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Space

Claims of interstellar meteor fragments in the ocean spark controversy

Leah Crane

TINY metal spheres found on the sea floor may have come from an interstellar meteor. The researchers who recovered the spherules say their compositions don't match anything ever seen before on Earth – but it is a controversial claim.

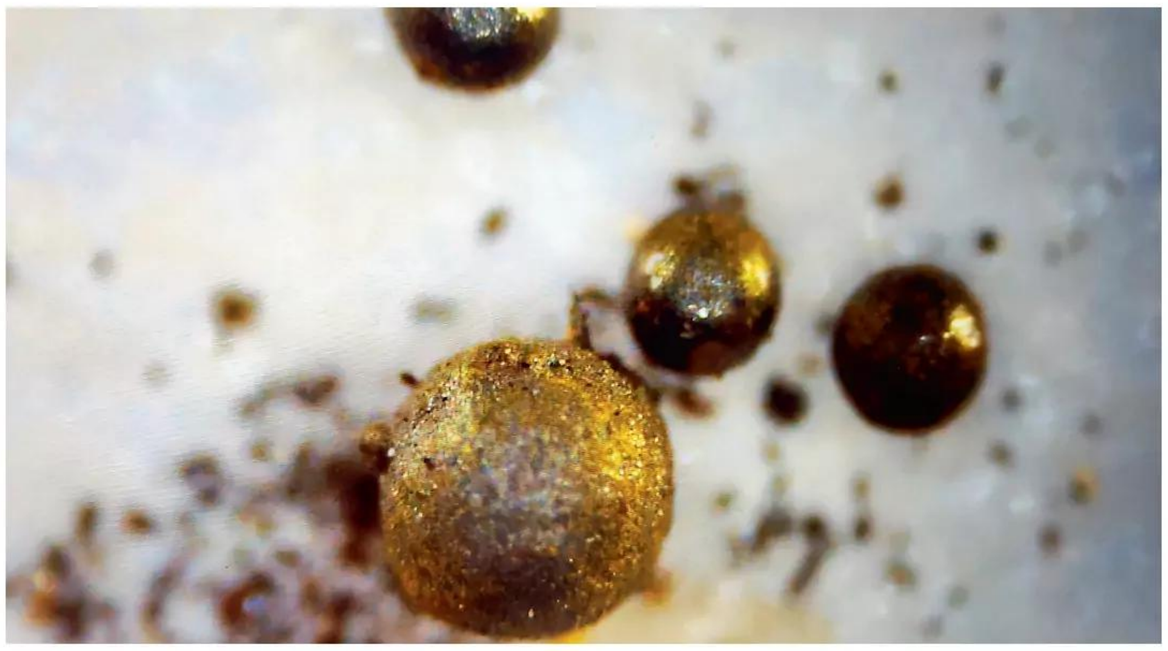
Earlier this year, Avi Loeb at Harvard University led an expedition off the coast of Papua New Guinea, where models predicted that remnants of an object nicknamed IM1 would have landed. IM1 fell to Earth in 2014. Loeb and his colleagues later identified it as a possible interstellar object based on its recorded velocity, which they claim was fast enough to indicate that it came from beyond our solar system. They hoped to locate its remains on the ocean floor.

During the expedition, the researchers found about 700 tiny, iron-rich spherules, ranging from 0.05 to 1.3 millimetres in diameter. Of the 57 examined so far, five seem to have unusual compositions.

These five orbs are rich in the elements beryllium, lanthanum and uranium, so the researchers have dubbed them BeLaU spherules. The spherules also have low concentrations of elements expected to evaporate in the heat generated by passing through Earth's atmosphere (arXiv, doi.org/kr2m). This indicates that they came from space, yet their compositions aren't consistent with origins on the moon or Mars, or even Earth, says Loeb.

"Usually when you have spherules that originated from meteors in the solar system, their abundances deviate by, at most, an order of magnitude," he says. These deviate by a factor of up to 1000. "If you combine everything that we know... I'm pretty confident that these came from an interstellar object."

Iron-rich spherules collected from the seabed near Papua New Guinea



AVI LOEB

The compositions imply the spherules are derived from a planet outside the solar system, whose crust has differentiated, altering how elements are distributed through it, says Loeb.

Not everyone agrees. We would expect interstellar objects to be leakage from clouds of icy bodies not bits of differentiated planets, says Alan Rubin at the University of California, Los Angeles.

Even the idea that these spherules are novel is controversial. "He'd have to compare them to every rock type on Earth and every mineral composition, and then do the same to every mineral and rock from meteorites," says Matthew Genge at Imperial College London.

"These are things that have been sitting on the sea floor [for] at least nine years, but frankly probably thousands of years, reacting with seawater," says Steven Desch at Arizona State University. "There are natural explanations."

There are doubts over whether IM1 came from outside the solar system, too. There are reasons to think the calculated velocities aren't correct, says Desch. It also isn't clear that material would have survived passing through Earth's atmosphere, he says.

Loeb says more evidence could be available soon, though. "We have only analysed one-tenth of the materials," he says. ▮

Health

Eczema linked to the diversity of bacteria on skin

THE skin microbiomes of people with eczema seem to feature higher levels of certain bacteria. Gaining a better understanding of this could lead to more effective treatments.

Atopic eczema is one of the most common forms of the condition. This occurs when the skin is unable to retain much moisture, and becomes dry, cracked and itchy. It is thought to have many potential causes and triggers, including certain soaps, cold weather or food allergies.

To see if the skin microbiome has a role in this, Paulo Wender Gomes at the University of California, San Diego, and his colleagues collected skin swabs from 60 people, half of whom had atopic eczema.

The researchers used genetic sequencing to identify the microbial profiles of each participant's swabs.

Overall, those with eczema had a less diverse bacterial make-up than those without the condition. "We observed the diversity of microbes on the skin's surface decreasing in patients with eczema," says Gomes. However, those with eczema had higher amounts of *Staphylococcus aureus* and *Staphylococcus epidermidis*. These bacteria are commonly found on skin and are mostly harmless, but can cause hot, red and swollen skin, such as lumps and blisters.

The researchers also found potentially inflammatory molecules, such as aspartyl-phenylalanine, at higher levels on the skin of people with eczema (bioRxiv, doi.org/kr2q). The molecules have previously been found in some strains of *S. aureus*, suggesting that this bacterium produces them.

"We observed the diversity of microbes on the skin's surface decreasing in patients with eczema"

It is unclear whether changes to the skin microbiome may cause eczema or if symptoms of the condition, such as dryness, alter the microbiome. Further research could lead to treatments that target certain bacteria or their byproducts, suggest the researchers.

Atopic eczema may have genetic links, which research could also explore, says Debajyoti Ghosh at the University of Cincinnati, Ohio. ▮

Sara Novak