New Scientist

WEEKLY October 2-8, 2021

HOW JUPITER MADE THE SOLAR SYSTEM

FIRST CRISPR FOOD GOES ON SALE

CHINA'S BID FOR GLOBAL QUANTUM SUPREMACY

COP26 BOSS ALOK SHARMA: 'WE HAVE TO GET THIS RIGHT'

EAT *yourself* YOUNG

Why caring for your gut microbiome holds the key to healthy aging

LUNAR DARK MATTER
Are secrets hiding in the moon's craters?

PLUS BENEFITS OF BEING A BOOKWORM / **FOUNDATION, REVIEWED** / **HOW APES LOST THEIR TAILS** / THE BEST WAY TO TIE SHOELACES

Science and technology news **www.newscientist.com**

No3354 US$6.99 CAN$9.99

0 72440 30690 5 39

Planetary science

Hints of a solar system smash-up

Jupiter's wobbles may have flung asteroids together to make hybrid meteorites

Jonathan O'Callaghan

A METEORITE that fell on Earth more than a century ago may contain some of the first concrete evidence for a cosmic mash-up in the early solar system.

Following the birth of our sun 4.5 billion years ago, it is thought that Jupiter's formation caused two reservoirs of asteroids to gather in the solar system, one inside the giant planet's orbit and one outside. The former are known as non-carbonaceous asteroids, because they are traditionally low in carbon, whereas the latter are carbonaceous asteroids, richer in things such as water and carbon that were able to survive further from the sun's heat.

There had been some evidence that dust from these two reservoirs had mixed, possibly as a result of Jupiter and the other outer planets migrating slightly in their orbits towards and away from the sun as the solar system settled.

Now, Fridolin Spitzer at the University of Münster in Germany and his colleagues have found some of the best evidence yet for mixing. It comes from a meteorite that appears to contain both carbonaceous and non-carbonaceous material. "This implies it's a mixture between these two reservoirs," says Spitzer.

The space rock, called the Nedagolla meteorite, fell in India in 1870. It was already unusual in that its chemical composition didn't match any other meteorites analysed to date, suggesting it didn't share a common origin with any meteorites on Earth.

When Spitzer and his team studied the meteorite to learn more about its origins, they were surprised to find pockets of the element molybdenum with different concentrations, some corresponding to carbonaceous meteorites and others to non-carbonaceous ones.

Measurements of the radioactive decay of the meteorite suggest that it formed at least 7 million years after the birth of our solar system (arxiv.org/abs/2109.04224). Two asteroids from the inner and outer reservoirs appear to have smashed together to form the meteorite,

VIKTORIIA RUBAN/ALAMY

Jupiter's formation separated asteroids into two groups

possibly as a result of Jupiter's gravitational pull as it moved towards or away from the sun.

"It's nice to find evidence that this actually happened," says Spitzer. If the team is correct, it would be some of the first meteoritic evidence that the mixing really took place.

"It's exciting," says Harold Connolly at Rowan University in New Jersey. "It's what we should be able to see if Jupiter was migrating and throwing material in and out of the solar system."

Other indirect evidence for this migration does exist, says Sara Russell at the Natural History Museum in London, such as the small size of the planet Mars – possibly the result of Jupiter being closer to Mars than it is today and sweeping up material, preventing Mars from growing larger.

"Then there's the massive diversity of material in the asteroid belt, which is really a jumble of super-ice-rich stuff and stuff that's at [relatively] high temperature," says Russell. "You need to have something stirring the pot to mix things up."

The Nedagolla meteorite would be the first physical evidence of a collision between a pair of asteroids from the two reservoirs, though. Meteorites already in collections on Earth may also contain similar evidence.

"There's so many parts of the collections that are really unexplored," says Russell. "I'm sure there are loads and loads of secrets to find out." ▮

Animal behaviour

Elephants used in Thai tourist industry have nervous tics

MORE than half the elephants in multiple Thai tourist facilities have nervous tics that may reflect anxiety, frustration or boredom.

The involvement of scientists in the elephant tourism industry has led to improvements in welfare, but many captive Thai elephants still develop repetitive behaviours called stereotypies, which are similar to nervous tics.

Pakkanut Bansiddhi at Chiang Mai University in Thailand and her colleagues observed the behaviour of 283 Indian elephants (*Elephas maximus indicus*) in 20 tourist facilities in Thailand's Chiang Mai province where elephants give tourists rides, walk side by side with them and participate in shows.

The team found that 57 per cent of these elephants showed repetitive behaviours, including swaying side to side, weaving or pacing around, bobbing their heads, making useless limb movements and rocking back and forth on their feet, at least once in a 15-minute period.

On average, the elephants did these things about six times in that period. The highest prevalence was in elephants aged between 4 and 10. Those younger than 3 and older than 50 were least likely to show these behaviours (*Applied Animal Behaviour Science*, doi.org/gxct).

"I'm surprised the figures are not higher than that," says Andrew McLean at the Human Elephant Learning Programs foundation in Australia. "Wherever they chain elephants, there are almost always locomotor stereotypies."

"Tics in young elephants could reflect anxiety about being separated from their mothers"

Trainers generally separate young elephants from their mothers when they are 3 or 4 years old. Their tics could reflect anxiety about their new situation, says Bansiddhi. Older elephants may have simply "learned to cope better with the stress in their environment", she says.

McLean, however, wonders if older elephants have reached a state called learned helplessness, in which animals give up trying to cope. ▮

Christa Lesté-Lasserre