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SPACE

# COMPOUNDS ESSENTIAL FOR LIFE FOUND IN SAMPLES COLLECTED FROM A NEAR-EARTH ASTEROID

Samples collected during Hayabusa2's trip to the asteroid Ryugu contain uracil, a substance present in RNA

**O**rganic compounds essential for life have been discovered in samples collected from a distant asteroid by Japan's Hayabusa2 Spacecraft.

The compounds discovered include niacin, which is also known as vitamin B3, and uracil, one of the four nucleobases. Nucleobases are nitrogen-containing compounds that make up RNA, which is a molecule present in all living cells and has structural similarities to DNA.

"Scientists have previously found nucleobases and vitamins in certain carbon-rich meteorites, but there was always the question of contamination by exposure to the Earth's environment," said lead researcher Prof Yasuhiro Oba, of Hokkaido University.

"Since the Hayabusa2 spacecraft collected two samples directly from the asteroid Ryugu and delivered them to Earth in sealed capsules, contamination can be ruled out."

Hayabusa2 was launched in December 2014 by the Japanese space agency JAXA. It reached its target, the space rock Ryugu,

## "The finding adds further credence to the theory of panspermia"

in June 2018, stayed for a year and a half to gather samples, and returned them to Earth in December 2020.

The team extracted the compounds by soaking samples taken from Ryugu in hot water and analysing them with a high-

resolution mass spectrometer. As well as uracil and niacin, they also found several other biologically important molecules, including a selection of amino acids, amines and carboxylic acids, which are found in proteins and play a role in the metabolism of living things.

The compounds likely formed from simpler molecules such as ammonia, formaldehyde and hydrogen cyanide, which are all commonly found in cometary ice, the researchers say.

The finding adds further credence to the theory of panspermia – the hypothesis that important building blocks for life are created in space and could have been brought to Earth by meteorites.

"The discovery of uracil in the samples from Ryugu lends strength to current theories regarding the source of nucleobases in the early Earth," said Oba.

"The OSIRIS-REx mission by NASA will be returning samples from asteroid Bennu this year, and a comparative study of the composition of these asteroids will provide further data to build on these theories."

