‘Oumuamua

Unpacking the mystery of our interstellar visitor

For the time being, the idea of building a spacecraft which can carry us to other stars is a goal reserved for the future – but that doesn’t stop interstellar visitors from coming to us. In 2017, a small, mysterious object named ‘Oumuamua became the first body in the Solar System ever confirmed to originate from a star system beyond our own.

Immediately, the sighting sparked numerous compelling theories about the origins of ‘Oumuamua, and ever since, the story of our understanding of this enigmatic object has followed surprising twists and turns. Although we may never know the full truth, ‘Oumuamua could have a lot to tell us about the early history of our Solar System – and how future sightings of interstellar visitors may appear.

AN ODD SPECK IN THE SKY

Perched on a mountaintop in the Hawaiian island of Maui, the Pan-STARRS telescope continually scans the sky for astronomical objects which noticeably move or change in brightness. While searching through data gathered by the telescope, Canadian astronomer Robert Weryk discovered a small object roughly 33 million kilometres from Earth, unlike any asteroid ever seen before.

From the beginning, astronomers’ observations of the object appeared to make little sense. For a start, its orbit around the Sun had a highly elliptical shape – a type of path typically only followed by comets. However, unlike any normal comet, this body didn’t appear to show any sign of a bright, dusty tail.

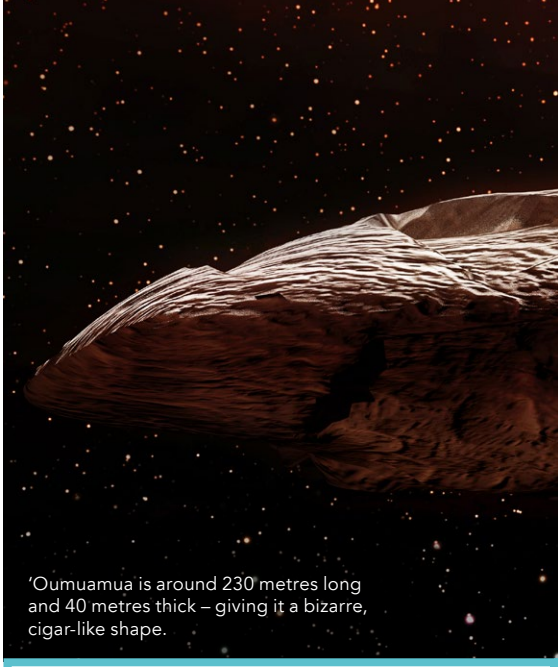
This left just one explanation: the object must have been ejected from another star system at some point in the distant past, before falling into the Sun’s orbit. For this feat, astronomers named Weryk’s discovery ‘Oumuamua, meaning ‘a messenger from the distant past, reaching out to us’ in the Hawaiian language. From this point on, the mysteries surrounding ‘Oumuamua’s origins only deepened.

A SHINY, TUMBLING CIGAR

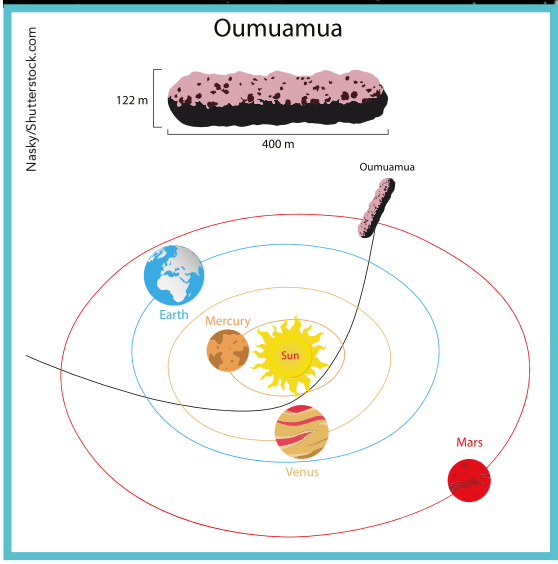
As they surveyed Pan-STARRS’ images, researchers noticed that although ‘Oumuamua was around 230 metres long, its’ thickness was only around 40 metres – giving it a bizarre, cigar-like shape. At the same time, some studies spotted unusual deviations in ‘Oumuamua’s path, which suggested that it must be propelling itself through space through its own mechanisms.

This was particularly strange since according to some researchers, the forces imparted by this propulsion would cause a body as elongated as ‘Oumuamua to spin out of control, and eventually disintegrate. On the contrary, ‘Oumuamua appeared to be perfectly stable; rotating in a tumbling motion that didn’t threaten to break it apart.

Only adding to the object’s strange features was its extreme shininess. As



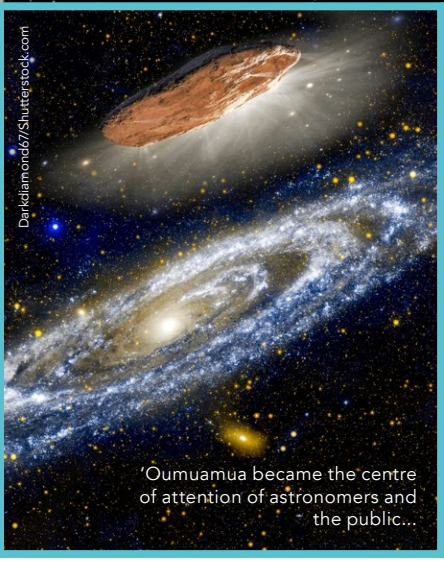
‘Oumuamua is around 230 metres long and 40 metres thick – giving it a bizarre, cigar-like shape.



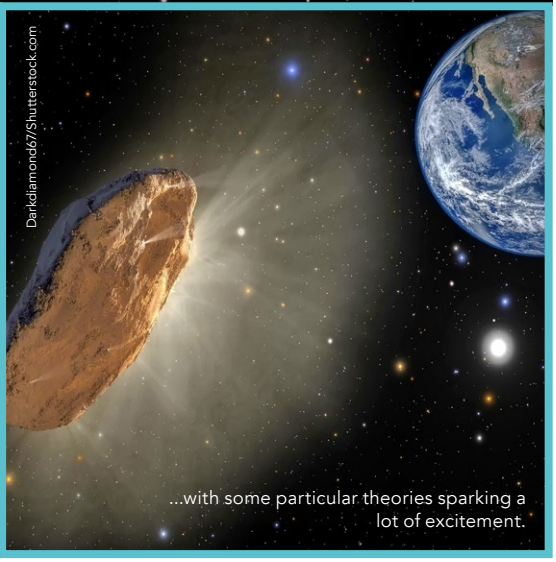
‘Oumuamua’s orbit around the Sun had a highly elliptical shape – a type of path typically only followed by comets.

Robert Weryk discovered ‘Oumuamua using the Pan-STARRS telescope at Haleakalā Observatory, Hawaii, in 2017.

Todd Dalton/Shutterstock.com



'Oumuamua became the centre of attention of astronomers and the public...



...with some particular theories sparking a lot of excitement.

Since our interstellar visitor is now rapidly retreating from Earth, we may never know the complete truth.

if it were coated in highly reflective white paint or metal, 'Oumuamua absorbed very little of the sun's light that fell upon it. In the months and years that followed its initial discovery, 'Oumuamua became the centre of attention of astronomers and the public alike – with some particular theories sparking a lot of excitement.

VISITORS FROM OTHER STARS?

Tentatively, some astronomers suggested that 'Oumuamua's shape, reflectivity, and orbital path were so unusual because they weren't natural at all. Rather, it didn't seem completely out of the question that the object could be a spacecraft, built by a civilisation from beyond the Solar System – maybe sent as a scientific probe; or perhaps an interplanetary that ran wildly off course.

Some theories went even further: suggesting that 'Oumuamua could feature a large solar sail, which harvests the energy contained in starlight to propel itself across vast interstellar distances. The astronomers behind these ideas stressed that they were highly speculative, but that didn't stop them from capturing the public imagination. To the disappointment of some, researchers in 2019 reached a broad consensus that 'Oumuamua had not been constructed by intelligent lifeforms – but many of the theories that remained were no less intriguing.

A GLIMPSE INTO THE PAST?

To explain 'Oumuamua's unusual, apparently self-propelled motions, some astronomers have now suggested that although it can't be a comet, it could be something similar. Conceivably, the object could have begun its interstellar voyage as a comet, but had its surface drastically altered along the way, destroying its characteristic dusty tail. This could explain why 'Oumuamua's surface is so shiny, and suggests it could be releasing hydrogen or nitrogen gas when heated by the sun – which wouldn't be detectable in the images taken by Earth-based telescopes.

Further studies suggest that similar objects could have been common in the Solar System in its earliest stages of planet formation. Here, dust grains were known clump together under their own gravity to form asteroids, which eventually amalgamated themselves to form planets. If this theory is correct, it could suggest that 'Oumuamua is a leftover planetary building block from a long-distant era. Ultimately, these represent just a few of the credible theories that are now circulating – with yet more recent studies suggesting that 'Oumuamua is a broken-off piece of an icy exoplanet, similar to Pluto.

PREPARING FOR FUTURE MYSTERIES

Such a complex web of often contradictory theories will inevitably be difficult to disentangle, and since our interstellar visitor is now rapidly retreating from Earth, we may never know the complete truth. But as technology advances, future telescopes will enable us to explore our Solar System in ever finer levels of detail. In the not-too-distant future, 'Oumuamua could soon be joined by discoveries of other interstellar visitors; shedding new light on mysteries currently shrouded by interstellar space.

Sam Jarman is a freelance writer based in the UK.