New Scientist

WEEKLY May 2–8, 2020

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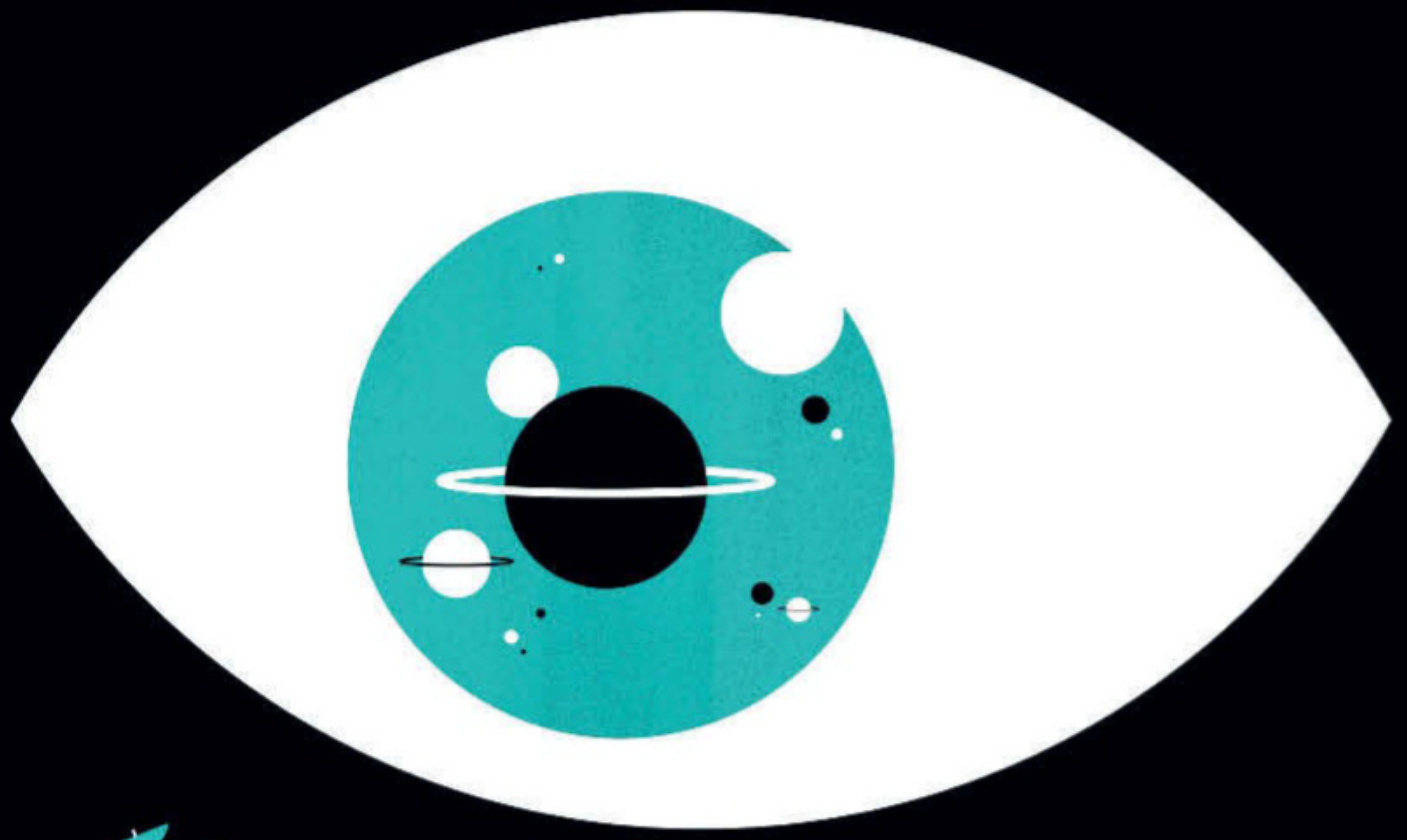

HOW THE TURTLE GOT ITS SHELL

Evolutionary puzzle finally cracked

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Diet

Epigenetic hints for the health benefits of drinking coffee

Alice Klein

DRINKING coffee may change how some of our genes are expressed, which could help explain its numerous health benefits.

Studies suggest that people who drink coffee are less likely to get certain illnesses, such as heart disease, but we don't know why. To learn more, Mohsen Ghanbari at Erasmus University Medical Center in Rotterdam, the Netherlands, and his colleagues looked at whether coffee consumption is associated with the presence of certain epigenetic markers – chemical tags on DNA – that increase or decrease the activity of certain genes that may influence health.

They looked for particular markers known as methyl groups in almost 16,000 people of European and African American descent in the the US and Europe. The more cups of coffee a person drank per day, the more likely they were to have altered levels of methyl groups at 11 particular DNA sites. This was still true after age, body mass index, smoking, alcohol consumption and other factors that may have influenced the results were taken into account (bioRxiv, doi.org/dsts).

The methyl groups tended to be attached to genes that play

"This provides tantalising clues to how epigenetics could explain some of coffee's health benefits"

roles in digestion, processing harmful chemicals and controlling inflammation.

These are "tantalising clues" to how epigenetics could explain some of coffee's health effects, says Peter Molloy at the Commonwealth Scientific and Industrial Research Organisation in Australia. But more studies are needed to prove that the markers alter the activity of these genes and that this affects our health, he says. ▮

Solar system

Glut of suspected interstellar asteroids discovered

Jonathan O'Callaghan

DOTTEDZEBRA/ALAMY

An artist's rendition of 'Oumuamua, an interstellar asteroid

NINETEEN objects orbiting our sun may have originated around another star, suggesting interstellar objects in our solar system may be more common than previously thought.

Fathi Namouni at the Côte d'Azur Observatory in Nice, France, and Helena Morais at São Paulo State University in Brazil simulated how the orbits of objects called centaurs have evolved since the dawn of the solar system. Centaurs are found between Jupiter and Neptune and have similarities to both asteroids and comets.

They found that the orbits of 17 centaurs could be explained by them being captured by our sun early in its life. A further two asteroids orbiting further out past Neptune, known as trans-Neptunian objects, also appear to have a similar origin.

"We followed their motion back in time to 4.5 billion years [ago] and found that all of these objects [were] perpendicular to the plane of the solar system," says Namouni. "This tells us they could not have been part of the solar system and must have been captured."

The researchers believe that these 19 objects were captured when the early sun was surrounded by a protoplanetary disc of dust and gas. This material could have slowed incoming objects from other young stars born nearby, although the 19 in question aren't thought to all have the same origin (*Monthly Notices of the Royal Astronomical Society*, doi.org/dst3).

To date, only two interstellar objects have been definitively identified in our solar system: the asteroid 'Oumuamua in 2017 and the comet 2I/Borisov in 2019.

It is thought that many such interstellar objects are constantly traversing our galaxy, and some of them also pass through our solar system. However, as these hurtle past our sun at high speed, we usually only have a brief window to study them. If numerous interstellar objects are permanently orbiting the sun, it would open up new avenues to observe objects born around other stars.

Studying them with telescopes should be possible, but using a spacecraft might be more challenging, according to Colin Snodgrass at the University of Edinburgh in the UK, deputy lead on the European Space Agency's Comet Interceptor project. "Any mission [would] need a big rocket to go out there," he says. "There's a reason why we haven't had a mission to any centaur."

Kat Volk at the University of Arizona says it is hard to trace the history of specific objects. "These high-inclination objects are interesting and present a challenge for solar system formation and evolution models, but I don't think an interstellar origin is convincing based on this work," she says.

Namouni, however, says that the centaurs are on stable orbits, and he is very confident that all 19 objects are of interstellar origin. "From my point of view, they are confirmed," he says. "What we need to do is to go and observe them and try to see if they look like solar system asteroids or not." ▮