

CURIOS?

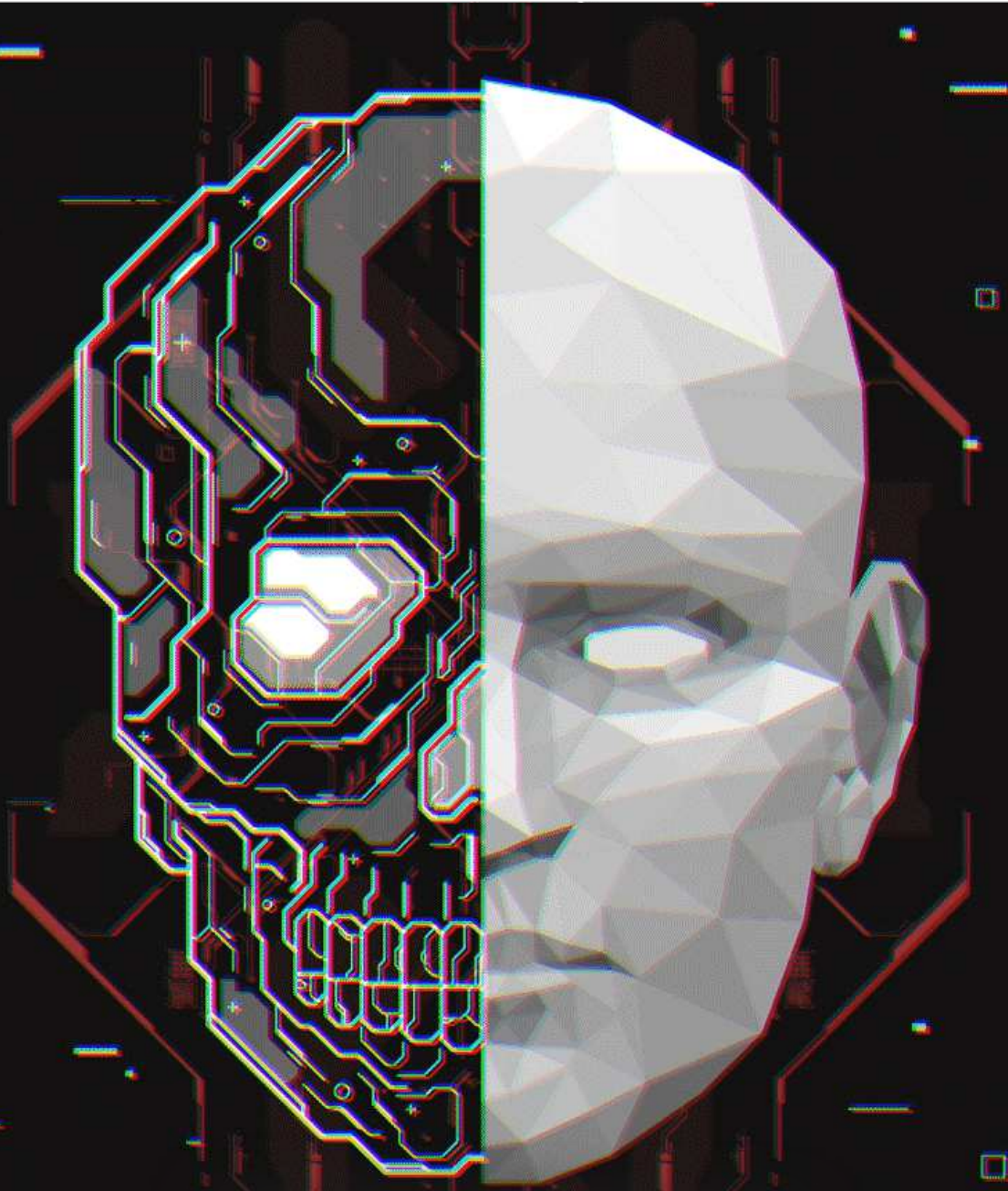


WHERE DO BODIES DONATED TO
MEDICAL SCIENCE ACTUALLY GO?

WHY ARCHAEOLOGISTS AREN'T
LOOKING FOR ATLANTIS

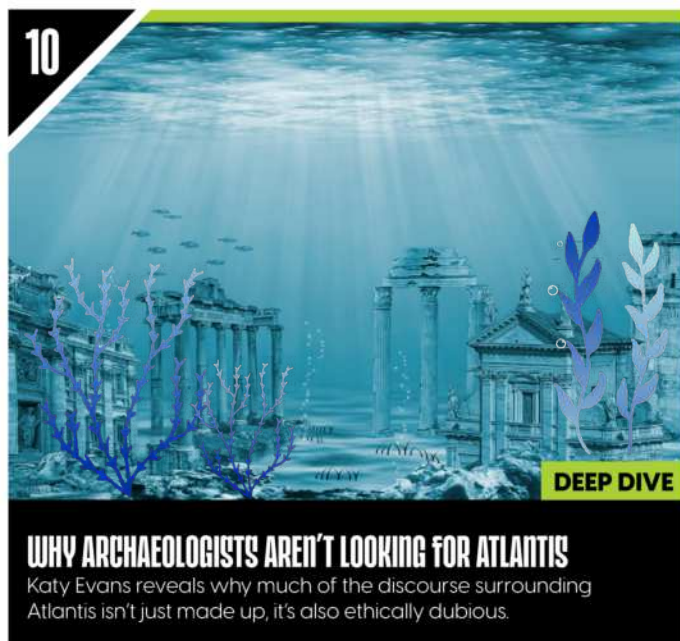
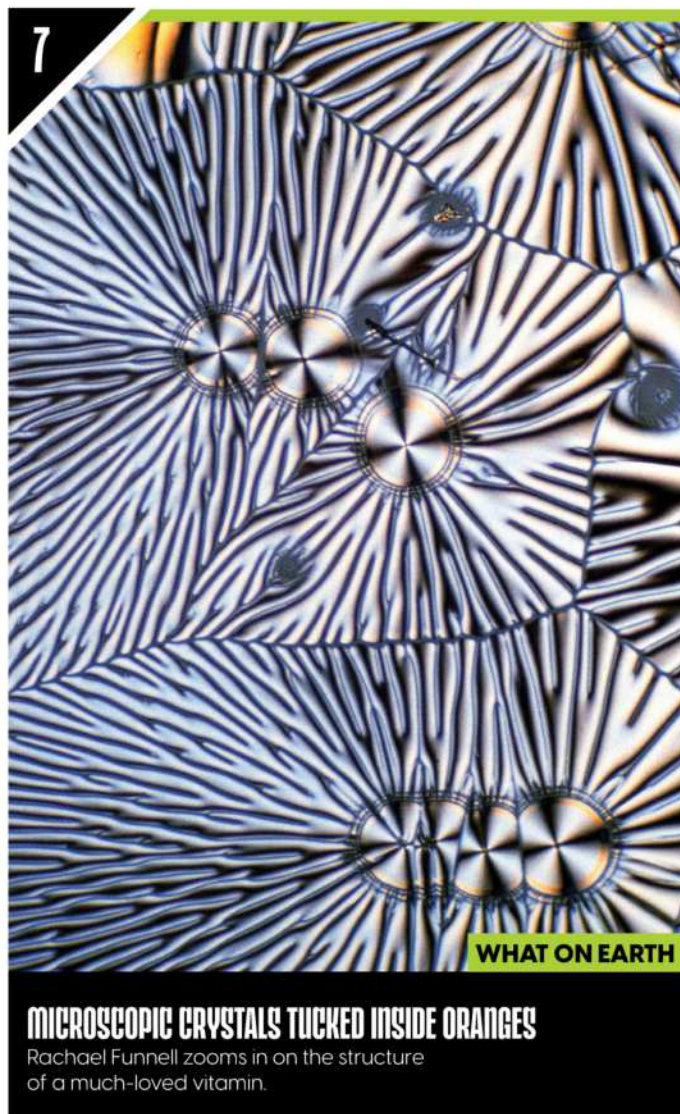
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What happens to your
digital footprint after you die?

Do you become a ghost in the machine?



September 2022

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IFLSCIENCE

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NEWS BITES



10,000 Mementos Fly To The Moon On Artemis I

As was the long-standing tradition on Apollo missions, Artemis I will be taking off tomorrow with mementos, commemorative items, and gifts of gratitude to all that have made the mission possible. NASA has revealed onboard Artemis are two items from Apollo 11: a small sample of Moon dust, and a piece of the rocket that enabled its collection more than 50 years ago. Also on board are two female LEGO® astronauts, a stuffed Shaun the Sheep, Snoopy, a Peanuts comic, tree seeds, USB drives containing poems and drawings by students and members of the public, and 90 Girl Scout space science badges. The Israeli Space Agency is sending a pebble from the Dead Sea while ESA is including a 3D model of the Greek goddess, Artemis. Neil Armstrong took a piece of the Wright brothers' Wright Flyer plane with him in 1969. Perhaps one day a piece of Artemis will fly to Mars.



Best Way To Grill A Burger According To Math

It's still BBQ weather in the Northern Hemisphere and though some of you may be convinced you have your burger flipping technique down pat (sorry), did you know there is actually an optimal way to quickly cook the perfect burger, according to math? Physicists have worked out that flipping a burger **three to four times** is the perfect way to get an evenly cooked patty in the least amount of time. Flipping a burger just once takes the longest time to cook the meat through from both sides to the middle, whereas flipping the burger every 15 seconds cuts the cooking time by a third. Happy flipping!



Taste vs Manners

This might be a little hard to swallow, but eating with your mouth open can actually make food taste better. Research has found that open-mouthed chewing helps release volatile organic compounds that reach the back of the nose better, kick-starting the olfactory sensory neurons. This heightens both sense of smell and the overall eating experience. The dining suggestion comes from a team led by Professor Charles Spence at Oxford University, who told **The Telegraph**, "We've been doing it all wrong. Parents instill manners in their children, extolling the virtues of politely chewing with our mouths closed. However, chewing open-mouthed may actually help to release more of the volatile organic compounds, contributing to our sense of smell and the overall perception." You might want to check with your dining company before you try this out, though.

Let Your Ears Do The Talking

Gone may be the day you are that person on the train talking loudly on the phone, as new earphone technology lets your ears do the talking without you having to make any noise at all. When we speak, muscles in our face move, and our ear canals change shape. The new **"EarCommand"** system emits near-ultrasound signals into your ear and detects the reflected echoes, meaning you can mouth voice commands to your cellphone without having to make a peep.

Sci-Fi September

There's plenty to please our sci-fi-loving hearts this month, whether it's time travel shenanigans or epic fantasy. The *Quantum Leap* reboot, set for release on September 16, sees a new time-traveler zip up and down the timeline righting the wrongs of the past (oh boy). After months of teasers, *The Lord of the Rings: The Rings of Power* finally comes to Amazon Prime on Sept 2. The epic fantasy series is set thousands of years before Bilbo's dinner was rudely interrupted and his adventures began. *Vesper*, set after the collapse of Earth's ecosystems, hits cinemas Sept 30 and follows a 13-year-old girl with unusual bio-hacking abilities.



The Human Brain Has Barely Changed In 160,000 Years

The most obvious way to recognize a *Homo sapiens* ancestor rather than a modern human is the shape of their skull, which was said to have evolved and changed as our brains grew. Not so, a **new study** now says. The shape of the human brain has changed little over the last 160,000 years, and the physical transformation of the human cranium was more likely due to changes in the face that came from diet and lifestyle. Scientists looked at 160,000-year-old *H. sapiens* skulls and compared them to modern specimens. They found the size and shape of juvenile *H. sapiens* skulls were very similar to those of kids today, but the ancient adults' faces were longer with more pronounced features. Human faces keep growing until around age 20, whereas the brain reaches about 95 percent of adult size by age six. If the fossil children's brains were almost fully developed, but the adult skulls looked very different, then it's unlikely that the brain changing shape was the driver of those changes.

WHAT'S UP?



High-End Fashion For The Discerning Danish Viking

On Wednesdays, we wear beaver

Name: Vikings
Date: 10th century
Location: Denmark

Appearance: Swathed in beaver fur, apparently. No horned helmets.

Why no horned helmets? Fun fact: they were invented by a costume designer in 1870s Italy for the Viking characters in a staging of Wagner's *Der Ring des Nibelungen* opera.

What about fur capes? Written sources indicate fur was an important commodity in the Viking Age, but it doesn't last long in the archaeological record, so it's difficult to find samples. Not much is known about which furs Vikings preferred.

Until now? Scientists from the University of Copenhagen recently managed to analyze animal remains from six high-status graves in Denmark. Using proteins recovered from the furs and skins,

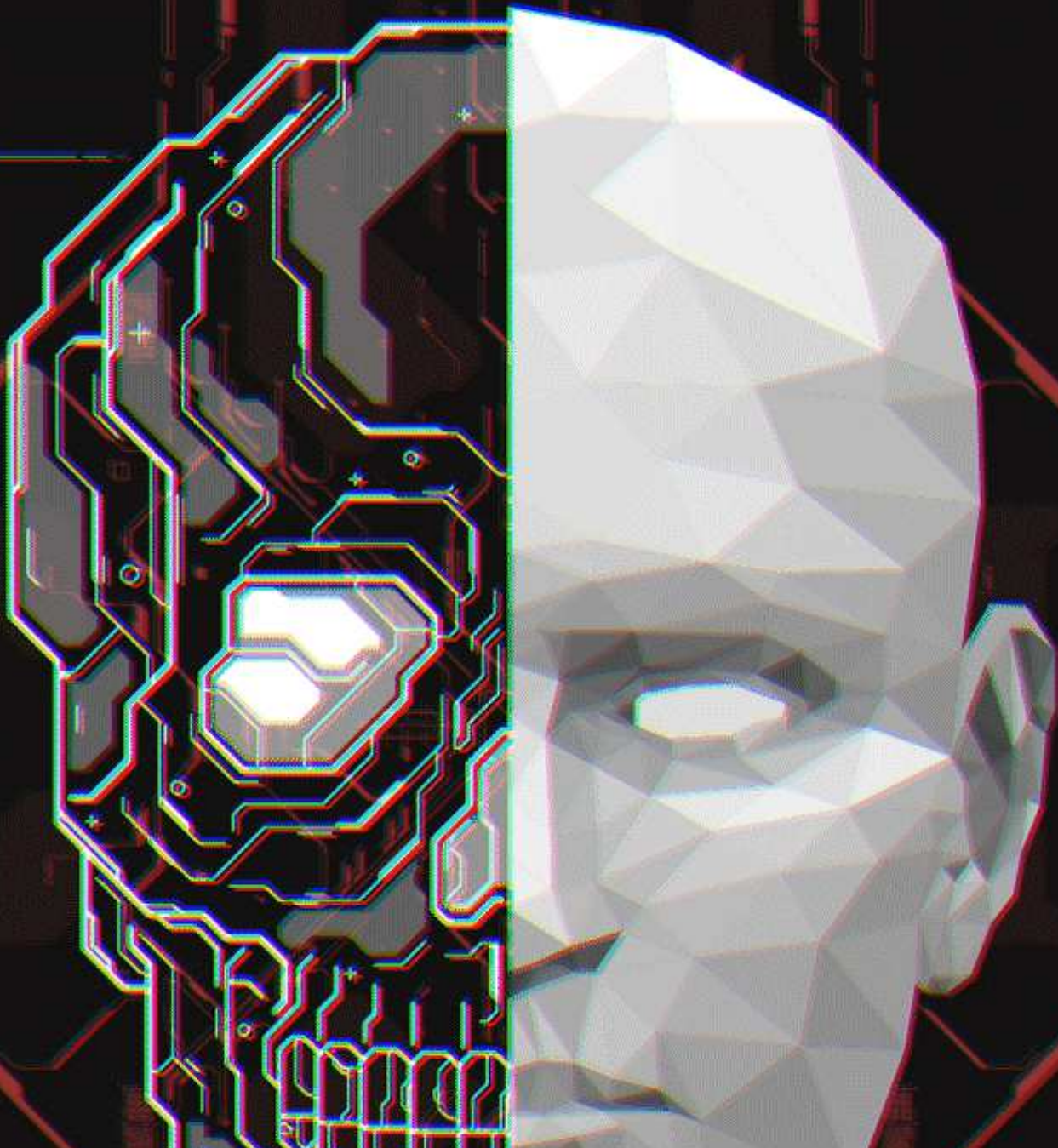
they found the grave furnishings were made from domestic animals, but the clothing was from wild animals like weasels and squirrels.

You mentioned beavers? They also wore beaver fur. Beavers are not native to Denmark, but their fur was of high-value for being warm, water resistant, and luxuriant, suggesting only the elite, fashion-forward, and, most importantly, rich, could afford this exotic luxury traded item.

The ultimate status symbol? It was very visual 10th-century high-end fashion. How else to instantly let people know of your status, sartorial sense, and wealth? Vikings weren't subtle.

How do you top that? Well, some Vikings were a little extra and wore furs from multiple species, probably to show off their extensive fur collections.

OUR COVER STORY



WHAT HAPPENS TO YOUR

DIGITAL FOOTPRINT WHEN YOU DIE?

Do you become a ghost in the machine?

By Francesca Benson

When you die, your persona can live on in the form of data. This is especially true if you're active on social media (and let's be real, that's most of us), with your personal data forming a digital footprint that remains even after death.

The dead could outnumber the living on Facebook alone by the year 2060, according to some estimates. A 2019 study found that between 1.4 billion and 4.9 billion Facebook profiles of deceased members could exist by 2100 depending on the platform's rate of growth.

However, it seems that many people don't understand what happens to their social media data after death. A YouGov poll of 2,185 people in 2015 showed that 27 percent of participants didn't know, 20 percent thought it was inherited by next of kin, 36 percent thought it was owned by the social media company, and 17 percent thought nobody owns it. When asked who could access their accounts if something were to happen to them, 52 percent said nobody could.

So, how can you manage your posts posthumously?

What happens to my social media pages after I die?

Rather than letting your Facebook account live on in limbo, "You can choose to either appoint a legacy contact to look after your memorialized account or have your account permanently deleted from Facebook," says Facebook's help center.

A Facebook legacy contact is someone on your Friends list who you nominate to take care of your profile after you die, which you can do if you are aged 18 or older. They can either be the caretaker of the memorial account, or choose to delete it entirely. With proof that they are an authorized representative of the

deceased, they can download content shared from the account as well.

Facebook also gives advice on how to delete a deceased person's Facebook account if you are not a legacy contact. Proof that they are dead (obituaries or memorial cards) and proof of authority (a will, birth certificate, power of attorney, or estate letter) are required.

"If you don't choose to have your account permanently deleted, it will be memorialized if we become aware of your passing."

So, what are memorialized Facebook pages? They are marked by the word "Remembering" next to the person's name, and still contain their posts and photos. Birthday reminders or friend suggestions won't appear for memorialized accounts, and nobody can log into the account, even the legacy contact.

A legacy contact can, however, write a post to pin to the memorialized profile, update the profile and cover photos, control who can post tributes to the profile, and determine who can see them.

Instagram, like Facebook, is owned by the company Meta. Therefore, their options are similar: Your account can be memorialized or removed via a valid request. Removal requests require proof that you are an immediate family member or can act on behalf of the deceased, such as birth or death certificates.

Memorial Instagram accounts will also display "Remembering" by the user's name, and won't appear on the Explore page. No changes can be made to the posts, comments, profile photo, followers, or accounts the memorialized account follows.

According to Twitter, "In the event of the death of a Twitter user, we can work with a person authorized to act on behalf of the estate, or with a verified immediate family member of the deceased to have an account deactivated."

You can request to deactivate Twitter accounts but will need to provide your

connection to the deceased. To prevent false reports, Twitter requests a copy of the user's death certificate and a copy of your ID.

Neither Reddit nor TikTok have information or options for account memorialization, legacy contacts, or account deletion by loved ones. IFLScience contacted both for clarification but did not receive a response. TikTok does, however, state that "If an account remains inactive for 180 days or more, the username may be reset to a randomized numeric username," which would apply to dead TikTok users.

It's unlikely you're going to be job-hunting from beyond the grave, and seeing the profile of a late loved one might upset users, so LinkedIn allows you to report users as deceased and forms on the site allow requests for account deletion or memorialization.

Memorialization and deletion requests require the deceased's date of passing and a link to their obituary. Loved ones must clarify their relationship to the deceased and submit legal documents proving they have the authority to act on the user's behalf.

THE DEAD COULD OUTNUMBER THE LIVING ON FACEBOOK ALONE BY THE YEAR 2060

What happens to my personal data after I die?

Data Protection legislation only applies to an "identified or identifiable natural person", so in theory, if you die, any data protection obligations die with you.

As the most popular domain on the web, Google is most likely sitting on a vast goldmine of your personal data. As such, Google says that "People expect Google to keep their information safe, even in the event of their death."

Google's Inactive Account Manager is one way to take control of your data after death. It either deletes or sends data to a trusted contact after a certain period of inactivity.

Google states that "We look at several signals to understand whether you are still using your Google Account. These include your last sign-ins, your recent activity in My Activity, usage of Gmail (e.g., the Gmail app on your phone), and Android check-ins."

If you die without setting this up, loved ones can request Google to close your account or receive data from it. However, Google won't provide login details to the account.

Microsoft accounts will be closed automatically after being inactive for two years. Microsoft needs to be served with a non-criminal subpoena or court order to consider whether to release a user's information to another party.

For Apple users, a legacy contact can be added to an Apple ID from iOS 15.2, iPadOS 15.2, and macOS 12.1, and will have access to the data in the account after the user's death. This access will require the access key generated when they were chosen, and the user's death certificate. Legacy contacts can also opt to delete the Apple ID.

However, legacy contacts cannot access in-app purchases or licensed media bought by the user, the user's payment information, or information stored in their Keychain password manager. Apple also cannot unlock devices with passcodes, as they are protected by passcode encryption.

People who are not the Apple ID's legacy contact can still request access with the proper legal documentation, which varies by region.

What happens to my cryptocurrency after I die?

If you want your investments to be passed on to your loved ones when you die, it's important to set up a plan to ensure your coins don't go to the grave with you.

In fact, accountant and blockchain asset expert Kate Waltman told Time earlier this year that "It's estimated that the total number of Bitcoin in existence [capped at 21 million] won't ever be 21 million because so many

early adopters of Bitcoin have either died (without succession planning) or lost their wallet keys and can't recover their funds."

Some people advise writing down your passcode or seed phrase for your wallet and locking it away in a secure place that your loved ones know about.

***IT'S IMPORTANT TO SET UP A PLAN
TO ENSURE YOUR CRYPTOCURRENCY
DOESN'T GO TO THE GRAVE WITH YOU.***

Post-Mortem Privacy

Much of our private lives are now carried out via the transfer of data. This poses a concern for platforms and users alike: How private can this potentially very personal data actually be?

In the US, there are currently no laws that specifically extend to "post-mortem privacy" protection. Most terms and services for things like social media accounts set up licenses and rights between you and the company, which may fall to the company if you die. For example, Instagram reserves the right to use your photos to advertise the platform, which could continue after you die.

"The rule of thumb is that you own your data, it's your property, basically. But you co-own it with whatever platform you're uploading into," associate senior lecturer at Uppsala University's Department of Government Carl Öhman told Popular Mechanics in March 2022. However, he explained that as dead people can't hold property, companies become the data's sole owner after death.

As Öhman said: "What happens to our digital remains is not just an ethical matter of 'who do I want to have access to my pictures on Instagram,' but it's very much a political discussion of who should be able to control our collective narratives of the digital past." •

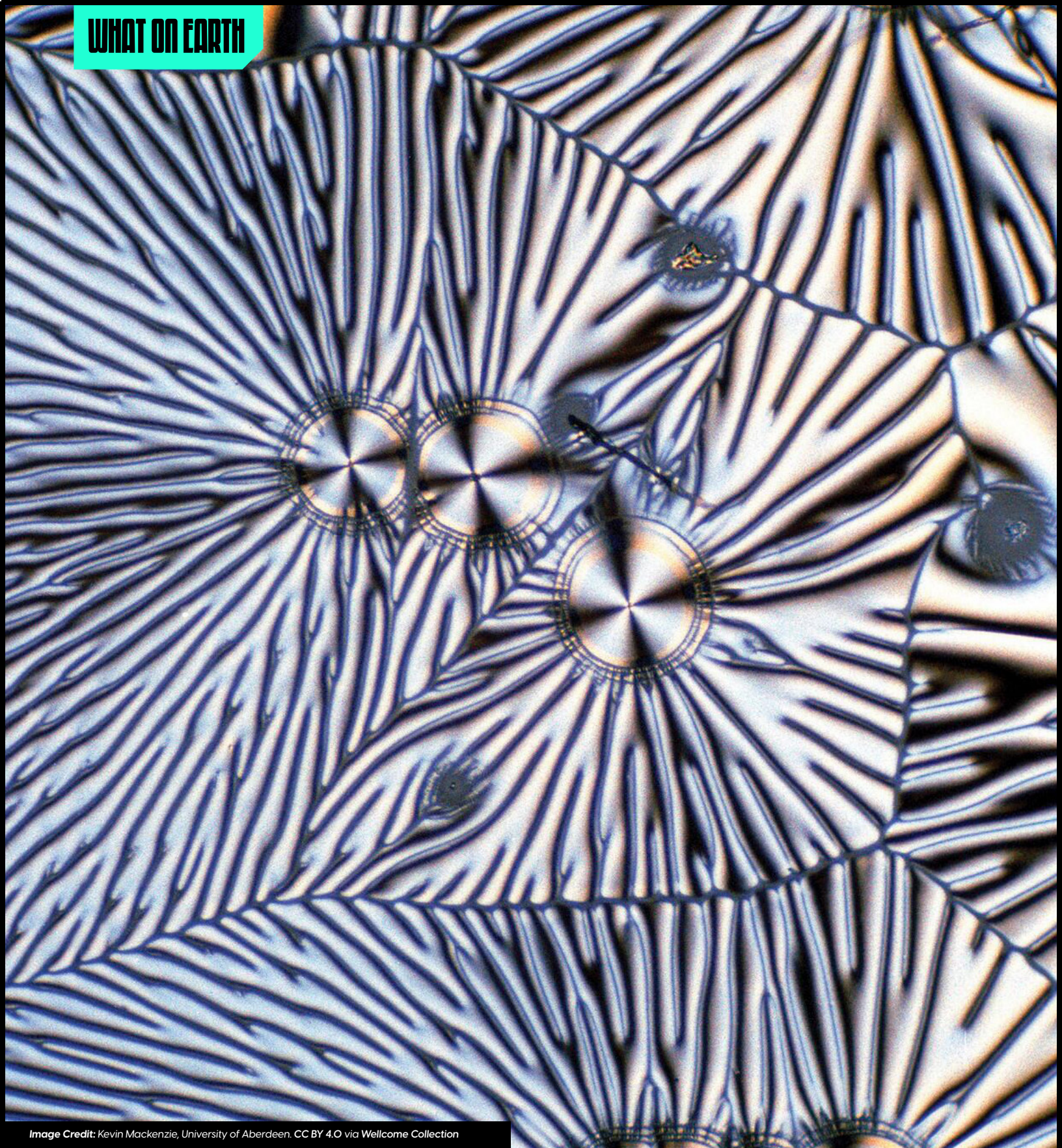
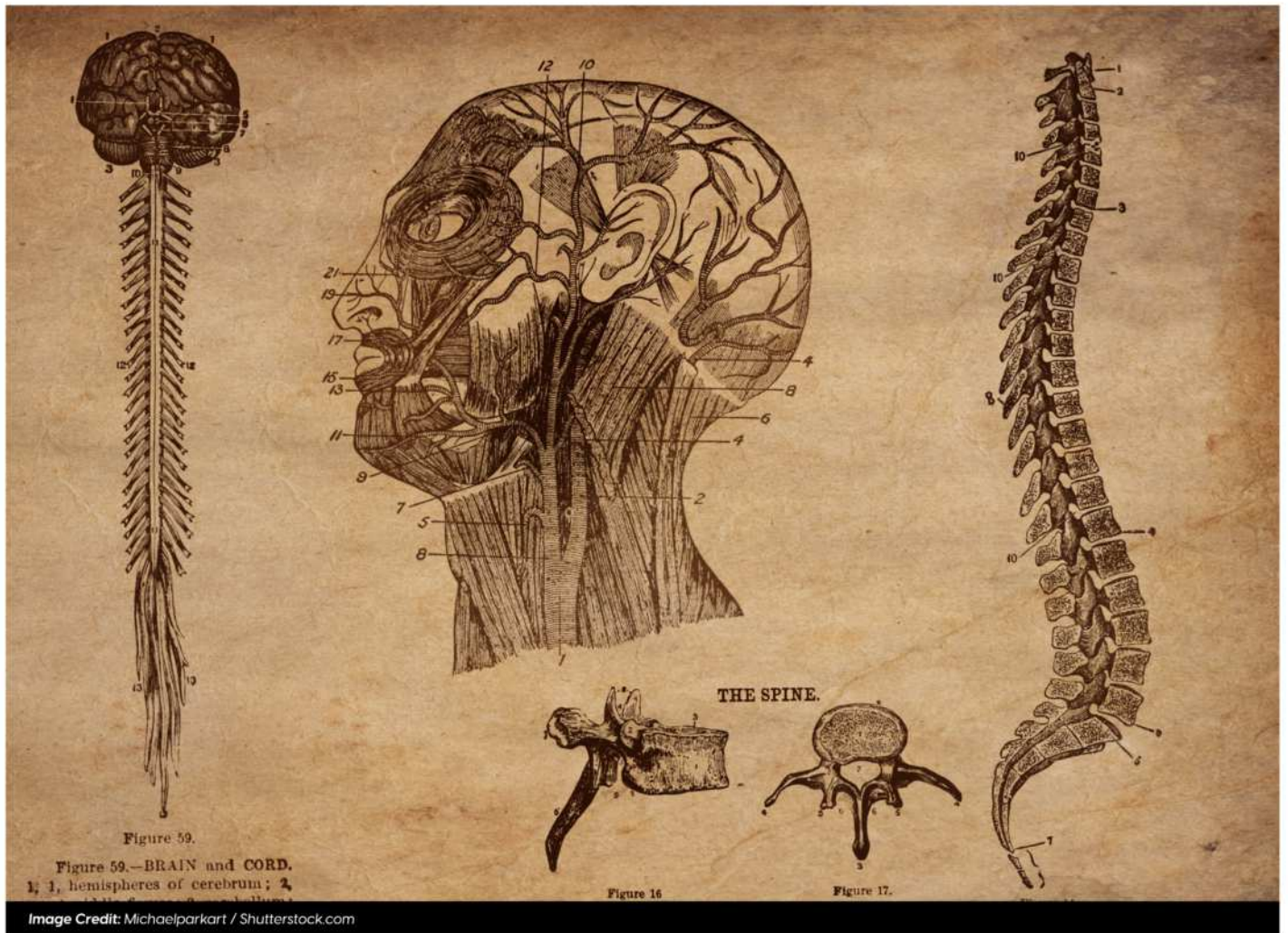


Image Credit: Kevin Mackenzie, University of Aberdeen. CC BY 4.0 via Wellcome Collection

VITAMIN C CRYSTALS

This psychedelic arrangement is what ascorbic acid crystals look like when imaged by polarized light microscopy, but you might know these babies better as vitamin C. The technique involves illuminating a sample to investigate its three-dimensional structure by capturing the light on a polarizing filter. Humans need vitamin C in our diets because it's a water-soluble vitamin, which means we can't store it in our bodies, so enjoying nutritious delights like leafy green vegetables and citrus fruits is a good way to keep topped up.



WHAT ACTUALLY HAPPENS TO BODIES DONATED TO MEDICAL SCIENCE?

HEAD OF ANATOMY FOR BRIGHTON & SUSSEX MEDICAL SCHOOL PROF. CLAIRE SMITH BREAKS IT DOWN.

By Rachael Funnell

There's a lot of loss surrounding death, but there is something to be gained when people donate their bodies to science. However, what actually happens to donor bodies? Where do they go?

To demystify the process of body donation, we spoke to head of anatomy for Brighton & Sussex Medical School in the UK,

Professor Claire Smith Having overseen the creation of the most advanced **3D model for female anatomy**, and with a wealth of experience working with human cadavers, Smith is very familiar with the donation process, which, as she explains, is still teaching us new things about the human body to this day.

I've died and donated my body to medical science, what happens now?

CS: Well, firstly, I'm really sorry that you've died. Hopefully, you've told someone in your family that this is your wish, and you've already signed a consent form to say that you want to donate your body. You have to do that when you're alive in the UK and Ireland where it's a first-person consent system, but that's not the case throughout the world. Once you've died, your next of kin or member of your family needs to contact your local medical school. In the UK, that's undertaken by a postcode system run by the human tissue authority.

Based on what you died from, and your medical history, the relevant authority will make a judgment on whether that body is suitable for donation. There are some diseases that we can't take because either the body doesn't embalm very well, or it poses a risk to the health and safety of those that would work on it. If the body is accepted,

then, they will arrange for the funeral services to transport it, usually within five days.

Do donated bodies stay whole or are they sometimes used in parts?

CS: It's really a question of supply and demand, and it also depends on the level of consent. So, an individual can choose whether we have consent to take images, whether we have consent to retain parts. Or, the medical history might make that body more suitable for either surgical training or undergraduate medical school training. All of those factors are assessed by someone like myself, and depending on what they're going to be used for they will either be embalmed or frozen.

Why do we need human donors?

CS: At this moment in time, we don't have anything that replicates a lot of what we anatomists do. There are amazing 3D virtual reality models out there that we do use in teaching and training. But there isn't anything that replicates the complexity of the 3D form as well as an actual human body. Also, despite having textbooks, we're all unique, and actually our doctors, dentists, and surgeons need to learn from that variation, and you can only get that from exploring human donors.

How are donated bodies used in surgical training?

CS: Donated bodies enable surgeons to practice procedures that can't be replicated on simulation models or on animal tissue. It's the really

high-level and complex things, not just learning to stitch an artery or something like that.

Surgeons also work with donors to develop new surgeries. So, they might come to us and say, "I've got a really complex case, this is what I want to do. Do you have a donor that might be suitable that I could try this procedure on?" Because it's never been done before.

How are donor bodies involved in medical students' education?

CS: Some donor bodies are dissected by students, so they're getting really close knife-to-skin experience which enables them to explore different parts of the body. That might be medical students, healthcare students, nurses, physiotherapists, or our teams might work to create something called "prosections" where an experienced anatomist does a beautiful dissection so students can examine the spatial relationships of structures within the body.

What about research?

CS: For research, students, staff, or surgeons, might come to me and say, "Claire, every time I do this knee operation, I'm always finding this little blood vessel here. It's not in Gray's [Anatomy, (1858), 42nd Edition, Elsevier], despite all the extensive work. Do you have 50 knees available which I could work on, dissect, and try to understand where these ligaments or arteries are going from and to?" Those sorts of investigations can lead to new knowledge ending up in textbooks.

Do unexpected things turn up in dissections?

CS: Individuals die from a whole range of things, but for many, it's linked to the brain, heart, or lungs giving up. However, when we dissect donors, we sometimes find things they never knew they had. We can uncover natural variations, such as an artery or vein where it shouldn't be, or organs where they shouldn't be. Other times, we can find a tumour or something that never made it onto their medical records.

Why do people donate?

CS: When we asked donors (for a study) why they are interested in donating, the majority of individuals said it was an altruistic thing to give back to healthcare workers and the wider public. Recently, and for the first time, we've also seen a percentage of individuals who have said it was for financial reasons as for donated bodies, medical schools do cover all associated funeral costs.

If people want to donate their bodies to science, what's the best thing to do?

CS: The top thing is to please discuss it with friends or family because there's no automatic system so the process will require someone to make a phone call to a medical school. If you're in the UK, go to the human tissue authority website and you can find a postcode finder system. If you're outside of the UK, search for your local medical school online and contact them. If they don't have a body retrieval system, they will know the nearest one that there is. ●



SCIENCE FACT OR FICTION:

WHY ARCHAEOLOGISTS ARE NOT LOOKING FOR ATLANTIS

To put it simply, if you're looking for Atlantis, you're not an archaeologist. Or not a very good one, at least. Why? Because Atlantis never existed. Yes, we know this. No, it's not a mystery. So, why do people (science-inclined people included) insist on searching for the mystical – but crucially, not mythical – “lost” city?

By Katy Evans



Atlantis is having quite the moment right now. In fact, it's so pervasive in modern pop culture you'd be hard-pressed to find someone who has not heard of the great city lost beneath the waves. Currently starring in both the DC (*Aquaman*) and Marvel (*Wakanda Forever*) universes, and not forgetting the Disney classic, *Atlantis: The Lost Empire*, you'd be forgiven for thinking there's little harm in bringing this fictional story to the big screen. Only, for some people, it's not fictional, and this is when the discourse gets dark. The ideology of those insisting Atlantis is/was real takes in disinformation, pseudoarchaeology, conspiracy theories, inherent racism, and a lot of abuse towards those fighting all four.

So, how has Atlantis gone from political allegory to an actual location and one of the most popular, and dangerous, conspiracy theories, encouraging mistrust in and undermining the scientific method and, in the most extreme cases, being used as "evidence" for nationalistic and white supremacy rhetoric?

Why Atlantis?

Few stories have achieved global fame like Atlantis. Becoming the symbol of a long-lost Utopia, its name is synonymous with advanced and secret knowledge, paradise lost, epic natural disasters, and adventure.

Why has the story of Atlantis prevailed for so long? Well, many people will tell you it's because it's a myth dating back thousands of years. Only it's not. It's true, its origin starts with Plato in Ancient Greece nearly 2,400 years ago, but it only became "mythic" around the late 1800s, and before then was not considered a myth at all. It still doesn't meet the criteria of a myth, despite the story taking on mythic proportions.

"I think part of it is the idea that there's a mystery there," archaeologist Dr Flint Dibble told IFLScience. "There's this misconception that archaeology is about solving mysteries, when in fact, we're not really doing that. I think that mystery very much romanticizes it."

It helps when there isn't a lot to go on – it's a lot harder for a tale to be twisted when there's enough evidence and information to fill the Library at Alexandria.

"The funny thing about Atlantis is when it was originally mentioned by Plato, he really didn't write very much about it. Just a few small paragraphs," Stephanie Halmhofer, a PhD student of archaeology at the University of Alberta, told IFLScience.

"But this city that he paints this picture of is just such an incredible place, you know, these massive palaces and gold everywhere and silver and dolphin

statues... I mean, who wouldn't want that to be a real place? Sometimes I'm sad Atlantis wasn't real. Because imagine finding this incredible, incredible place."

Halmhofer, whose research focuses on pseudoarchaeology and conspiratorial ideologies, thinks it can be easy to fall into conspiracy theories when people are experiencing times of hardship or turmoil and are looking for answers, or something or someone to blame.

"It's like an escape from reality, even though to folks it is a reality. [Atlantis] seems like it's a pretty amazing place. So I understand kind of why people are wanting it to be a thing."

"It's a story about a civilization that's destroyed in some sort of big event. That's the allegory that Plato created, and of course, you know, floods and things, these kinds of catastrophes resonate very well," Dibble offered.

"We live in a period of catastrophism, as people are worried about climate change, or many other problems in the world, nuclear weapons and things like that. And so I think there's a certain appeal of catastrophe stories as well."

Plato: the man, the myth, the legend

All available evidence points to the ancient Greek philosopher Plato inventing the powerful island nation in 360 BCE to prove a point about the ideal state and the dangers of imperialism. Described in



two dialogues in *Timaeus* and *Critias* – Plato’s follow-up to *The Republic* – Atlantis was no utopia. It was the aggressor of Plato’s idealized Athens, a version that existed long before the real Athens did.

IN HER SEMINAL WORK, SHE LISTS ATLANTEANS AS ONE OF THE SEVEN ROOT RACES OF HUMANITY. SHE ALSO LISTS INVISIBLE ASTRAL JELLYFISH, LEMURS THAT HAD EYES ON THE BACK OF THEIR HEADS, AND A FUTURE RACE FROM VENUS.

Atlantis, a highly advanced civilization, grew greedy and essentially too big for its boots, waging imperialistic war on the nations around it. Only Athens, the much smaller power, managed to stand its ground and triumph over the invading forces, defeating its army and freeing its slaves. After the battle, violent earthquakes and floods caused Atlantis to sink into the sea.

Plato’s tale, sandwiched between stories of the Greek gods, was not meant to be a historical treatise, but an example of how a utopia can fail, and a just state (Athens)

can prevail. It was the Athens of the Atlantis story that was Plato’s idea of the ideal state.

“It’s the sequel to *The Republic* in a sense,” Dibble says. “[In] Plato’s *Republic*, he develops his model of an ideal political system, and this moves that forward. The goal of the Atlantis story, in the *Timaeus* and *Critias* dialogues, is to sort of show how this republic would act in a more political warfare situation.”

So, how did this brief allegory end up becoming the ultimate mythic utopia? And how did Atlantis, the greedy loser that underestimated its smaller enemy, come out of it thousands of years later as the good guy?

How do we know Atlantis isn’t real?

Firstly, it’s important to understand Atlantis is not a myth, not in the historical sense of the word, anyway, and it’s certainly not an Ancient Greek myth. Myths are traditional stories, often of unknown origin, that are passed down over long periods of time and can be traced to multiple contemporary sources: writings, artworks, pottery, and evidence of oral histories.

Plato is the first and only ancient source of Atlantis, Greek or otherwise. Not only

are there no other known references in contemporary writing, artwork, or pottery, but there are none that predate Plato’s writings. According to him, the events of Atlantis occurred thousands of years before his story takes place.

You would expect some kind of mention of a mighty powerful nation, a war, even the natural disasters that occurred, somewhere.

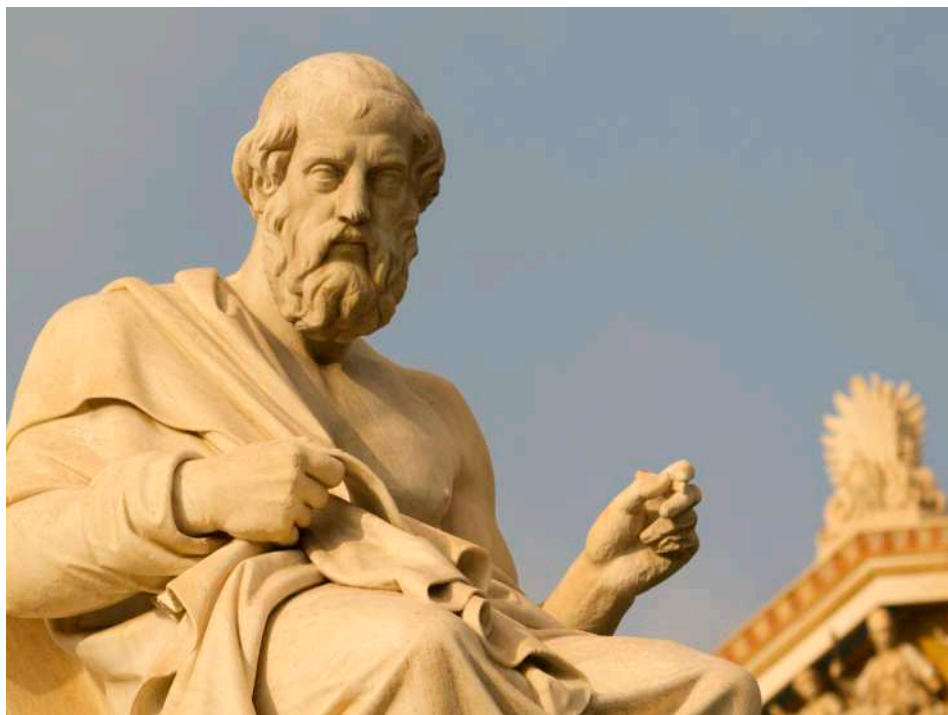
The embellishments and mystery surrounding the “search” for this lost utopia has become what Dibble calls a “modern myth”.

The idea that Atlantis was an actual historical place and not just a story invented for a specific purpose by Plato didn’t surface until the 19th century. In the 1870s, one Madame Helena Blavatsky, a Russian living in the United States, founded a religious movement, Theosophy. In her seminal work, *The Secret Doctrine* (1888), she lists Atlanteans as one of the seven root races of humanity. She also lists invisible astral jellyfish, lemurs that had eyes on the back of their heads, and a future race from Venus.

In 1882, Ignatius Donnelly, former US congressman, published *Atlantis: The Antediluvian World*. The book centered on the idea that Atlantis had really existed and not only represented a place where humanity “dwelt for ages in peace and happiness” but was the source of many ancient civilizations around the world if you followed the clues in Plato’s writing.

This book and Madame Blavatsky’s had a huge impact on what would become known as “Atlantaology” but are also the beginnings of the idea that real historical (and notably, non-white) ancient civilizations weren’t capable of existing without the help of a mythical people, an ideology that would take a very dark turn.

“It’s all modern mythology. It’s based off very clearly not reading Plato closely. And of course, at the time these historians and philosophers are writing, there’s not much archaeology around, archaeology is just starting. So there’s no archaeological evidence that supports or disrupts it,”



Dibble says. "Obviously now, 150 years later, the archaeological evidence shows nill, it's very clear, and a close reading of the context of [Plato's] dialogues shows that they're just flipping it on its head to make their own modern mythmaking."

How is archaeology being misused in the "hunt for Atlantis"?

Archaeology is the study of human culture through its material remains. It's what we learn about a people from what's left behind. It's not just that there is no archaeological evidence of any Atlantean city or people, but modern sonar, LIDAR, and mapping techniques have revealed no evidence for the landmass, an island Plato described as larger than modern-day north Africa and half of Turkey combined, helpfully pinpointed as being in the Atlantic Ocean.

"If you think about everything that has been told about Atlantis, whether Plato's original version, or the version a lot of folks share today that they claim is from Plato, if you think about all these things that they tell us we're supposed to be seeing of Atlantis, the sheer size of this continent and these materials, which we find at other archaeological sites, why wouldn't we find them at Atlantis?" Halmhofer shrugs.

"We have found absolutely nothing from Atlantis. [There's] Plato's work and that's it. So, archaeologically speaking, there's just nothing. Sadly, nothing."

NOT EVERYBODY WHO BELIEVES IN ATLANTIS IS A NEO-NAZI. ATLANTIS IS JUST VERY ATTRACTIVE TO NEO-NAZIS.

But for most archaeologists, the missing evidence is missing the point.

As Dibble points out, archaeology is not about using these tools to try and prove something exists, but about what we can learn from the archaeological evidence. Sometimes the evidence found doesn't match up with things like text sources, or proves textual sources impossible, ie fictional.

"I guess you could say we have the archaeological evidence that proves Plato's description wrong," Dibble says. "Not that we have anything for Atlantis, because there is no Atlantis. But he also describes Athens in the same dialogue when he's describing Atlantis. And it's pretty clear that what he describes as an early Athens never could have existed."

For example, Dibble describes three things mentioned in Plato's Athens that we know from archaeological evidence didn't exist at the same time: the wall around the Acropolis, the Temple of Athena, and the Agora fountain house.

It's not just that there is no archaeological evidence that this Athens or Atlantis existed, but the archaeological evidence that does exist actually shows Plato's Athens couldn't have existed, so it's logical to conclude that neither did Atlantis.

The dangers of pseudoarchaeology

Pseudarchaeology is a false (from ancient Greek "pseudes") version of archaeology that rejects scientific methodology, accepted evidence, and data gathering and instead relies on bias and cherry-picking to make "evidence" fit an assumption or established narrative.

"It's not that the information folks are using is necessarily wrong or not factual. But they're pulling facts out of that context, and giving it a new context," Halmhofer explains. "[People are] taking facts out of context [and] drawing a bunch of different facts together to create this new story, rather than just looking at them in their context and saying 'what is this telling me?' and being willing to change [their] mind depending on what [they] see. That's a big part of archaeology."

One of the strongest arguments from people who are anti-science is that when something thought to be proven true is later revealed not to be, science keeps moving the goal posts rather than accepting it as wrong. But as Halmhofer points out, that is not quite the gotcha moment they may hope for, that's actually the scientific method. Science isn't about



being proven right, it's a process of learning and discovery, constantly being updated.

There are many reasons why someone may believe in or propagate pseudoscientific claims. Sometimes it is just bad science, cherry-picking data and refusing to overcome personal biases. Sometimes it's the exploitation of people's fascination with mysteries (there is serious money to be made in the entertainment industry). But it can also spread racist sentiments, historical and cultural appropriation, and nationalism.

"I think that the core of pseudoarchaeological theories is problematic, what they're built out of and around is problematic. But that doesn't necessarily mean that every single person who adheres to them or falls into them is really terrible," Halmhofer says. "Not everybody who believes in Atlantis is a neo-Nazi. Atlantis is just very attractive to neo-Nazis."

Nazis, natives, and nationalism

In today's society, particularly in the US, pseudoarchaeology is very clearly linked with nationalism, racism, and colonialism, and is used as an argument for white supremacy.

Halmhofer says it's not a coincidence that the rise in interest in Atlantis in America was in the early days of the birth of a new nation trying to give itself a history.

When Spanish conquistadors arrived in South America and southern North America in the 1500s, they weren't expecting to see such sophisticated cities and people, Halmhofer says. They needed a reason to explain what they were seeing and, for some people, Atlantis became that reason: The only way these Indigenous people could have built these things was if Atlantis survivors had made their way to the Americas and taught them. There is even an argument that America is a piece of Atlantis that broke off and survived the flood.

"Pseudoarchaeology, at its core, is very racist and very colonialist. You're constantly telling these folks that they could not have done what they've done without intervention



from Atlantis, or extraterrestrials, so that's the problematic core," says Halmhofer.

It wasn't just America trying to link itself to Atlantis though. Nazi historians and archaeologists were determined to find this "last civilization" as they thought it would reveal the source of the "Aryan" Nordic race. They thought Atlanteans were of the purest blood so Aryans must be descended from them. Claims of descending from pure blood Atlanteans via the Aryan race is built into white supremacist mythology today.

While it's true some people who make claims about pseudoarchaeology – like Atlantis or the Egyptian pyramids being built by aliens – are overtly racist, sometimes such conversation is meant as harmless fun, even if it's propagating a racist theory.

"Sometimes it's really subtle," Halmhofer says. "So I'm not really mad at folks who kind of fall into this and you know, enjoy watching *Ancient Aliens*. Because maybe you just don't know, and you haven't quite seen that light yet. But when you see it, you can't unsee it."

Halmhofer hopes that by speaking up about the dangers of pseudoarchaeology, particularly on social media, people may recognize the problems with what they're watching, reading, or promoting and step back from it. But she also recognizes what archaeologists need

to work on to help combat the misuse of their findings, particularly after seeing some of the traps scientists during the COVID-19 pandemic fell into online.

"Teaching media literacy, basic science communication skills, and then just basic social science supportive type skills would just be so useful," she says.

Because Halmhofer's research is specifically on conspiratoriality – a term coined in 2011 that refers to ideologies built out of New Age spirituality and conspiracy theories – she says she has been into some "really dark, far-right spaces" and seen "incredible levels of hate and violence" connected to pseudoarchaeology to an extent that many archaeologists still don't believe.

Dibble, who is well known for debunking pseudoarchaeology on Twitter, also points out that there is an onus on journalists and documentary makers to not play up mystery or danger when reporting on archaeology. He concedes that this includes scientists too and that anyone producing information should also consider how to combat disinformation when that information is twisted by others.

As Halmhofer says, wryly: "When I got into archaeology I did not know I would spend as much time talking about extraterrestrials as I do, but you know, here we are." ●

HOW CAN WE MAKE BIRDING

BETTER FOR THE PLANET?

In this excerpt from *Low Carbon Birding*, editor Javier Caletrio explores the ways in which birding can be bad for our planet and how we can better take in nature without leaving such a footprint.

There is beauty in the simplicity of birdwatching. A pair of binoculars and a curious mind are all you need to enjoy a pleasant and rewarding pastime. It is not surprising then to find around the end of November birdwatchers posting images of recent sightings on social media as a way to express their disdain for the materialist ethos associated with Black Friday. Interestingly though, these posts reveal a blind spot in the way birdwatchers often conceive of their hobby. While most of these photos are from areas local to the person posting, others are of birds from distant places. In 2020 one such post included photos of birds and mammals taken by a birdwatcher on five continents. Another showed a colourful passerine from Australia. The well-intentioned English birdwatcher posting that photo was probably unaware that her return flight to Sydney had generated the equivalent of 480 suitcases of carbon, each case weighing 20 kilograms (44 pounds). Just imagine coming back home from your wildlife holiday, the smile on your face reflecting pride in what you think is a lifestyle revolving around

experiences rather than material possessions, and finding 480 cases filled with carbon in your own back garden.

Flying might not entail an accumulation of material stuff in our houses, but we instead chuck carbon through the plane window at a rate of 50 bricks per hour, each brick weighing 2.4 kilograms (5.3 pounds). And each of our fellow 350 passengers in that flight is doing the same. Pouring that carbon into the local wetland would be unthinkable, and yet we have come to live with the illusion that the atmosphere is not part of nature or that it is just a limitless sink. Birdwatching can be light and simple but it can also be heavily polluting.

People enjoying high-carbon lifestyles that depend on frequent flying and long-distance driving are making a disproportionate contribution to climate change, and the problem is that there is no technological fix that can

generalise for 7.9 billion people the material standard of living currently enjoyed by a minority at a high cost to others. The key issue, however, is not that too many birdwatchers routinely engage in long-distance driving and frequent flying, but that wildlife media and influential organisations in the birding world often celebrate these

styles of high-carbon birdwatching. And if this kind of behaviour is regarded as normal and acceptable by those who are supposed to know and care for nature, then what message are birdwatchers and conservationists sending to the

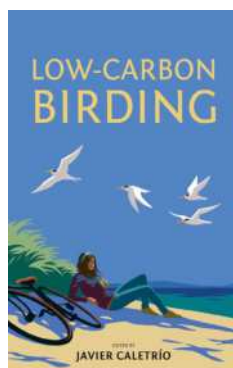
rest of society? What sense of urgency are we conveying? The challenge is not one of changing individual minds but of cultural change. We need to normalise behaviours and worldviews that are aligned with the realities of the climate emergency. We need to reimagine birdwatching for a liveable planet.

I say reimagine because, beyond the need to reduce fossil fuel demand, we must also reassess how we value birds and places and, ultimately, how we conceive of ourselves and our relation to the world. There is a rich diversity in the experiences we can have here and now, but we must adjust our values and lives to see it that way. Whether

it is marvelling at the playful flight of the swallow, patiently listening to redwing calls on a calm autumn night, sharing a cup of tea after fieldwork and discussing unanswered questions about the birds in the patch and beyond, or savouring the first glimpse of a nutcracker from an Alpine train, the chapters in this book show that we can enjoy diverse and meaningful experiences of birds while consuming, or at least making a reasonable effort to consume, no more than an equitable share of nature. Birdwatching can and should be redefined around a commonly held sense of what is enough.

The good news is that key elements of what might constitute a low-carbon birding culture today are already there. Patch birding has a long and respected tradition going back to Gilbert White's studies of Selborne. In addition, many people are beginning to explore the possibilities of low-carbon travel for their birdwatching trips and holidays.

But we need to be more confident in viewing the commitment to enjoying birds more locally and low-carbon travelling not as second best options for those who cannot afford or choose not to own a car, drive long distances or fly frequently. A culture of moderation is something to celebrate. Not only is it a sensible thing to do, it can open our eyes to an abundant world. ●



AUTHOR

WITH

JAVIER,
CALETRIOEDITOR OF *LOW CARBON BIRDING*

for granted every day: having a coffee with a friend knowing that you can walk in the street and meet others safely.

Second, I would like to see everyone with a platform – beginning with big organizations and wildlife magazine editors, columnists, and public figures with large audiences – helping to amplify the voices of climate scientists who are telling us what needs to be done, not what politicians and individuals with large carbon footprints find palatable.

Third, I would like to see birdwatching societies and clubs in an emergency mode discussing how they can be part of a wider transformation away from fossil fuels. The unavoidable fact is that there is a rapidly diminishing carbon budget for 1.5-2°C (2.7-3.6°F) and the effort to stop emissions needs to be shared in an equitable manner. For the affluent parts of the world's population this means lifestyle change, it means driving less and flying less.

What do you enjoy most about birding?

I love learning about plumages, partly because they can tell you about things such as the age, sex, subspecies, and condition of the bird – this is very important to know if you ring birds (in the US you call it bird banding) – but perhaps most importantly because the diversity of colours and patterns you find is most rewarding aesthetically.

But you ask what I enjoy most, and I have to say observing the behavior of birds. The more familiar you are with a species or even a specific individual, the more interesting it becomes. Many behaviours of common species have been described, but not many birdwatchers have seen some of them or even are aware of them. •

What inspired you to piece together *Low Carbon Birding*?

In the last few years, as the reality of the climate crisis has started to sink in, a growing number of birdwatchers have been wondering whether a birding culture that relies heavily on burning fossil fuels has a place in a liveable planet. The aim of this book is to give greater visibility to these voices, in the hope that they will encourage others to talk about climate change and rethink the way they enjoy birds.

What do you hope people will take away from it?

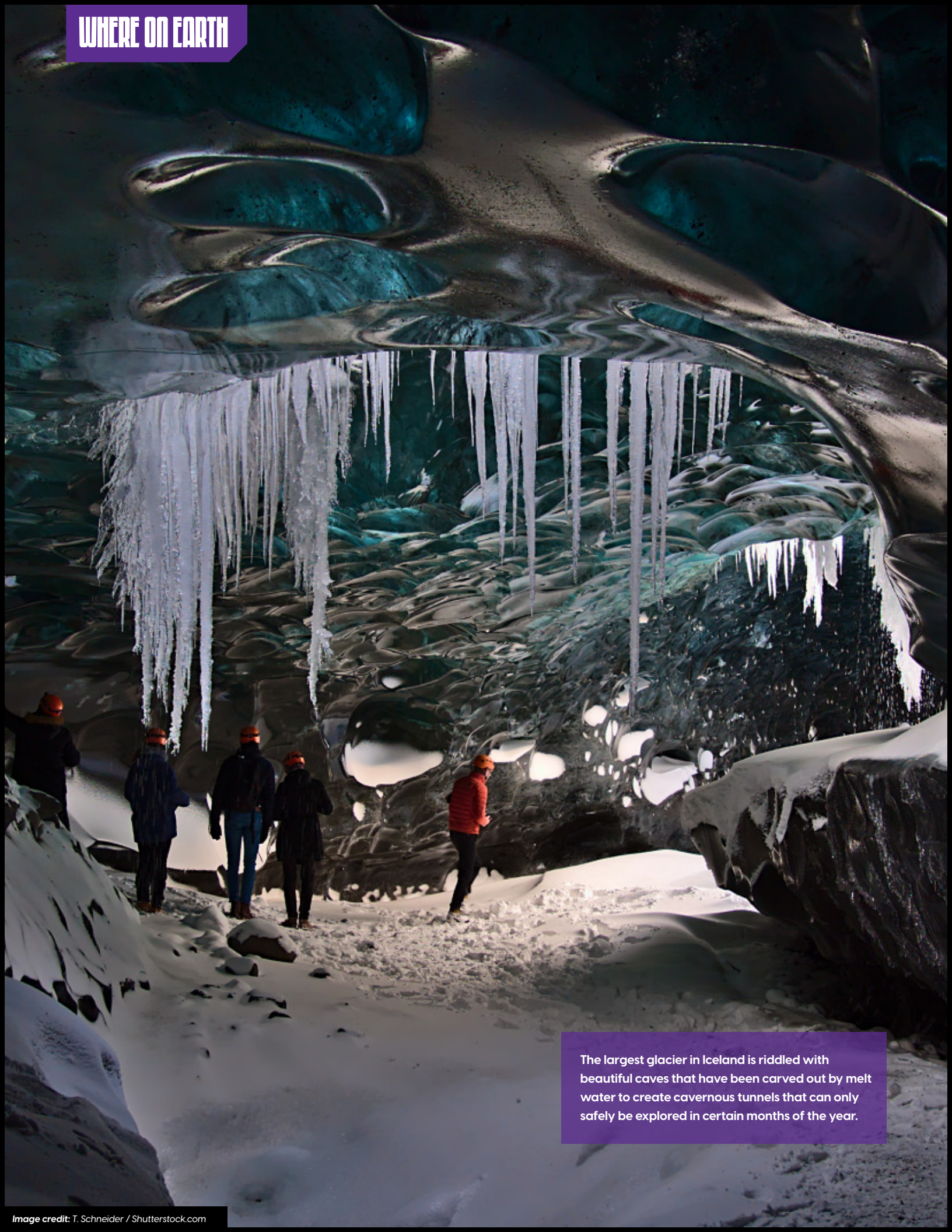
Firstly, that low-carbon birding is not only possible, but it is also enjoyable. Second, you don't have to visit a hundred countries and see thousands of bird species to be a good birdwatcher. Thirdly, that low-carbon birding is not the end of travel. It's about doing it differently. That may mean reducing long-distance driving and spending more time locally. In places with good public transport, it can mean giving up the car and rediscovering the sense of freedom afforded by bicycles and the joys of train travel.

Finally, that as an approach to enjoying birds, low-carbon birding is not a destination but a journey, one filled with doubts and concerns about how to act responsibly. Don't worry about not being perfect – the figure of the perfect low-carbon birder doesn't exist. What matters is to keep making a reasonable effort to reduce emissions and, most importantly, talking to others about the reasons why you are doing it. In so doing, you will be inspiring others and those conversations can help create the support and momentum for wider systemic changes.

What changes do you hope to see among the birding community?

First and foremost, I would like to see bird conservation organizations changing the way they communicate climate change. It is no longer about "us" saving "nature", as if, if we failed, we could carry on business as usual. As climate scientists have warned, the stakes could not be higher. It is about maintaining the conditions for civilized life, the conditions that enable us to do the trivial things that we take

Low Carbon Birding is published by Pelagic Publishing and is available to buy from September, RRP £16.99.



The largest glacier in Iceland is riddled with beautiful caves that have been carved out by melt water to create cavernous tunnels that can only safely be explored in certain months of the year.

ICELAND'S CRYSTAL ICE CAVES CARVE WALKWAYS DEEP WITHIN A GLACIER

Iceland's Vatnajökull National Park centers around the country's **largest glacier**, Vatnajökull. Its biggest outlet is the Breidamerkurjökull glacier tongue, which is a piedmont glacier that formed as the result of a valley glacier meeting flat plains upon which the ice spread out. It once reached toward the Atlantic Ocean but has been retreating inland since around 1930.

Within Breidamerkurjökull exist special ice caves that form as a result of glacier melt merging into waterways that carve out tunnels. They differ from true ice caves (rock caves containing a lot of ice), which is why technically they're what's known as **glacier caves**.

When glacier ice compacts as a result of pressure, it pushes all the air bubbles out, turning it from the white ice we more often see on land into a rich blue. However, not all glacier cave ceilings are the same color, as these turquoise sections of compressed ice can meet with grey, white, and black **volcanic ash deposits**, creating otherworldly tunnels that sit deep within the glacier. Some caves sit closer to the glacier's surface than others, and when light shines through their blue "crystal" ceilings it can look as if the roof is glowing.

Beautiful as they are, being made of ice means there's a window in which you can explore Iceland's glacier caves safely. Traditionally, the season starts in November and ends in March as this is when the weather is cold enough to ensure the caves are stable. Come summer, the hotter weather can make the caves dangerous as melting resumes, but some remain frozen year-round.

The transient nature of Iceland's glacier caves means they are constantly changing in appearance and structure, making each visit unique. It also provides a bit of fun for guides who, at the end of the summer season, get to head back into the glacier in search of newly formed caves and tunnels. •



WATCH

Super/Natural TV series on Disney +

See flowers in bee-vision and listen in on a conversation between elephant seals in this recent release from executive-producer James Cameron and Disney +, which brings together scientific innovation and leading-edge filmmaking to showcase the unique experiences of some of Earth's strangest species. Narrated by Doctor Strange's Benedict Cumberbatch, each episode looks at the super-senses of extraordinary animals and plants to investigate how they interact and explore to secure not just their own place on the planet, but that of their offspring, too.



Available to stream on Disney+ from **September 21**.

SEE

Don't Worry Darling Film from Warner Bros Pictures

Florence Pugh and Harry Styles star as husband and wife Jack and Alice in this unsettling tale. The couple live in the "safe and secure" community of Victory, an experimental company town that houses the families of workers for the top-secret Victory Project where "progressive materials" are formulated. As their seemingly perfect lives unfold, Alice comes to suspect that beneath the 1950s societal optimism, all is not right with their desert utopia and the Victory cause.

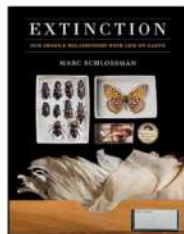


Showing from **September 23**.

EXPLORE

Extinction Photobook from Marc Schlossman

Having volunteered labeling mink skulls in the mammals department of the Field Museum in Chicago as a teenager in the mid-70s, photographer Marc Schlossman returns to his "family" (as the museum dubbed it) in creating what he likes to call extinction mugshots. In this photobook, he documents "Earth's sixth mass extinction" through photos of the museum's collections to shine a light on what is happening to the environment during an age when human activity is dominating the natural world.



Extinction is on sale in the US from **September 1**.

SCIENCE IN MEDIA



LISTEN

IFLScience The Big Questions Podcast from IFLScience

Our podcast is back for season 2, with two new episodes coming out in September. First, Rachael Funnell speaks with Dr Barney Long of Re:wild, who works on the conservation of endangered mammal species, to ask: How do we know if a species is really extinct? Then, Dr Alfredo Carpineti delves into "Why is the universe made of matter and not antimatter?" with Professor Jeffrey Scott Hangst. The episodes go live September 9 and 23, respectively, wherever you get your favorite podcasts.

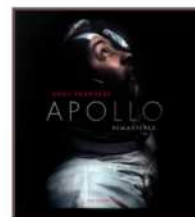


Episodes available **September 9 and 23**.

DISCOVER

Apollo Remastered Photobook from Andy Saunders

A new collection of remastered photographs arrives in *Apollo Remastered*, a photobook release from Andy Saunders, revealing never-before-seen insights into humankind's journeys into space. Using reels of film from NASA's archives, Saunders has remastered photos from the Apollo Missions, allowing us to see, for the first time, snapshots of adventures in space that until now had been lost to underexposure. Some of the original photos were thought to be blank, but thanks to Saunders' digital archaeological wizardry, now carry remarkable detail.



Available to purchase from **September 1**.



DATES TO REMEMBER

Don't miss out on some of the science highlights of September 2022, including opportunities to give back on World Cleanup Day, an unmissable launch as NASA sends Artemis I soaring, plus a chance to win some great prizes for your wildlife photography.



AUGUST 29

Artemis I To Launch

NASA is set to take the first step of its Artemis mission, which will ultimately see the first people to land on the Moon in 50 years. Artemis I, an uncrewed flight around the Moon, is a huge test for the massive SLS rocket launch system and Orion spacecraft. If successful, it could launch future missions to Mars. The mission has a launch window of 8:33-10:33 am ET on August 29, and you can watch it live via our **Facebook** page and **NASA Live TV**.

SEPTEMBER 17



World Cleanup Day

The world's largest one-day civic action requests your company on September 17 for the annual **World Cleanup Day**. With volunteers from over 191 countries, the initiative hopes to tackle the global waste crisis by encouraging people to either create or join a cleanup. Since it began in 2018, it's seen over 60 million people become involved with World Cleanup Day. Help them reach their goal of engaging 5 percent of the world's population by joining in this year.

19 TO 25

Pollution Prevention Week

According to the **World Health Organization**, 99 percent of the global population currently breathes air that exceeds the guideline limits for pollutants. As well as impacting human health, this pollution is closely connected to the climate crisis and processes that have the potential to destabilize ecosystems. Therefore, the US Environmental Protection Agency recognizes **Pollution Prevention Week** in the third week of September each year to promote practices that reduce the amount of pollution being released into the environment.



Fall Equinox

It's that time of year again when the Northern Hemisphere slips into winter as the Southern Hemisphere wakes up to spring. The word equinox refers to the movement of the Sun across the Earth's equator as it moves from north to south. It represents a midpoint at which day and night are about the same length in both hemispheres, unifying the globe in the amount of daylight and nighttime we experience for one day. It occurs twice each year, once in March and a second time in September.

22 TO 23



Photography Competitions

You can enter the **California Ocean and Coastal Amateur Photography Contest** until September 19. Susan Cook was last year's Judge's Choice winner with this image of a great blue heron in surfgrass, Sands Beach, Santa Barbara.



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

Choose how you end each issue. For those who prefer the darker side, Katy Evans explains how you can't trust your brain after midnight. If you like your science lighter, Tom Hale reveals that Atlantic dolphins are lovers, not fighters.

BEWARE MINDS AFTER MIDNIGHT

Everybody knows you shouldn't feed Mogwai after midnight, but they're not the only things that should be tucked up in bed at the witching hour. In the dark, as we lie awake, our minds turn to matters with a negative spin.

If you've ever lain awake at night and felt the urge to eat a tub of ice cream, doomscroll Twitter, finish that bottle of wine, or angry-reply to comments, this is because our brains function differently when we should be asleep.

Outlined in a study in *Frontiers in Network Psychology*, this is known as the "Mind After Midnight" hypothesis, and you can blame our circadian rhythms for it.

The hypothesis posits that when humans are awake during their night (the part of their 24-hour cycle that typically involves sleep), neurological changes happen in the brain that mean we act or think differently to how we would in the day. Particularly affected are our information processing (viewing the world negatively), reward processing (guilt or blame), and impulse control (the midnight ice cream, wine, or

that time you bought the LEGO® Millennium Falcon online).

In fact, it can make us engage in harmful behaviors, including ones linked to addiction such as gambling or substance abuse, because we're not thinking through the consequences.

***PARTICULARLY AFFECTED IS
OUR IMPULSE CONTROL (THE
MIDNIGHT ICE CREAM, WINE, OR
THAT TIME YOU BOUGHT THE LEGO
MILLENNIUM FALCON ONLINE)***

According to the authors, this is because, from an evolutionary standpoint, our internal biological clock is attuned toward processes that promote sleep after midnight, not wakefulness, so our brains are not functioning in the way they would in the day. Our propensity to jump to negative thoughts at night may be an evolutionary hangover from when humans were once most at-risk at night, so our brains may be more attuned to negative stimuli.

Essentially, keep any important decision-making for the waking hours. You'll be better equipped to ignore that person sliding into your DMs because you know you deserve better, or better able to resist the urge to, you know, rob a bank.

In the harsh light of day, it's a lot harder to rationalize just how much you spent on that LEGO® Millennium Falcon.

BE MORE DOLPHIN

The animal kingdom is not exactly known for being friendly to strangers. Even our species, which owes much of its success to cooperation, has a nasty tendency to fear the outsider when push comes to shove.

But one species that suffers no such stranger danger is the Atlantic spotted dolphin. In a recent study published in *Royal Society Open Science*, scientists were surprised to observe two previously separated communities of dolphins hooking up in the Bahamas near Bimini, merging groups, and forming close bonds with one another.

Prior to this *Cetacean Love Island*, the dolphin groups were separated by 160 kilometers (99 miles) of water and had never been seen interacting before. Then, in 2013, dozens of dolphins from the northern group were seen heading south and merging with the other community. Over the course of the next five years, more waves of migrants joined the expanding pack, integrating the once distant social networks.

***INSTEAD OF WEST SIDE
STORY, THE DOLPHINS WERE
MORE WOODSTOCK***

The researchers recorded the interactions between the gangs

and observed how they would happily dive and play with each other, rubbing up against one another and even flirting, displaying courtship behavior. There was even some evidence of inter-group canoodling.

The scientists were surprised because it was very unexpected behavior. When most mammal species are met with unknown individuals entering their territory, they react with hostility, suspecting the newbies of being rivals. There are some exceptions – such as the notoriously love-thy-neighbor bonobos – but aggression is the general rule.

Instead of *West Side Story*, the dolphins were more Woodstock. And there weren't just male-female pairings between the two groups either. Male "friendships" in dolphin society are pretty central, and here, males of the two groups were seen engaging in some pretty tactile behavior: touching fins, swimming and diving together, goosing each other with their snouts, and even engaging in a little more-than-friends action (common among dolphins).

So, it looks like these two communities of Atlantic spotted dolphins in the Bahamas truly are making love, not war. They are immensely intelligent creatures and, as this research showed, are capable of forging extremely complex social bonds.

Perhaps *Homo sapiens* could learn a few things from this bunch of amiable marine mammals.



**The Darker Side
of Science**



**THE LIGHTER SIDE
OF SCIENCE**