

= Adrastea (moon) =

Adrastea (/ ædrə'sti? / ad @-@ r? @-@ STEE @-@ ? ; Greek : ?????????) , also known as Jupiter XV , is the second by distance , and the smallest of the four inner moons of Jupiter . It was discovered in photographs taken by Voyager 2 in 1979 , making it the first natural satellite to be discovered from images taken by an interplanetary spacecraft , rather than through a telescope . It was officially named after the mythological Adrasteia , foster mother of the Greek god Zeus ? the equivalent of the Roman god Jupiter .

Adrastea is one of the few moons in the Solar System known to orbit its planet in less than the length of that planet 's day . It orbits at the edge of Jupiter 's Main Ring and is thought to be the main contributor of material to the Rings of Jupiter . Despite observations made in the 1990s by the Galileo spacecraft , very little is known about the moon 's physical characteristics other than its size and the fact that it is tidally locked to Jupiter .

= = Discovery and observations = =

Adrastea was discovered by David C. Jewitt and G. Edward Danielson in Voyager 2 probe photographs taken on July 8 , 1979 , and received the designation S / 1979 J 1 . Although it appeared only as a dot , it was the first moon to be discovered by an interplanetary spacecraft . Soon after its discovery , two other of the inner moons of Jupiter (Thebe and Metis) were observed in the images taken a few months earlier by Voyager 1 . The Galileo spacecraft was able to determine the moon 's shape in 1998 , but the images remain poor . In 1983 , Adrastea was officially named after the Greek nymph Adrastea , the daughter of Zeus and his lover Ananke .

= = Physical characteristics = =

Adrastea has an irregular shape and measures $20 \times 16 \times 14$ km across . A surface area estimate would be between 840 and 1 @, @ 600 (~ 1 @, @ 200) km² . This makes it the smallest of the four inner moons . The bulk , composition and mass of Adrastea are not known , but assuming that its mean density is like that of Amalthea , around 0 @. @ 86 g / cm³ , its mass can be estimated at about 2×10^{15} kg . Amalthea 's density implies that the moon is composed of water ice with a porosity of 10 ? 15 % , and Adrastea may be similar .

No surface details of Adrastea are known , due to the low resolution of available images .

= = Orbit = =

Adrastea is the smallest and second closest member of the inner Jovian satellite family . It orbits Jupiter at a radius of about 129 @, @ 000 km (1 @. @ 806 Jupiter radii) at the exterior edge of the planet 's Main Ring . Adrastea is one of only three moons in the Solar System known to orbit its planet in less than the length of that planet 's day ? the other two being Jupiter 's innermost moon Metis , and Mars ' moon Phobos . The orbit has very small eccentricity and inclination ? around 0 @. @ 0015 and 0 @. @ 03 ° , respectively . Inclination is relative to the equator of Jupiter .

Due to tidal locking , Adrastea rotates synchronously with its orbital period , keeping one face always looking toward the planet . Its long axis is aligned towards Jupiter , this being the lowest energy configuration .

The orbit of Adrastea lies inside Jupiter 's synchronous orbit radius (as does Metis 's) , and as a result , tidal forces are slowly causing its orbit to decay so that it will one day impact Jupiter . If its density is similar to Amalthea 's then its orbit would actually lie within the fluid Roche limit . However , since it is not breaking up , it must still lie outside its rigid Roche limit .

Adrastea is the second @-@ fastest moving of Jupiter 's moons , with an orbital speed of 31 @. @ 378 km / s .

= = Relationship with Jupiter 's rings = =

Adrastea is the largest contributor to material in Jupiter 's rings . This appears to consist primarily of material that is ejected from the surfaces of Jupiter 's four small inner satellites by meteorite impacts . It is easy for the impact ejecta to be lost from these satellites into space . This is due to the satellites ' low density and their surfaces lying close to the edge of their Roche spheres .

It seems that Adrastea is the most copious source of this ring material , as evidenced by the densest ring (the Main Ring) being located at and within Adrastea 's orbit . More precisely , the orbit of Adrastea lies near the outer edge of Jupiter 's Main Ring . The exact extent of visible ring material depends on the phase angle of the images : in forward @-@ scattered light Adrastea is firmly outside the Main Ring , but in back @-@ scattered light (which reveals much bigger particles) there appears to also be a narrow ringlet outside Adrastea 's orbit .