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PLUS ARTIFICIAL CORNEA / **HUNT FOR INTERSTELLAR METEORITE** / **POST-APOCALYPTIC CAT GAME** / WHY ODD NUMBERS FEEL WRONG

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Astronomy

Hunt for interstellar meteorite on sea floor

Alex Wilkins

ASTRONOMERS who claim to have spotted an interstellar meteor hitting Earth are trying to raise $1.6 million to mount an expedition to search for fragments that may remain on the sea floor north of Papua New Guinea. But the claim remains controversial and other researchers say the odds of finding anything are minimal.

There have only been two confirmed observations of interstellar objects: 'Oumuamua, a cigar-shaped asteroid spotted in 2017, and Borisov, a comet seen in 2019. A few months before Borisov was seen, Avi Loeb and Amir Siraj at Harvard University claimed to have identified an interstellar rock by crunching publicly available data collected from classified US government sensors, which cover nearly the entire Earth.

According to the pair, the roughly 0.5-metre-wide rock, called CNEOS 2014-01-08, entered Earth's atmosphere from an interstellar trajectory in 2014 before burning up, but not everyone was convinced. The US government didn't release measurement uncertainties for the data, which meant that the object couldn't be verified as being interstellar.

But in April this year, US Space Command, a division of the Department of Defense, released a statement about the meteor, stating "the velocity estimate reported to NASA is sufficiently accurate to indicate an interstellar trajectory". It still hadn't released the actual uncertainties, but Loeb and Siraj were encouraged.

Alongside its statement, US Space Command released a light curve for the meteor, a record of its brightness in Earth's atmosphere over time that Siraj says can be used to infer the rock's composition. In a new analysis co-authored with Tim Gallaudet at Ocean STL Consulting, the pair say the meteor probably contained some form of iron, suggesting metallic fragments may have made it to Earth's surface (arxiv.org/abs/2208.00092).

"It's an extreme outlier in terms of composition, and it would be very difficult to get that kind of tensile strength without a lot of metal," says Siraj.

SHUTTERSTOCK/TRIFF

An artist's impression of a meteor burning up in Earth's atmosphere

$1.6m

Cost of proposed expedition to hunt for meteorite fragments

The sensor readings give a 10-by-10-kilometre area of the sky where the meteor entered the atmosphere. Using that data, along with models of winds and ocean currents, the researchers say they have traced its final resting point to 100 square kilometres of the Bismarck sea, north of Papua New Guinea.

They now want to launch a 10-day expedition to collect possible meteorite fragments by towing a box covered in magnets across the ocean floor – as the fragments contain iron, they should be magnetic.

The researchers hope to fund the $1.6 million expedition through private donations, though they are about $1 million short. Siraj says they are already in contact with oceanographic experts, including one who carried out a similar ocean meteorite expedition in 2018.

But there is still the problem of the missing data, says Peter Brown at Western University in Ontario, Canada. "I don't think the science community is going to buy into that unless the raw data is released, which I think is not likely."

Even if data for the meteor fireball is released, the ocean depth and potential for strong currents to have transported the fragments away from the search area makes success unlikely, says Alan Fitzsimmons at Queen's University Belfast, UK. "It's going to be much worse than looking for a needle in a haystack." ▮

Evolution

Losing parts of our voice box may have helped speech

Clare Wilson

THE loss of small tissue structures from the voice box may have led to the evolution of human speech.

While many animals make calls to communicate, the evolution of human speech seems to have required anatomical changes.

In humans, the vocal cords are flaps of tissue that vibrate as air is expelled from the lungs, allowing us to make "voiced", rather than breathy, sounds. Some non-human primates also have "vocal membranes", a small extension of the vocal cords that makes their sounds louder and higher, but also irregular and harder to control.

These membranes may have been lost in humans when our ancestors diverged from chimpanzees, says Tecumseh Fitch at the University of Vienna in Austria.

To better understand this loss, Fitch's team scanned the voice box, or larynx, of 43 species of dead or anaesthetised apes and monkeys. All had this vocal cord extension (*Science*, doi.org/gqm8zm).

The team also analysed videos of the voice boxes of an anaesthetised chimpanzee, rhesus macaques and squirrel monkeys. In these animals, vibration and collision of the vocal membranes were the primary source of their calls, as their vocal cords were in motion less often.

If humans had vocal membranes, our speech would probably sound more rough and variable, with abrupt pitch changes, says Fitch.

"A key thing that distinguishes human speech from animal sounds is our fine-grained control over the sounds we make. That is only possible if our vocal apparatus is easy for our brains to control," says Richard Futrell at the University of California, Irvine.

But Adriano Lameira at the University of Warwick, UK, says many apes and monkeys can make quieter and more controlled noises, as well as loud and irregular ones. ▮