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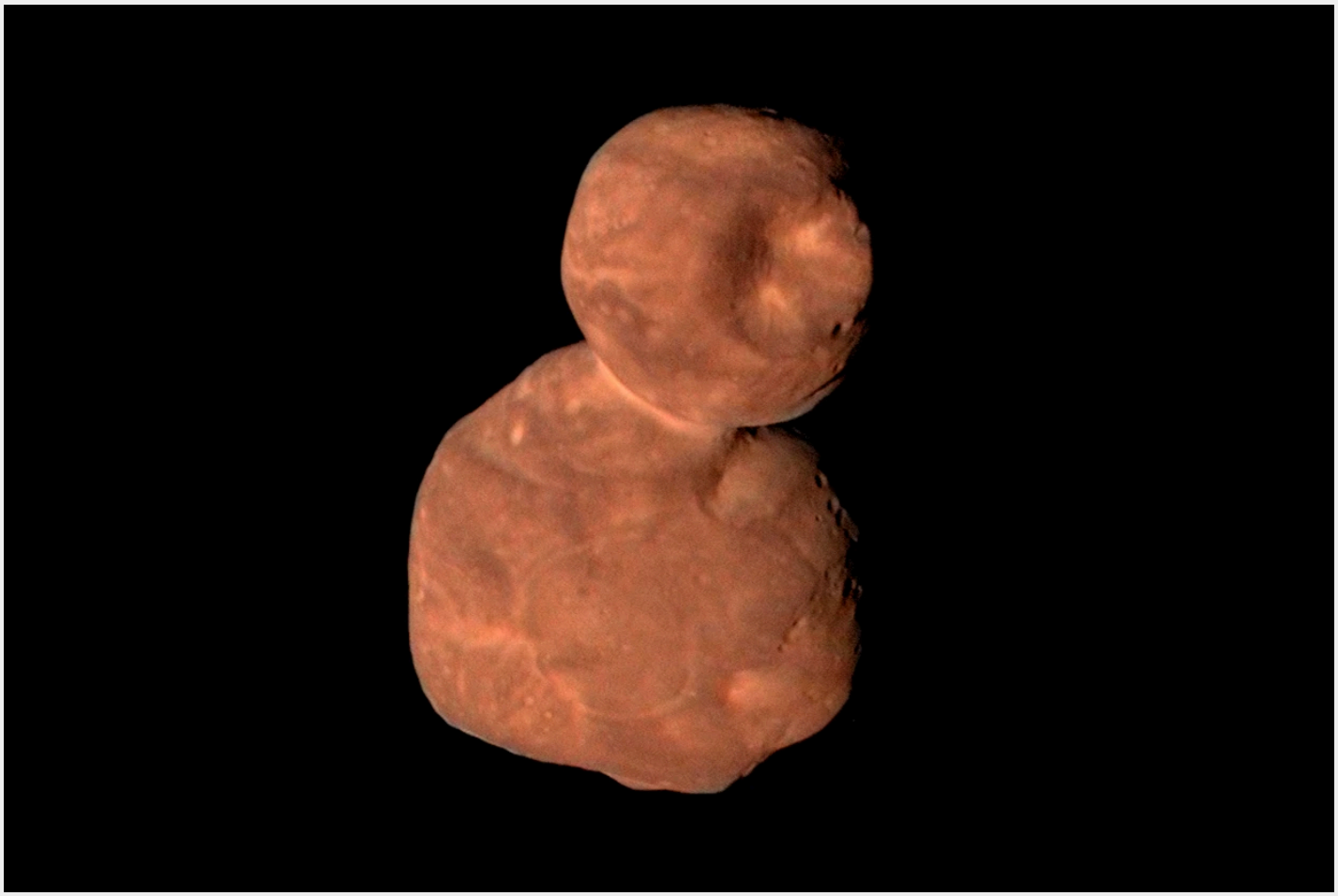
‘Sugar world’ sweetens the Solar System’s remote reaches

The icy body Arrokoth has a sugary coating that gives the body its distinctive red appearance.



The icy body Arrokoth (artificially coloured) might be sugar coated, according to laboratory experiments on the types of ice found on its surface. Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute/Roman Tkachenko

After visiting Pluto in 2015, NASA's New Horizons probe continued its lonely voyage through the cold, dark outer reaches of the Solar System. But it was rewarded with its next target — a red, sugary treat.

The object, named Arrokoth, is an icy body that looks like two irregular M&Ms stuck together. When New Horizons took close-up photographs of it in 2019, planetary scientists were puzzled by its distinctive red shade. The probe also revealed that Arrokoth is rich in methanol ice, which is unusual for objects in its region of the Solar System.

To find out how Arrokoth's surface got painted, Chaojiang Zhang at the University of Hawaii at Manoa and his colleagues bombarded methanol ices and carbon monoxide — which is often produced when methanol is exposed to radiation — with high-energy electrons in the laboratory[1]. This replicated the dose of cosmic radiation that Arrokoth faced over a period of almost 2 billion years. The interaction yielded sugars such as ribose and glucose, which can produce a reddish tinge.

'Sugar worlds' such as Arrokoth are a plausible source of organic molecules important to life's evolution, the authors say.

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References

1. Zhang, C. *et al. Proc. Natl Acad. Sci. USA* **121**, e2320215121 (2024).