

Science Focus

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COULD REWRITE PHYSICS AGAIN

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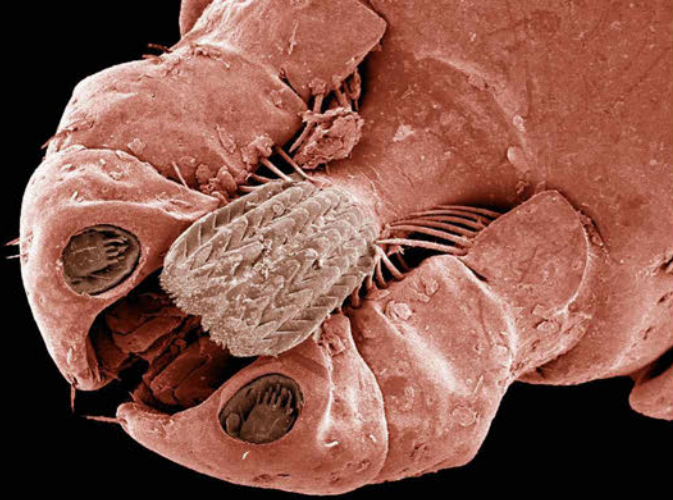
Why they're on the rise and what to do if you get bitten

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ANALYSIS

ALIENS: THE TRUTH IS OUT THERE, SAYS HARVARD PROF

Prof Avi Loeb says we shouldn't dismiss the possibility that extraterrestrials are already observing us

ABOVE Hard-bodied ticks have beak-like mouths

→ vulnerable skin and limit the opportunities for ticks to attach. Lighter colours also allows you to see ticks crawling over your clothes as they seek out bare skin.

If you can, avoid areas of long grass and stick to the middle of footpaths. Applying chemical repellent such as DEET, being careful to follow the instructions, can also help. When you can, perform 'tick checks' on yourself and, if in a group, each other. Ticks walking across clothes can be brushed off easily, but take care not to brush them onto someone else.

HOW SHOULD I REMOVE A TICK THAT HAS BITTEN ME?

Many techniques have been recommended, but the key thing is not to leave the mouthparts of the tick behind. The best method is to use tweezers to grasp the tick as close to the skin as possible, pushing the skin gently down around the head to get hold of it. Then, slowly and gently but firmly, pull the tick from the skin. Wash the area thoroughly with soap and water afterwards, and then apply an antiseptic cream to the bite. The NHS website offers good advice for tick removal.

WHAT SHOULD I DO IF I GET BITTEN?

Being bitten does not mean you'll develop a tick-borne disease: complications from tick bites are relatively rare. But there is no way to tell straight away if a tick bite will develop into anything more serious, so there are some things you should watch out for.

In the UK, Lyme disease is the main concern and can develop three to 30 days after being bitten. You should monitor the bite and your general health and if you develop a rash, often resembling the bullseye of a dartboard, or flu-like symptoms, then you should consult your GP, telling them you have recently been bitten by a tick.

Do remember, however, that although the 'bullseye' rash is well-known as a symptom, only around a third of people with Lyme disease will develop it.

by **PROF ADAM HART**

Adam Hart is an entomologist and Professor of Science Communication at the University of Gloucestershire

Everyone, it seems, has heard of the idea that the US government is sitting on proof that extraterrestrials exist and have been visiting Earth for decades. It's a conspiracy theory so prevalent it has entered the mainstream.

It's easy to dismiss such stories but, seriously, could there be even a small amount of truth in it? Could extraterrestrial probes really be functioning near Earth? We don't know. But Harvard astronomer Prof Avi Loeb's Galileo Project aims to investigate.

What used to be called UFOs (unidentified flying objects) have now been retitled as UAPs (unidentified aerial phenomena). In a blow against the conspiracy theorists, a report from the US Office of the Director of National Intelligence was released in 2021 detailing the UAPs they had been investigating.

According to the document, 144 UAP reports were made between 2004 and 2021, mostly by military personnel. Few conclusions could be drawn, however, because the actual data was limited and difficult to analyse – and that's where Loeb plans to help out.

"I think the government is puzzled. They don't know what to make of it. They're not scientists," says Loeb. "I say let's just figure it out, let's not have any prejudice, just collect better data. That's the scientific method. That's the way science is done."

The goal of the Galileo Project, therefore, is – according to the project's website (bit.ly/GalileoProject) – to transform the search for extraterrestrial technological signatures from accidental or anecdotal observations "to the mainstream of transparent, validated and systematic scientific research".

To collect such data, the project team has assembled a special observatory at Harvard University in Cambridge, Massachusetts. It monitors the entire sky, tracking everything that passes overhead. The trick, according to Loeb, was adapting the equipment to track fast-moving objects, because when looking out into the distant Universe, astronomical telescopes are never required to move quickly.

Loeb became interested in using science to investigate the idea of extraterrestrial visitation back in 2017, when astronomers discovered the unusual asteroid 'Oumuamua. Only spotted as it was leaving the Solar System, 'Oumuamua was unusual

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in that it appeared to be roughly cylindrical rather than potato-shaped, as is usual for asteroids. It also appeared to accelerate in a way that could not be explained by the gravity of the Solar System.

Most astronomers assumed that it must have released some gas, like a comet, causing it to accelerate. But Loeb found himself thinking that this would be exactly the type of behaviour that you would expect from an alien spacecraft.

He noticed another coincidence, too. Six months before ‘Oumuamua’s closest approach to Earth, a metre-sized meteor hit our planet. Its speed and trajectory indicated that it had come from outside the solar system. Although its orbit was not correlated with that of ‘Oumuamua, it inspired him to consider

ABOVE Harvard’s Prof Avi Loeb is working to expand the parameters of our search for intelligent alien life

the possibility of an interstellar craft releasing small probes to investigate the planets it was passing. He called these hypothetical probes ‘dandelion seeds’ and wondered whether any of the reported UAPs outlined in the 2021 release might fit the bill.

In 21 of the 144 reports, some sort of unusual movement was reported. Often this movement is extremely fast, but as Loeb and Dr Sean M Kirkpatrick, who heads the Pentagon’s All-domain Anomaly Resolution Office, point out in their draft paper, extremely fast movement through the air results in an optical fireball – just like when meteors burn up in our atmosphere.

They suggest that the lack of a fireball could mean that the objects are closer to the observer than assumed, and therefore smaller and moving more slowly. →



ABOVE 'Oumuamua was not your average asteroid

→ But in order to know for sure better data is required, underlining the need for rigorous measurements.

Prof Michael Garrett, a radio astronomer at Jodrell Bank, University of Manchester, is vice-chair of the International Academy of Astronautics' SETI Permanent Committee. He sees Project Galileo as a bridge between two subjects that have traditionally been widely separated: UFOlogy and the Search for Extraterrestrial Intelligence.

Whereas both disciplines have been viewed with extreme scepticism or even ridicule by the scientific community, the latter has now managed to establish itself as a valid scientific avenue of enquiry. In SETI, radio astronomers use their telescopes to listen for any extraterrestrial signals passing by Earth.

"If I accept that there's intelligence out there and that might have been around for a long time, I also have to accept that there might be phenomena, including phenomena that could visit us, that's associated with intelligence. I can't somehow think there might be intelligence somewhere on the other side of the Galaxy and then say, 'Oh, yeah but it can't be here'. Those two things, to me, don't make sense and are not logical," says Garrett.

The first data from Loeb's prototype observatory is expected this summer. However, the project is currently based at just one site – to make real progress he needs more. His team is now constructing others to be deployed elsewhere in America. If they can attract the necessary funding, which would run into tens of millions of dollars, they plan to extend these observatories all around the world. Loeb is then hopeful that they'll collect the data required.

"It's basically like multiplying the number of objects that we monitor. To get to the bottom of this we have to have enough locations to get good statistics, and clarify whether there is anything other than natural or human-made objects," says Loeb.

by **DR STUART CLARK** (@DrStuClark)

Dr Stuart Clark is an astronomy journalist, author and lecturer, and a Fellow of the Royal Astronomical Society. His latest book is Beneath The Night (Faber, 2020)

COMMENT

GENE-EDITED FOOD: WHERE'S MY SUPER MEAL?

Can gene editing create 'superfoods' that actually live up to the hype? Well, maybe...

So-called 'superfoods' are often touted as being beneficial for our health but the concept is mostly just marketing hype designed to sell us more expensive fruit and veg, rather than providing any actual benefits. However, with gene editing now approved by the government for use in commercial crops in England, that could be about to change.

Gene editing, using technologies like CRISPR/Cas9 or TALEN, is faster and cheaper than conventional breeding techniques and less controversial than genetically modified (GMO) foods. This is because, instead of inserting whole genes from outside of the plant, as is the case with GMOs, gene editing allows for small and targeted changes to subtly alter the genetic makeup of existing crops, potentially allowing us to create foods with different properties.

We all know that fruits, vegetables and whole grains are good for us, but most people don't eat the amount or variety recommended for good health. One of the ideas behind gene-edited crops is that nutrient levels could be boosted in certain fruits and vegetables, making it easier for us to eat a healthy, balanced diet.

In fact, lots of crops based on this idea have already been produced. One example is soybean and rapeseed that has been edited with one gene suppressed to produce a healthier fat profile. Similarly, bananas and rice have been made to include extra vitamin A, and other crops have been enriched with vitamin E, iron and zinc. These nutrients have been targeted because they're key deficiencies in many people's diets. But clever editing could mean we need fewer servings of fruits and vegetables, so we wouldn't have to stress as much about reaching our intake or variety targets. Imagine an apple that could provide all your daily vitamin and mineral needs, so that an apple a day really could keep the doctor away.

What's more, gene-edited food sources could be superior to current nutrition-boosting methods such as supplements, meal replacements and fortified foods. Supplements contain high doses of vitamins but don't contribute to fullness or come with the social aspects of eating. These features are also lost in complete nutrition solutions and diet shakes. Similarly, fortification can add extra nutrients into