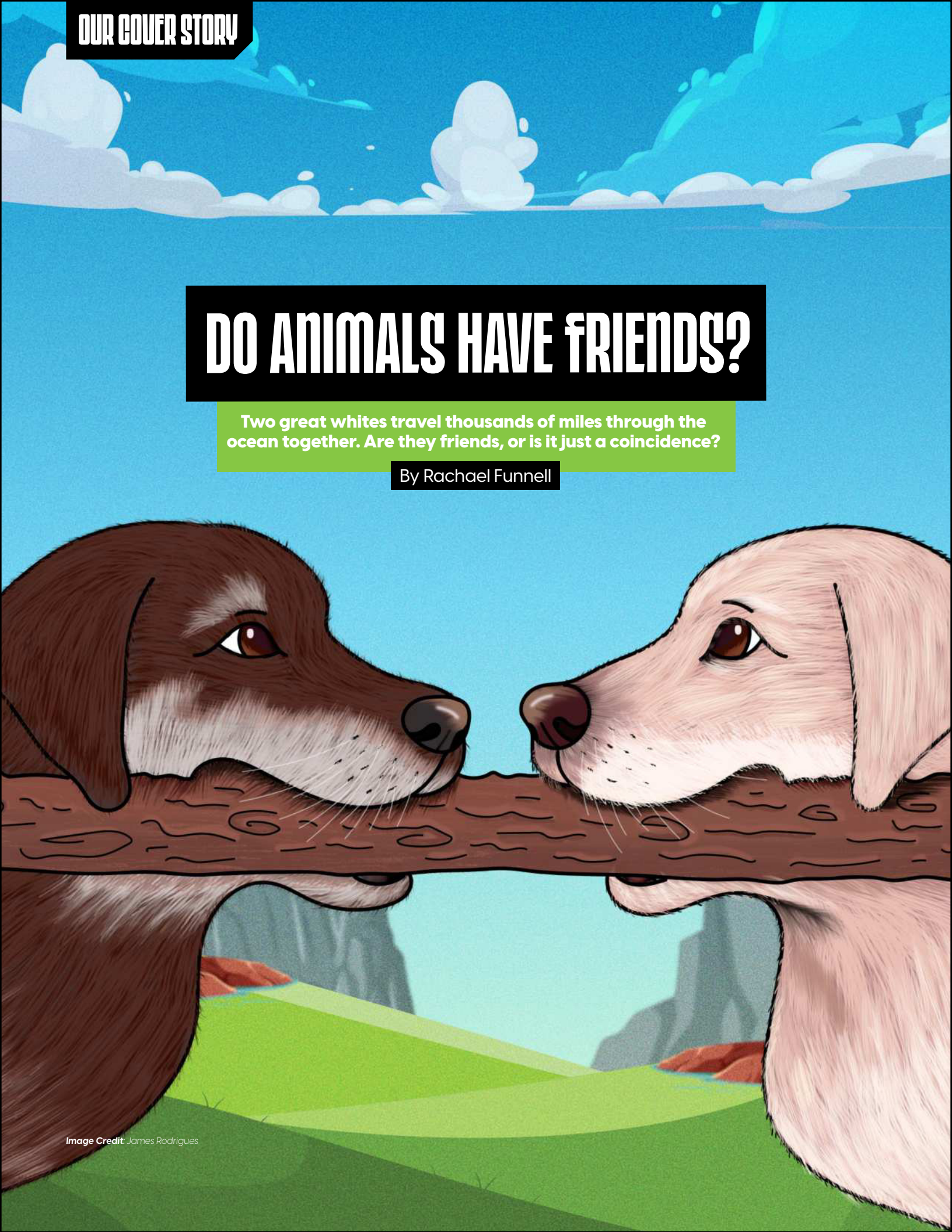


Image Credit: *James Rodrigues*

The Fox And The Hound. Finding Nemo. Babe. There are all kinds of movies about friendships between animals, even sometimes between animals and humans, but are friendships something that really exists out in nature?

In the case of cinema, we say let the anthropomorphism roll. After all, nobody wants a version of *Finding Nemo* where a bereft Marlin eats his last, damaged egg before the redemption arc can begin. As for the science, however? We need to remind ourselves not to view animal interactions through the lens of our own behavior – but are there some examples that can't be explained by the drive to hunt and mate? Do some animals really have friends?

Man's best friend

Ask anyone with a dog if animals have friends and the answer will likely be an enthusiastic, tail-wagging "Yes!" So, we didn't bother doing that. Ask **Jules Howard**, zoology correspondent and author of *Wonderdog*, however, and you get a slightly more balanced answer.

> **"I MIGHT SMILE AND SHAKE HANDS, [MY DOG] SNIFFS BUTTS AND WAGS HIS TAIL, BUT THE BASIC PRINCIPLES ARE THE SAME."**

"What is a friend? I don't think, zoologically, we have an agreement on what this means," he told IFLScience. "A friend is, to me, an 'other' who I like to be around and to share experiences with and with whom I have some sort of shared history. On an evolutionary level, friends do me a favour – ancestrally, it pays to have friends."

"Dogs definitely have this," he adds. "Free-roaming dogs have a good working understanding of other dogs that share their social space and actively choose (or avoid) dogs that may positively or negatively affect their daily lives. The same is true for the dogs we take to the local park or walk around our neighbourhood. My dog responds to dogs he knows and likes just like I do when I see friends: with excitement and affection."

"I might smile and shake hands, he sniffs butts and wags his tail, but the basic principles are the same," Howard notes. "Dogs are, like us, wired for social living, so yes – friendships are, for many (but not all) dogs, an important part of life."

We can be thankful that sniffing butts isn't a greeting our four-legged friends adopted from *Homo sapiens*, but there's no getting away from the fact that our domestication of canines has transformed them in many ways. Somewhere between turning a wolf into a pug, we may have tinkered with their behaviors, too, so what about friendships among the more wild animal life?

Lone wolves

The concept of lone wolves is one that should be isolated to college dorms, banded about by the kind of guy who's decided a headband is about to become his whole personality. In real life, we know that wolves move in packs – and despite the haunting howl having become synonymous with loneliness, research has found it's more often to do with when a wolf is missing its buddy.

The **research** sampled saliva from wolves after certain members were removed from the pack to look for signs of stress in the form of cortisol. The samples revealed that while all separation events – regardless of whether the missing party was socially dominant or not – elicited a stress response, this didn't correlate with the amount of howling. What seemed to get the wolves howling the most was when the wolf that had gone missing was a close social connection.

As Howard said, it seems friendships could be, for many, but not all wolves, an important part of terrestrial life. So, what if we look further afield? Or, as it were, deeper down.

Big sharks, old chums

There's a lot to be surprised about when it comes to sharks. They're **older than trees**, lived on the Earth before Saturn had rings, and can even have belly buttons, but perhaps, one of my favorite facts, is that they might even **have friends**. That was the suggestion of a 2023 paper that starred Simon and Jekyll, two great white sharks.

Data tags revealed the pair made a staggering journey together, swimming roughly 6,437 kilometers (4,000 miles) up the Atlantic coast side by side. Such a trip was considered a first for the species, *Carcharodon carcharias*, and a "potentially groundbreaking" discovery according to Dr Bob Hueter, chief scientist at marine research organization OCEARCH.

The exact relationship between Simon and Jekyll isn't clear-cut. As two male juveniles, it's possible they're brothers. Given the number of **same-sex relationships we see out in nature**, they could even be lovers. Or perhaps these predatory fish had formed a special kind of friendship. It's hard to know for certain, with nothing to go on other than a shared route of migration, but it gives you pause for thought.

> **"[BELUGAS] REALLY COULD BE CONSIDERED THE SOCIAL BUTTERFLIES OF THE WHALE WORLD."**

What would be the point and purpose of such a friend? For belugas, there are many.

Whale hello there

Described as the "canaries of the sea", it's well established that belugas form lasting relationships with fellow whales that aren't related to them. They even get chummy with other whales, particularly narwhals, whom they've been seen blending pods and even **having babies with**.

"They really could be considered the social butterflies of the whale world," marine mammal scientist **Valeria Vergara** told IFLScience. "**Studies** have shown that their communities have similarities to human societies (with important social networks, cooperation, and interactions with both kin and non-kin). In fact, they have lifespans comparable to those of humans, so these friendships can last a very long time!"

THE FACT IS THAT FRIENDSHIP, ACROSS A WIDE RANGE OF SPECIES, HAS BENEFITS THAT GO BEYOND SOCIAL STIMULATION... FRIENDS CAN BE LITERAL LIFESAVERS.

In the same way that human friendships can be multifunctional, cross-generational, and independent of sex, these ocean-dwelling mammals may also benefit from the rich tapestry of a varied social life. With pod sizes ranging from around 10 to 25 members to mega-pods upwards of 1,000, there's a lot going on and a lot to say about it, and as a result, they've evolved quite the repertoire of communications.

"Belugas are one of the most loquacious whale species," continued Vergara. "Contrary to popular belief, they don't actually sing in the way humpback whales sing ... but they 'talk' through a huge variety of sounds like whistles and chirps and moans and creeks."

"We really know very little about what all these hundreds of sounds mean."

A more recent discovery by Vergara and her research assistant may lend further weight to the beluga buddy concept, as it revealed that these animals may have identity calls similar to bottlenose dolphin signature whistles. Though the evidence is preliminary and awaiting corroboration, Vergara posits the calls could "help belugas keep track of one another acoustically, a little bit like human names."

A little help from my friends

So, if all this friendship business requires a complex social understanding, suite of vocalizations, and ways of communicating that – if done wrong – could see a friend turned foe, why bother? Could it not be easier just to go it alone and leave all the handshaking, butt-sniffing, and – if you're a Guinea baboon – genital-fondling to everyone else?

The fact is that friendship, across a wide range of species, has benefits that go beyond social stimulation. As animal behavior specialists Beki Hooper, Delphine De Moor, and Erin Siracusa of the University of Exter wrote for **The Conversation**, friends can be literal lifesavers.

"Friendship evolved because it helps us, whether we are human or not," they wrote. "Animals (including humans) who have allies live longer and healthier lives by helping their companions deal with challenges. Comrades can offer support in times of conflict and provide protection against threats like predators and food shortage."

From altruistic wolves feeding aging pack members, to territorial red squirrels going out of their own way to befriend neighbors, making friends could be considered a convergently evolved trait we see across the animal kingdom. We humans may have evolved away from needing friends to ensure food and shelter, but the benefits of a buddy are quite literally, all around us. •



Image Credit: James Rodrigues

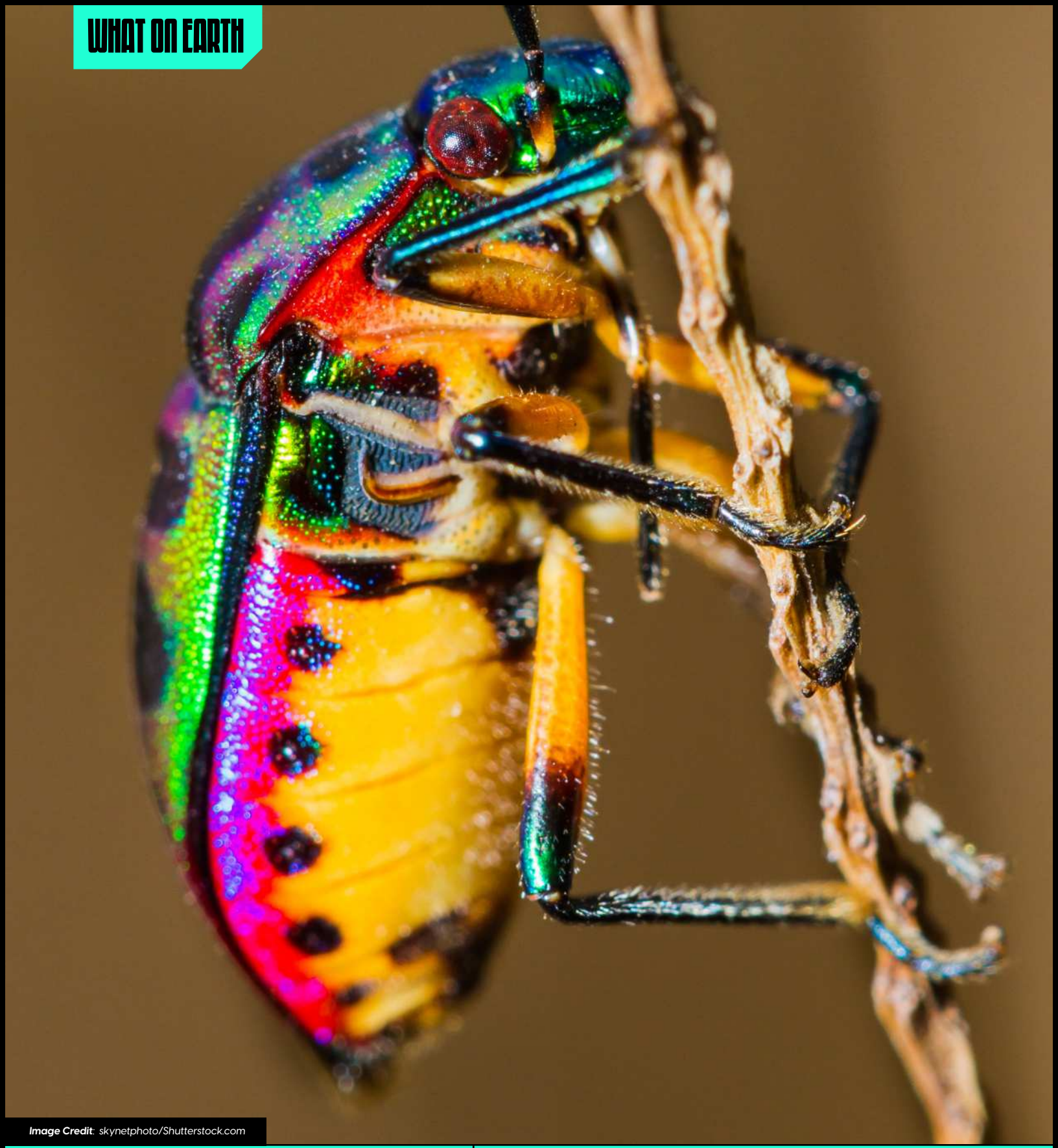


Image Credit: skynetphoto/Shutterstock.com

BEJEWELED BUGS

It's not difficult to work out where the nickname "jewel bug" takes its inspiration from. Also known as Scutelleridae, the family is made up of true bugs that use hypodermic needle-like mouthparts to suck up plant juices. Some species are a little drab in appearance, but others get their remarkable iridescence not from pigments, but nanostructures on their surface that alter **how light is reflected.** Beautiful though they are, don't be fooled – as a close relative of stink bugs, they can kick up a mighty plume of unpleasantness if you get on their nerves.

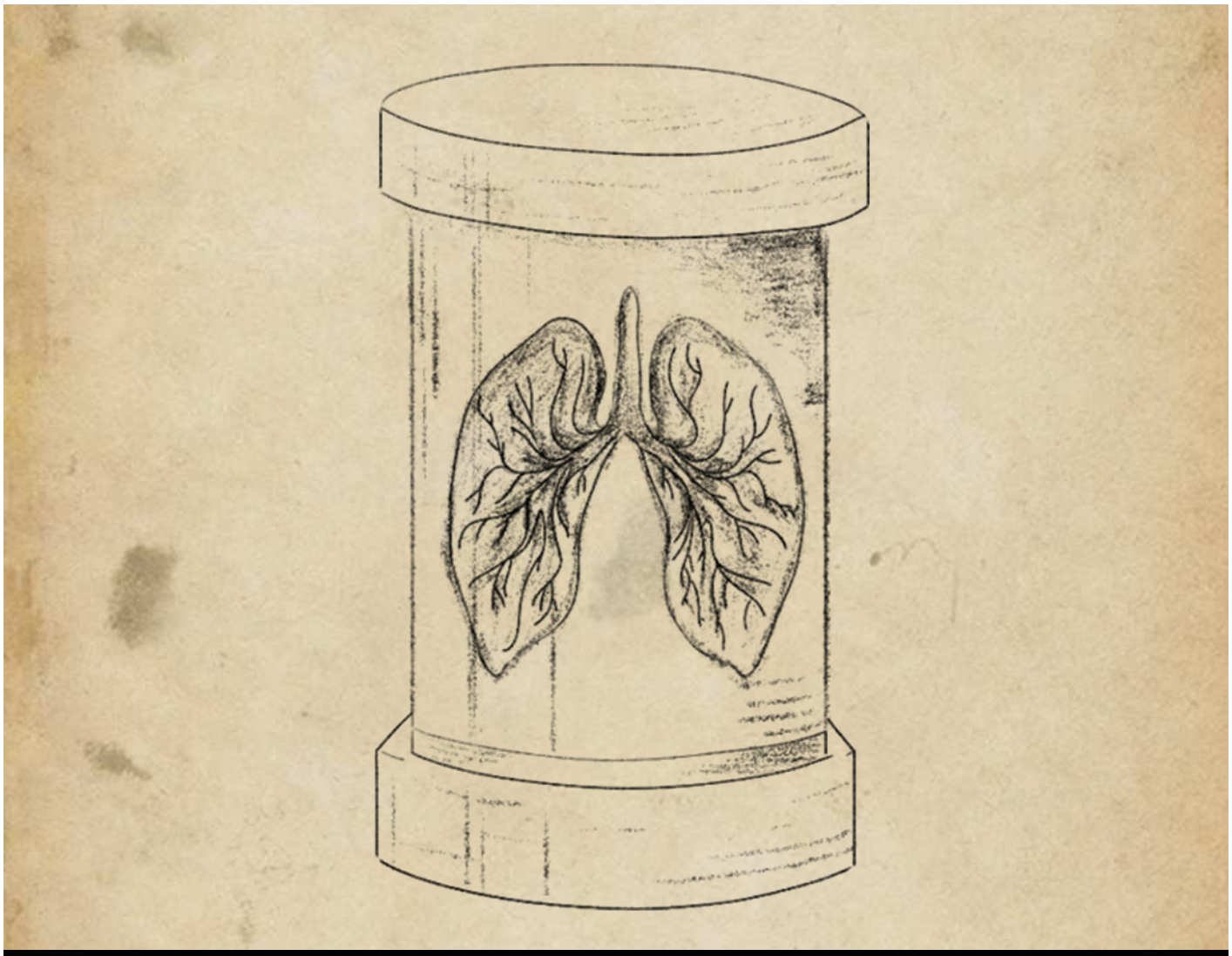


Image Credit: *James Rodrigues*

WHAT'S IT LIKE WORKING IN A HUMAN TISSUE BANK?

AND WHY DO WE NEED THEM, ANYWAY?

Q&A

By Rachael Funnell

Sometimes surgeons need to remove parts of our bodies to make them healthy, but where do those sections of human go? Sometimes they're simply destroyed, but other times – with the patient's consent – they are handed over to scientists to see what we can learn from diseased tissues.

Those scientists work in what we call tissue banks, or biobanks, and they are a curious place indeed. As a technician, you never quite know what is going to arrive in a bucket at the door – but when it does, it must be treated as rare and valuable, because it is.

Removing a tumor that doctors hardly ever get to see could be the pivotal moment that leads to a novel therapy, or even a cure, and we have the donors of these tissues to thank for the opportunity. It's a rich, varied, and unusual place to work, which is why we spoke to IFLScience's custom content manager **Dr Beccy Corkill**, who used to work in a biobank, about what it's really like.

What is a tissue bank?

BC: It's a facility where you can store human tissue. Some are collected from cadavers, and others are removed through surgery. I worked in the Liverpool tissue bank in 2014, so it has changed slightly since then, but at that point, we collected samples from surgeries.

Why do we need them?

BC: There are many reasons, but at our facility, it was mainly research. Things like genomic, proteomic research, imaging data, and histology. It can also be an educational tool for biomedical students who need something to practice on.

What sort of things were you collecting?

BC: Liverpool Hospital was connected to our tissue bank, and it's well known for breast cancer treatment, so ours was mainly cancer; people who went to get a mastectomy, or tumors taken out. We also got blood samples, colorectal samples, and – very rarely – we got things like whole shoulders, or a foot.

How did they arrive?

BC: We got them very fresh. So, there would be a knock on the door, and there'd be someone standing there in scrubs who had just been in surgery. They had these very distinctive white buckets the samples would go in. We then had to go over to the hospital, which was literally over a bridge, and get the doctors to get the bit of cancer tissue out, and that's what we ended up using.

THERE WAS ALSO THE TIME I ALMOST CUT MY FINGER OFF WITH A DIAMOND-SHARPENED BLADE AND SPLATTERED BLOOD EVERYWHERE...

What was your role, specifically?

BC: I had a few roles: I was classed as a laboratory technician, so my day-to-day was receiving those samples and getting them processed. We would use liquid nitrogen to deep freeze them quickly, otherwise the cells can be destroyed. There was also a lot of paperwork, making sure we had all the consent forms. For the bloods, we used to spin it down and get the plasma, and those went in the freezer too.

What qualifications does someone need to work in a tissue bank?

BC: I had a master's degree, but I also knew a lot of people who were just enthusiastic about science and had a lot of experience. So, I think it depends on how you approach it. As long as you are enthusiastic, and you have a strong stomach, I think that's the main thing.

What would you say to someone considering it?

BC: It's very interesting work. You're going to be helping researchers potentially develop something even greater, that could help the future of humanity. Don't apply if you're squeamish, and also be respectful of any organ donations because you don't want any sample to be wasted because they are so precious, like a gift.

Any particularly memorable moments?

BC: There was one time when someone's shoulder came in, and the surgeon arrived and he was very excited. I know that might sound wrong, but it was a very, very rare situation, and it was really good to have a surgeon actually visit and be like, "Okay, this is a very precious sample, we want to tell you exactly how to do it."

There was also the time I almost cut my finger off with a diamond-sharpened blade and splattered blood everywhere... •

NEW PODCAST Coming Soon! May 2024 IFLScience is launching the We Have Questions podcast. Catch the full conversations and more, coming soon on all good podcast platforms.

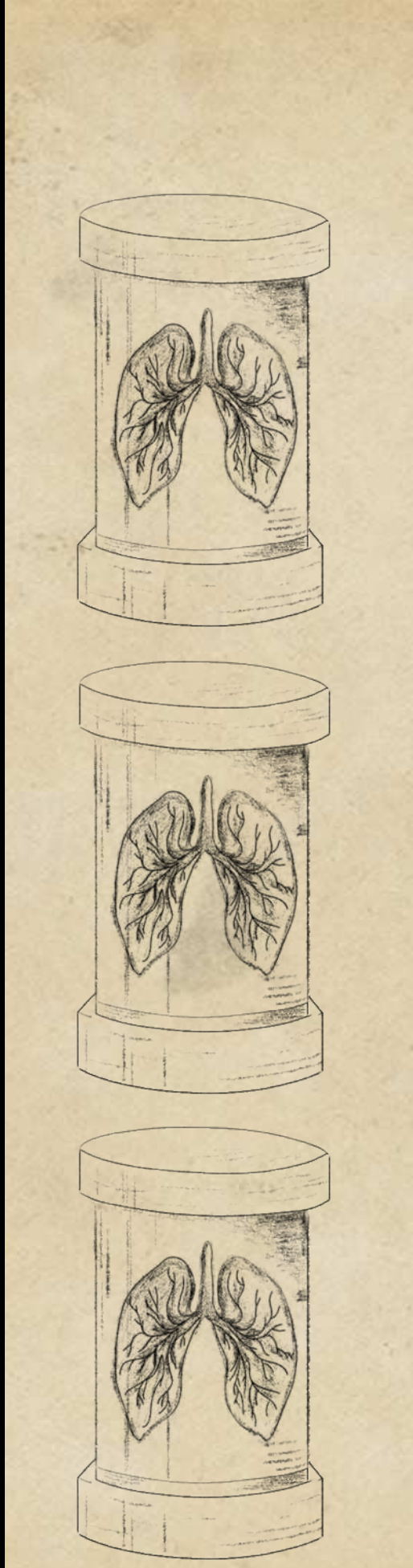


Image Credit: James Rodrigues

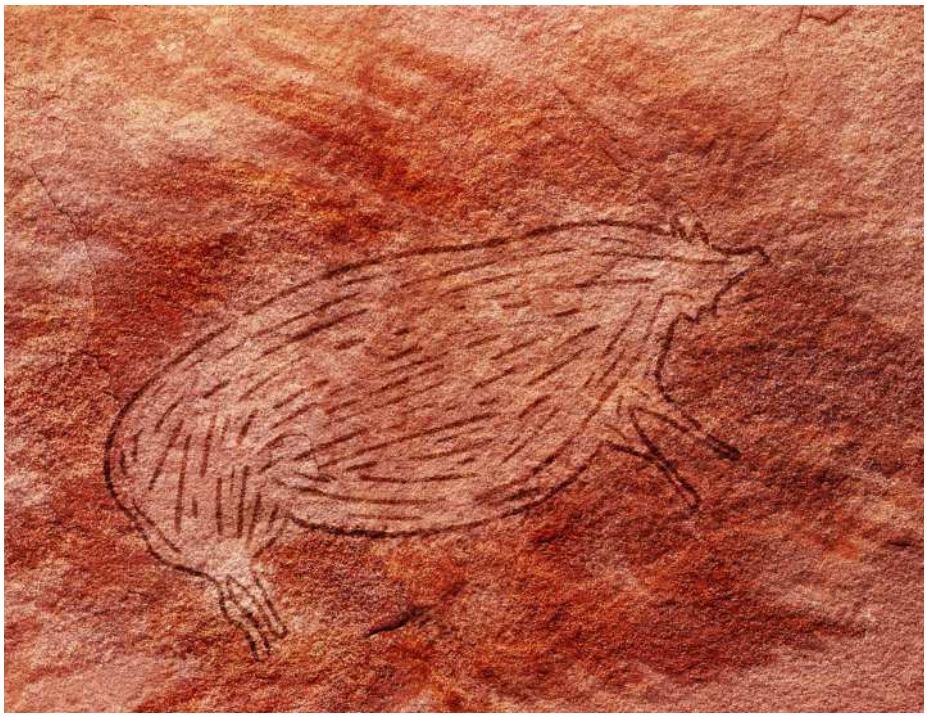
SCIENCE FACT OR FICTION:

WHAT WAS THE FIRST WORK OF "ART"?

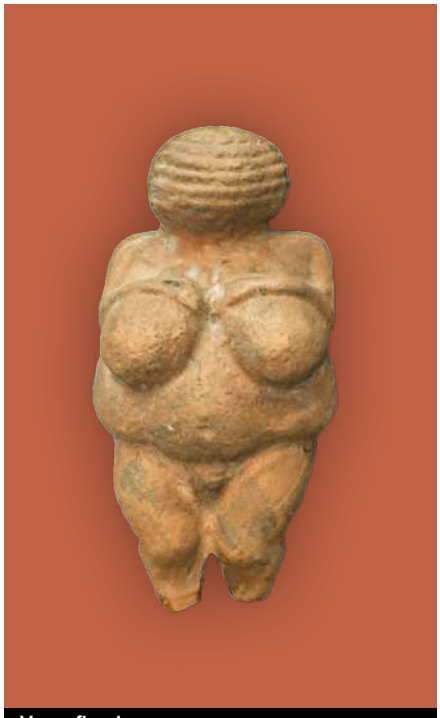
From abstract carvings to potential self-portraits, Tom Hale explores the origins and evolution of ancient "art".



Image Credit: James Rodrigues, peekeedee/iStock



Along with science and taxes, art is one of the few things that separates us from the rest of the animal kingdom. You might be able to teach an elephant to wield a paintbrush with its trunk, but you're not going to find a Da Vinci Dumbo creating masterpieces in the bush just for the love of creating.



Venus figurine

Homo sapiens and other hominins, as far as we know, are the only animals that spontaneously create art. We can trace the development of this creativity back hundreds of thousands of years. However, pinpointing the origins of "art" is no easy feat – not least because the definitions are so hazy. Can a bone with an "X" carved on it be called art? What about a scribbled zigzag on a cave wall? Is that any different from graffiti on a city wall? Can *that* be considered art?

To avoid getting bogged down in semantics and fiddly questions about "**what is art?**", we can agree that "it" didn't evolve one night with a sudden eureka moment. It evolved at a snail's pace, slowly and perhaps unknowingly.

Whatever we label it – "art", "visual culture", or whatever else – it's changed radically over the millennia, yet a common thread runs the whole way through. As Picasso supposedly said after he saw the famous French cave paintings in 1940: "Since Lascaux, we have invented nothing."

Abstract art: The hot new trend of the Middle Paleolithic

Around 500,000 BCE, something close to resembling "art" started to mutate into existence – but *Homo sapiens* weren't the artists.

The oldest engravings made by humans **can be found** on a shell discovered along a river bank in Java, Indonesia, dating somewhere between 540,000 and 430,000 years old. This was at least 200,000 years before *Homo sapiens* evolved, indicating it was fashioned by our human relative *Homo erectus*.

The carvings consist of little more than a zigzag pattern etched onto a freshwater shell. Nevertheless, archaeologists suggest that these were intentional incisions, designed to decorate the shells *H. erectus* was using as tools.

To find the next steps in visual culture, we have to zip forward a few hundred thousand years to see some of the earliest-known "drawings" by a human: a 73,000-year-old shard of stone **discovered** in South Africa's Blombos Cave that was scrawled on using an ocher crayon.

The drawing is purely abstract and features six straight sub-parallel lines crossed diagonally by three slightly curved lines. Commenting on the ambiguity of the work, the researchers **said** they were hesitant to call it "art", but they believe it was almost undoubtedly an abstract design that was intentionally created.

All of the oldest examples of "art", whatever that may be, were non-figurative. In other words, they were examples of visual culture that did not attempt to represent or depict objects, figures, or recognizable scenes from physical reality. Instead of depicting a reindeer or people, early visual culture was limited to abstract shapes and vaguely organized patterns – and it remained this way for a very long time.

"We have a very long period of nonfigurative art. We don't know how far back it goes, but it certainly goes back beyond 100,000 years ago," **Professor Paul Pettitt**, an archaeologist at the University of Durham who specializes in Paleolithic art, told IFLScience.

A subtle yet key change in momentum

Image Credit Top: James Rodrigues, peekeedee/iStock, **Bottom:** WHPics/iStock

occurred around 65,000 years ago when Neanderthals living in present-day Spain started to actively adorn their caves. Some of the earlier instances involve caves inhabited by Neanderthals that contained stalagmites that were lavishly coated with red pigment.

There are other examples of cave paintings by Neanderthals in this part of Europe that feature dots and geometric signs, as well as hand stencils and hand prints made by splashing red ocher pigment across the walls.

"Where does [figurative art] come from? Do you wake up one day and say: 'Nobody's ever done this, I'll draw a reindeer!' It's a bit of a weird one. I wonder whether the idea comes from hand stenciling, which is an odd intermediary," remarks Pettitt. "You're not drawing or creating in any way, but you remove it and you do have a human hand."

Hand stencils were an avant-garde trend among Neanderthals. The individual would place their palm against the cave wall and spray it with pigment, leaving behind the outline of a shape, as if to say: "I was here." It could be argued that these humble hand stencils served as a crucial transition from abstract visual culture to figurative art of animals, humans, and other beasts.

"Conceptually, it might give you the idea for maybe other things," Pettitt speculates.

A fat pig: The next big thing in the Paleolithic art world

The dawn of figurative art is when things start to become very interesting and less hazy. As it stands today, the earliest known example of figurative art is a 45,500-year-old ocher **painting of a pig**, doodled by *Homo sapiens* among the limestone karsts of Maros-Pangkep on the Indonesian island of Sulawesi.

It was uncovered in 2017 by Indonesian PhD student Basran Burhan. Blown away by the discovery, he quickly sent a WhatsApp message to his supervisor at Griffiths University in Australia, **Adam Brumm**.

"It just blew me away. It is rare to find such a large, masterfully painted, and wonderfully complete portrayal of an animal in the local rock art, so this one was very special," Brumm, a professor of archaeology specializing in Southeast Asia, told IFLScience.

Instead of abstract shapes with little apparent relation to the real world, the creators of the art were trying to depict the visual forms of physical reality. As far as we know, the fat-bellied pig in Sulawesi is the oldest evidence of that being achieved – which is a very big deal.

"These foragers were hunting wild pigs, which were no doubt an important part of their diet, but they were also portraying them in their art in a way that suggests these animals were more than just food to them," Brumm explained.

Around 38,000 years ago, we started to see an explosion of this kind of figurative art across Eurasia and beyond. The forces behind



this seemingly sudden artistic revolution are not clear, but it might be a reflection of our societies becoming more complex and a deeper need to build social connections, forged by a shared visual culture.

"We're starting to live in larger groups. There's a greater need to preserve and communicate more information, and a greater need for us to be cohesive with groups that we may see only once or twice a year at aggregation sites. There simply could be more of a need for vehicles to express that we're all the same kind of people," ponders Pettitt.

It's about the journey, not the destination

Just like the pig of Sulawesi, most figurative art of the Upper Paleolithic (50,000 to 12,000 years ago) still carries this obsession with animals. The 17,000-year-old prehistoric paintings found at Lascaux in France, undoubtedly the most famous cave art site in the world, feature around **6,000 representations of animals**. The vast majority are horses followed by equal numbers of stags and aurochs, and then ibexes and bison.

Humans are occasionally depicted at Lascaux, but scarcely so. Likewise, there's very little appearance of predators, like cave lions, wolves, or bears. This distribution of animal depictions is similar to those found in caves elsewhere in Eurasia; large herbivores were the subject of choice.

These kinds of animals were generally what the hunter-gatherers would have been eating and living alongside. However, it seems unlikely that they were simply illustrating their favorite food or the local wildlife. Instead, many archaeologists believe they were trying to deeply engage with these animals on a spiritual level, as if calling to them on an unworldly plane and wishing for their return.

"Evocation of these animals in little dynamic scenes was a critical part of what I think is very clearly some kind of ritual behavior," Pettitt explains.

This ritual might have taken the form of a dramatic display, a bit like prehistoric performance art. Perhaps a shaman-like figure would scrawl images on the fire-lit wall while the rest of the group sang, danced, and dined out on the product of the day's hunt. Amid the merriment, they built social bonds and expressed the significance of the animals they needed to live.

In other scenarios, the ritual may have been very personal. It's been suggested that one example of this is the portable objects that humans carved from bone or rock during the Upper Paleolithic.

Some of the most beautiful examples of these relics are the "Venus figurines". Dating to 30,000 to 20,000 BCE, they appear to depict curvaceous female figures with small heads, wider hips, big breasts, and tiny feet. Traditional interpretations typically said their voluptuous bodies were symbols of fertility, sexuality, or beauty, hence being nicknamed after the Roman goddess Venus.

However, others **have argued** these statues were, in fact, self-portraits by women created from the point-of-view of someone looking downwards at their own body.

"Sometimes, it's very private, it's very individual, and you get the sense that actually, it's the act of creating an image – whether or not you or anybody else can see it – that's important," Pettitt says.

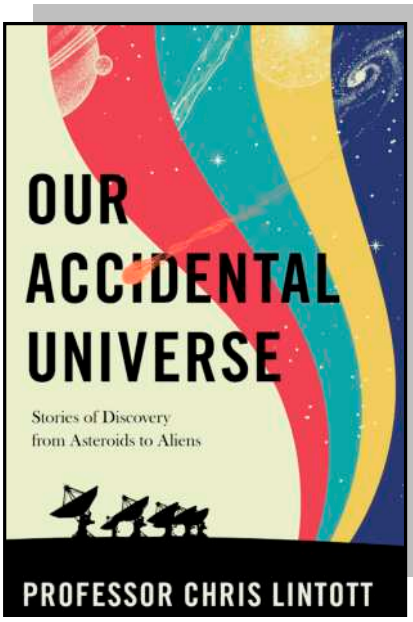
This idea may seem very alien to today's idea of art. In the 21st century, we tend to see visual art as an object that sits in a white-walled gallery in front of gawking crowds. Hopefully, it will rise in monetary value too, affirming that it is indeed "art".

Prehistoric people had no such concern. There were certainly no queues of caveman punters lined up outside the Lascaux Caves, hoping to catch a sight of the latest antelope portrait after reading about it in the local stone tablet. For the artists of the Upper Paleolithic, the act of creating the image was the primary concern, not so much the image itself.

In a world where every artwork must be quantified by price tags and social media engagement, it feels like a good time to remember the philosophy of the prehistoric artist: joy and beauty are often found in the process, not just the outcome.



Image Credit: James Rodrigues, peekeedee/iStock



COSMIC COINCIDENCES

In this excerpt from *Our Accidental Universe*, Professor Chris Lintott details some of the chance occurrences that have shaped the universe as we know it.

A little more than 5 billion years ago, one of the hundred billion or so stars in our Milky Way galaxy exploded. The immediate result for this massive star was spectacular, producing a supernova, an explosion that briefly outshone the rest of the galaxy, but despite its dramatic show, the event was not particularly remarkable. A middle-aged galaxy like our Milky Way, an average-sized system engaged in the business of turning gas and dust every so often into stars, perhaps hosts one such supernova once a century. Like most, this particular supernova will have left behind a dense remnant, either a black hole or else an exotic, dense object called a neutron star. It will also have scattered material throughout its neighbourhood, mostly gas newly enriched in heavier elements by the nuclear reactions which take place amongst the debris. It is these reactions, rather than the initial explosion, which produced the light by which the supernova would have shone so brightly so briefly. The shock of the star's sudden end will have borne this material outwards, sweeping up and carrying away any surrounding gas to create a void, a bubble 150 light-years – a million billion kilometres – across.

At the edge of the bubble gas was compressed, and the resulting disruption began a process of collapse that, in the course of a few tens of millions of years, produced a new generation of stars. Amongst those new stars was one unremarkable yellow dwarf, and 5 billion years later this star is the Sun that warms the Earth each morning. As it rises sedately and surely each day in the east, as it has done for billions of years, long before any creature existed to gaze up and wonder about its origins, it has come to symbolize for many of our planet's cultures the stability and timelessness of the cosmos. Yet we now know that it owes its existence to the cosmic coincidence of a supernova in just the right place and at just the right time, without which you and I would not be here to contemplate that dawn.

A similar story of chance could be told of the careening of asteroids in the disc of rubble that surrounded the newly formed Sun and within which Earth formed, or the collision of a proto-planet the size of Mars with the newly formed Earth, a cataclysm which produced the Moon, whose gravitational pull causes the tides which washed our distant fishy ancestors on to unfamiliar shores. A little later, an asteroid coincidentally happened, unfortunately for the dinosaurs, to be in the same place at the very same time as the Earth, so greatly improving the chances of the small furry mammals that survived the impact and went on to evolve, before developing astronomy, gin, and the other trappings of civilization a little while later.

When we look up at the night sky, where once we might have imagined stars divinely arranged in their unchanging patterns, moving in perfect order, science tells us we should see only an accidental Universe, arranged by chance. Trying to understand this feels less like an exercise in cerebral theoretical physics and more like reading history. There is no equation scribbled on a blackboard that can tell you why the Milky Way, Sun or Earth are precisely the way they are, or why this planet has produced a species capable of trying to tell their stories in the first place. We exist as the result of a chain of countless accidents, just as my happening to be sitting at this desk on a January day in Oxford is the result of historical happenstance on scales large and small.

Image Credit: Penguin

Q&A AUTHOR



PROFESSOR CHRIS LINTOTT

AUTHOR OF *OUR ACCIDENTAL UNIVERSE*

Professor Chris Lintott talks to us about the unexpectedly messy nature of astronomy, including the bizarre accidents that have molded the cosmos and the people who discovered them.

What inspired you to write this book?

When I was a kid obsessed with watching the sky, a comet hit Jupiter. Nothing like it had happened since the invention of the telescope, and no one knew what to expect – but even in my small back garden telescope, I could see the bruises it left in the giant planet's atmosphere. That started a lifetime of obsession with being surprised by the cosmos.

The most exciting and memorable times in my life as an astronomer have been when the unexpected happens – when a new object is found, a new telescope switches on its cameras for the first time, or a new discovery is made. At that point, we all go into overdrive, throwing ideas around and speculating about what might be going on and how it might change our view of the cosmos. Astronomy is a pretty small world, so gossip and speculation play a large part too. It's a world of surprise and confusion, and I came to realise that it's a very long way from how many people imagine science happens.

There's what a colleague of mine, Bill Keel, calls the Hollywood version of science, where we all sit around at a big conference table until someone says "My God, I've got it!" and then we all applaud their cleverness or leap into action as appropriate. I wanted to tell stories of how we've really found out about the universe, in all their messiness.

Of the many accidental discoveries you talk about, is there one that is closest to your heart?

I've spent most of my career thinking about galaxies, so the story of the Hubble Deep Field is precious. It seems like an obvious idea – to point the most powerful telescope ever built at a patch of sky to make the deepest-ever image – but it was hugely controversial at the time. Many senior astronomers thought such an observation would discover nothing at all, but the first Deep Field revealed tens of thousands of galaxies, caught in a snapshot of the early universe, and now it's a standard part of what new telescopes like JWST do.

From flying through the plumes of Enceladus to discovering pulsars, fortune seems to favor the bold. Are there characteristics that are shared among all these "accidental" discoverers?

The people in the book share two things, which are a willingness to be surprised and a persistence to solve a mystery when chance does come knocking. I think often of Penzias and Wilson, who discovered the cosmic microwave background – the oldest light in the universe – while looking for the source of interference getting in the way of radio communications. It would have been so easy for them to ignore that last, faint hiss – but it brought them unexpected glory. I think it's a good lesson for life, to pay attention to surprises.

How will citizen scientists continue to contribute to these efforts?

We've spent a lot of time wiring up the system handling data from the new Vera Rubin Observatory so that everyone can help us sort through the data. The observatory's telescope is as big as the biggest in the world, but will survey the sky every three nights, producing 30TB of data and about 10 million alerts of things that have moved or changed as it goes. To be surprised on this scale needs a lot of machine learning, but I argue in the last chapter that it will also need a distributed crowd of volunteers online, looking for really unusual things. Who knows, this might be how we find aliens, evidence of string theory – or just some really cool galaxies.

If you were to stumble on an accidental discovery, what would you like it to be?

Wishing for talkative aliens bearing the answers to our cosmological questions is a little obvious, so I'll settle for a new interstellar object passing through the Solar System. The first such object, 'Oumuamua, was fascinating and another would have a great story to tell us about its origins far, far away. ●

Our Accidental Universe is published by Torva and is available now.

Image Credit: Penguin



Arizona is home to the largest concentration of petrified wood found anywhere on the planet. The region's unique geological history is to thank for the bumper crops of fossils, but they're not the only ancient treasures to be found here.

Image credit: *Petrified Forest NPS via* **Flickr**, **Public Domain**

200-MILLION-YEAR-OLD TREES MAKE UP ARIZONA'S PETRIFIED FOREST

Home to trees that date back over 200 million years, the Petrified Forest National Park in the middle of a desert in Arizona is a window to the past where the fossilized remains of hundreds of species have been discovered.

Petrified wood is a type of fossilized wood, alongside mummified wood and submerged forests. In petrified wood, the organic materials get gradually replaced by minerals, or minerals settle in between the existing cell walls of the wood. The former is known as replacement, while the latter is called permineralization.

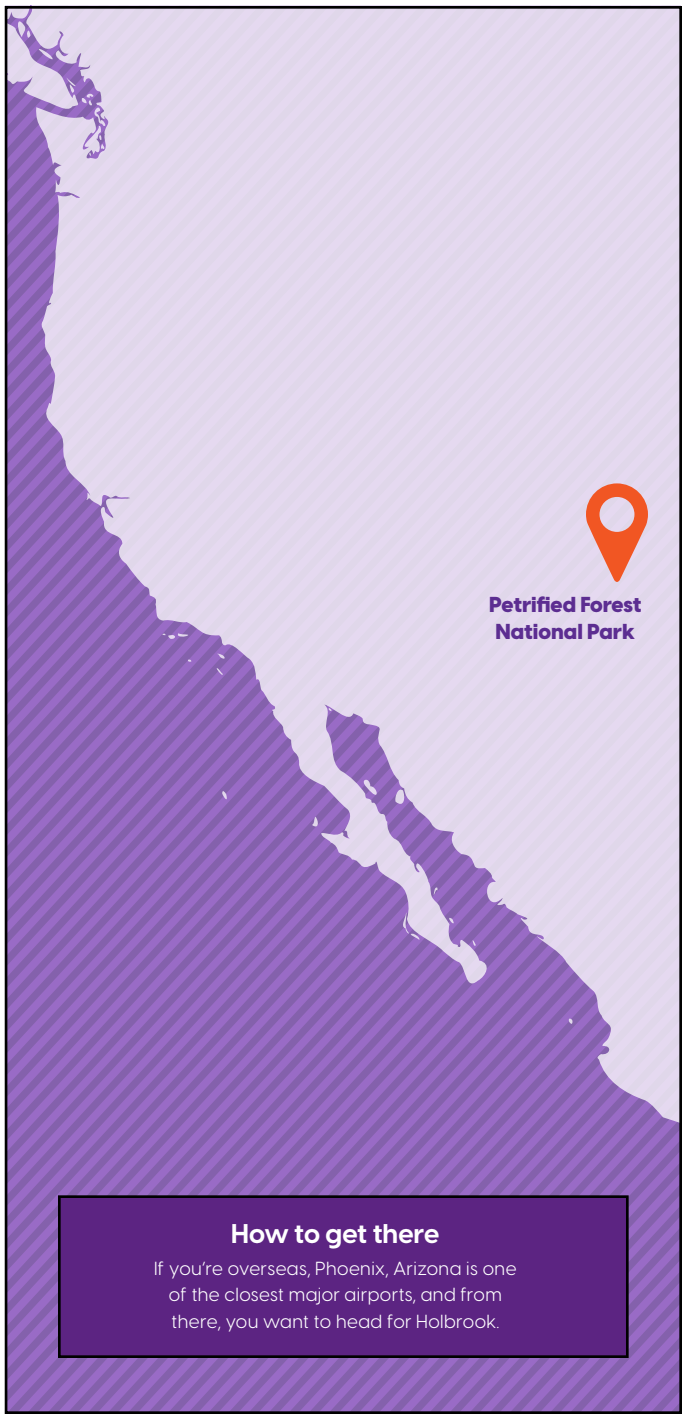
Anything from calcite to pyrite, silica, and even opal can move in – but it takes some pretty specific conditions for the tree to survive long enough for this to happen. Typically, you're looking at a few thousand to a few million years, and a tree can only survive that long if it's protected from the elements and organisms that would break it down.

The most common way organic remains are protected from the **decomposition ecosystem** is by getting buried very soon after death by some kind of sediment, be that mud or volcanic ash. As these layers build up, they compress and lithify, which means they turn to rock. That's why we find fossils of dead animals smushed between layers in cliff faces.

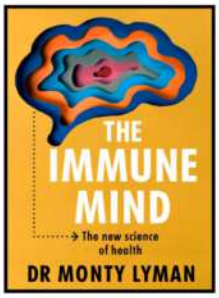
The petrified logs in the national park in Arizona once sat in sediments known as the Chinle Formation. Around 60 million years ago, they started to get pushed upward by tectonic forces. This exposed the sediment layers to erosion, and over time more and more fossils have been revealed by wind and water.

As well as petrified wood, fossils of other plant and animal life have been found in the park, including Late Triassic ferns, phytosaurs, huge amphibians, and early dinosaurs. The rich variety and abundance of fossils here has meant that thieving has become a big problem, and while pocketing a piece of petrified wood might seem like a small crime, it can significantly harm the science.

Removing a relic from its original location reduces the amount of archaeological information to almost zero, explained ex-Petrified Forest National Park **curator Wendy Bustard**, and once you've picked them up, you can't just pop them back. By all means, visit the national park, but if you see some petrified wood, don't pick it up, or else it's believed you'll have bad luck all year.



THINK



The Immune Mind

Book from Dr Monty Lyman

Could inflammation cause depression and arthritis drugs cure it? Can gut microbes shape your behavior? Can something as simple as brushing your teeth properly reduce your risk of dementia? In *The Immune Mind*, Dr Monty Lyman explores the fascinating connection between the mind, immune system, and microbiome. We'll be learning all about the emerging field of immunopsychiatry at CURIOUS Live this May. Keep your eyes peeled for further details in future issues of CURIOUS.

Available **April 4**.

PLAY



Grounded

Game from Obsidian Games

Honey, I Shrunk The Gamers. Experience what it's like to be the size of an ant in this previously Xbox-only survival adventure game now available on other platforms. The world becomes a beautiful but dangerous place when size is no longer on your side, and you'll face down all kinds of creepy crawlies in your quest to survive. Play alone or with friends as you battle the perils of the backyard, building a base to protect yourself against your new giant, wild neighbors who may come knocking the more you disturb the ecosystem.

Released to Playstation 4, 5, and Nintendo Switch on **April 16**.

WATCH



Swede Caroline

Film from Belstone Pictures and Picnik Entertainment

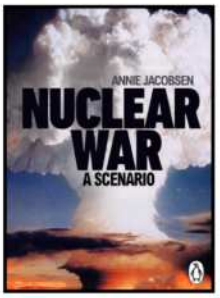
Dig into the scandalous world of competitive vegetable growing in this British mockumentary. In pursuit of her stolen marrow plants, Caroline (played by Jo Hartley) hires two private detectives, only for them to be kidnapped. Believing the two events are connected, Caroline embarks on a mission to track down her missing marrows. The scandalous tale of conspiracy, corruption, and courgettes is a fitting tribute to the world of competitive vegetable growing that's long been a big part – figuratively and literally – of horticulture.

In cinemas **April 19**.

SCIENCE IN MEDIA



LEARN



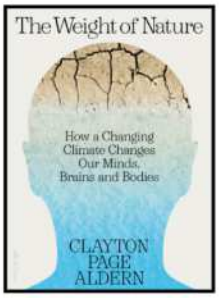
Nuclear War: A Scenario

Book by Annie Jacobsen

There is only one scenario other than an asteroid strike that could end the world as we know it in a matter of hours: nuclear war. And it could start in as little as 26 minutes and 40 seconds from now. In piecing together all that we can legally know about the response to a nuclear attack via extensive interviews, Jacobsen uses what she's learned to piece together the most likely scenario. Hear all about it at CURIOUS Live in May where we'll be speaking to Jacobsen about what might happen if nuclear war began.

Available **now**.

READ



The Weight of Nature

Book by Clayton Page Aldern

The product of seven years of research, Aldern's *The Weight Of Nature: How a Changing Climate Changes Our Minds, Brains and Bodies* details how global warming is altering our biology. After reading a 2015 Pentagon report about the global climate's ability to "aggravate existing problems" like poverty and social tensions, Aldern realized the conflict and crime spikes reported couldn't be pinned to income or food security alone. There was something else going on: a burgeoning public health crisis linked to our climate that few have spoken about, until now.

Available **April 9**.

Image Credit Top Left and Top Right: Torva, Penguin, *Bottom Right:* Allen Lane, Penguin

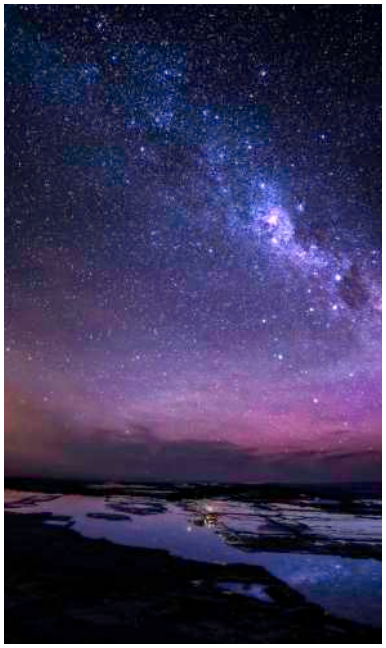
DATES TO REMEMBER

Spring has well and truly sprung, and it's brought with it a treasure trove of dates to put in your diary. Marvel at the night sky with International Dark Sky Week and the Lyrids meteor shower, which reaches its peak toward the end of the month. There's also World Autism Awareness Day, World Health Day, and the chance to put those funny pics of your pets to good use and win a cash prize.

APRIL

2-8 International Dark Sky Week

International Dark Sky Week is a worldwide celebration of the night sky. For some, it might be frightening, but the natural night is critical to the health of our planet – and unfortunately, it's under threat from the harmful effects of light pollution. This April, you're invited to turn off your lights and appreciate the beauty of the night sky. Find out what you can do to embrace the dark and save the night **here**.





2 World Autism Awareness Day

The United Nations' World Autism Awareness Day (WAAD) is recognized annually on April 2, to help increase awareness and acceptance of autism around the globe. Autism is a developmental disability with a spectrum of traits which can result in various social, communication, and behavioral challenges. Because of this, autistic people often face discrimination, which is why WAAD's work to make the world a more inclusive place for autistic and other **neurodiverse** people is so important.



14 Comedy Pet Photo and Video Awards

The deadline for the Comedy Pet Photo and Video Awards is fast approaching, so get your best (silliest) pics and vids in pronto. If you fancy sharing the comic capers of your beloved pet and winning a top prize of £500 ($636), click **here** to enter.



7 World Health Day

April 7 is the anniversary of the World Health Organization's founding – and also World Health Day. This year, the theme is "My health, my right", intended to champion the rights of everyone, everywhere, to access healthcare, as well as clean air and drinking water, food, quality housing, and freedom from discrimination.



22 Lyrids Peak

The Lyrids meteor shower will be at its best on the night of April 22, with between 15 and 20 meteors per hour expected. Viewing opportunities will be hindered by the almost full Moon, but don't fret – it should still be possible to glimpse a fiery space rock or two!

Image Credit Top Left: dizimage/iStock, *Top Right:* Paragorn Dangsombroon/Shutterstock, *Middle Left:* MilesStonesiStock, *Middle Right:* wongmbatuloyo/iStock, *Bottom Right:* Adventure_Photo/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 why parasocial relationships with influencers might turn sour. If you like your science lighter, discover the campaign to bring together long-distance bison lovers.

FOLLOWING GONE FROSTY

The Internet is brimming with gossip forums, and within them, polite and not-so-polite criticisms directed toward a whole host of social media influencers. But there's an unusual common trait amongst the haters – many of them used to be fans. So why the change in tune?

It's not always intentional, but influencers often end up establishing what's known as a parasocial relationship with the people who follow them. Sharing embarrassing stories or the intimate details of their lives, or being responsive to comments, is often what makes influencers popular. But it can also result in their fans feeling like they're friends when they're actually far from it.

By analyzing posts made to gossip forums, a **study** by marketing researchers revealed that it's influencers changing tack and withholding information, or becoming less interactive with their following, that can cause some fans to become angry. There was also discontent when influencers shifted to only posting sponsored content, which made some ex-followers feel exploited.

Users share information about influencers, allowing disgruntled ex-fans to feel connected to them without actually being a follower.

Despite the change in feelings, however, the researchers also found that parasocial relationships don't always cease to exist. They can simply become negative instead, and that's when ex-fans might turn to gossip forums.

"We found that some consumers are reluctant to commit to a voluntary parasocial break-up by disconnecting with the [influencer], despite experiencing intense antipathy towards them, preferring instead to sustain a negative parasocial relationship with the [influencer] by participating in [influencer] anti-fan communities," the authors write.

Analyzing the types of posts users made to such forums, the researchers found that many users continue to share information about influencers, allowing disgruntled ex-fans to feel connected to them without actually being a follower. Many also believed that influencers read the forums.

Though that might not be the case, it could lead to influencers receiving hateful comments in one way or another. The solution? "Prevention is better than cure," say the authors. Budding influencers should make sure the level of detail they share about their lives is sustainable.

For followers? Maybe just switch off your phone.

BISON MATCH-MAKING

Move over, Patti Stanger – the World Wildlife Fund (WWF) is on a particularly unique matchmaking mission that hopes to save a Ukrainian bison herd from extinction, although some millionaires wouldn't go amiss.

European bison haven't had an easy time of it. By 1900, they'd been brought to the brink of extinction by hunting and no wild bison remained in Ukraine. Thankfully, conservation efforts saw them reintroduced to the country, including a group in Zalissia National Nature Park.

LUCKILY, IT'S FOUND NOT JUST ONE, BUT TWO YOUNG MALES LOOKING FOR A SERIOUS (ALBEIT OPEN) RELATIONSHIP.

Then came the war. In March 2022, fighting in the area led to the death of all four of the herd's males. Under the threat of extinction without breeding partners, the WWF set out to find a match for the remaining female herd.

Luckily, it's found not just one, but two young males looking for a serious (albeit open) relationship. But here's the catch – they're 300 kilometers (186 miles) away and it's a difficult, costly job to move them.

"Relocating any animal, even a domestic one, requires careful preparation and time. Relocating Europe's largest land animal will require a year of coordinated action and an initial [€10,000, roughly $10,850]. The bison need our help," said Dr Bohdan Vykhor, CEO of WWF Ukraine, in a **statement**.

As a result, the WWF has launched a campaign hoping to raise awareness and money to support moving the two hopeful romantics. There's even a fun little graphic showing the bison moving closer together as the donations come in. But amusing graphic design aside, why is conserving the species so important?

According to the WWF, bison help to maintain forests and grasslands, ecosystems that show resilience to climate change and support a whole range of species – so ensuring their survival is pretty key.

"After a long absence, this can not only revive populations of this threatened species but also enrich and restore remaining wild landscapes in Europe," concluded Irene Lucius, regional conservation director for WWF Central and Eastern Europe.