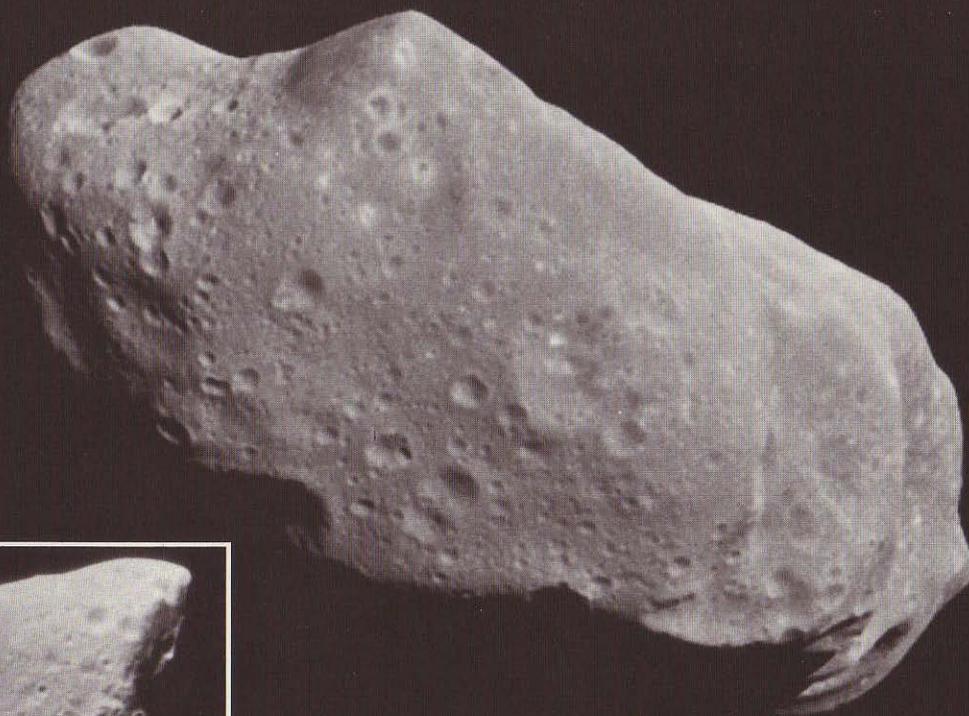




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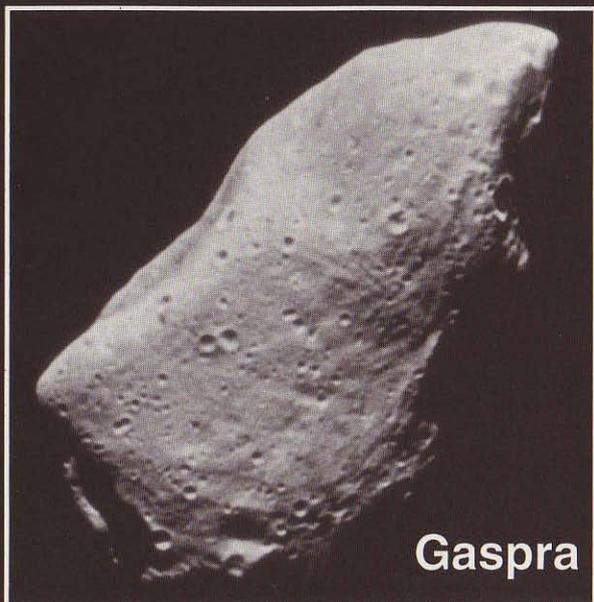
Asteroids: Ida with Moon and Gaspra (Inset)



Ida



Dactyl



Gaspra



The *Galileo* spacecraft, launched on October 18, 1989, has its primary mission reaching Jupiter's system; however, its carefully designed trajectory path allowed the spacecraft to accomplish two secondary missions: flying by two "minor planets"—Gaspra and Ida—and sending back to Earth our first-ever, close-up view of asteroids.

On October 29, 1991, *Galileo* passed within 1,600 kilometers of asteroid 951* Gaspra and, with incredible navigational accuracy, took pictures of it—pictures that reveal an irregular planetary body riddled with craters and fractures. To date, over 600 craters have been identified on the asteroid, the longest measuring about 1.5 kilometers across. The type of cracks seen—some more than 90-meters long—are similar to ones seen before only on the Martian moon Phobos. Some planetary scientists theorize that about 4 billion years ago, Gaspra probably measured about 97 kilometers across. But, after years of catastrophic collisions with other planetary objects, the asteroid now measures a mere 19 X 12 X 11 kilometers. This history may not be unusual for asteroids like Gaspra, many of which are believed to have accreted into relatively substantial minor planets during the formation of the solar system, only to be broken down in collisions over the ensuing billions of years.

On August 28, 1993, *Galileo* approached another asteroid—Ida. This 52-kilometer-long asteroid is more than twice as large as Gaspra. The images *Galileo* sent back reveal that numerous craters—many larger than those observed on Gaspra—pepper the surface of the asteroid. The extensive craters seem to dispel the once-believed theories that Ida's surface is geologically youthful. The sharp images of Ida also dispel a popular belief that Ida is a double body. Though Ida is not a double body in the sense that astronomers had thought, *Galileo* found that it

has a moon. This tiny natural satellite, named Dactyl, is about 1.2 x 1.4 x 1.6 kilometers. It orbits Ida at a distance of about 100 km from Ida's center. Like Ida and Gaspra, Dactyl is a heavily cratered body. The largest crater observed on Dactyl is about 80 meters across. Remarkably, Dactyl appears to be composed of different materials than Ida.

Ida, like Gaspra, is an S-type asteroid, meaning that it is a reddish object composed of a mixture of the minerals pyroxene, olivine, and iron. Approximately one-sixth of all known asteroids fall within the S-type category. Gaspra and Ida like other S-class asteroids are the parent bodies of some types of basaltic meteorites.

Asteroids have long been recognized as the source of most meteorites. Our study of meteorites

has taught us much about the solar system. With advances in telescopic instrumentation in the last 5 years, scientists have recognized the wealth of information that asteroids themselves may provide about the solar system's origin and evolution.

NASA's Near Earth Asteroid Rendezvous (NEAR) mission, scheduled to launch in February 1996, will swing by Earth before reaching its main target—asteroid 433 Eros—in January 1999. During its 1-year rendezvous period, NEAR will address such questions as: "Is Eros related to a known meteorite type?" "Is Eros related to comets?" (Some scientists believe near-Earth asteroids are extinct or dormant comets) and "Is there evidence that Eros is a fragment of a larger body?"

Fast Facts

	951 Gaspra	243 Ida
Distance from Sun		
(At Perihelion) (A.U.)	1.82	2.74
Period of Revolution	3.28 Years	4.84 Years
Length	19 km	52 km
Inclination of Orbit to Ecliptic	4.10°	1.14°
Eccentricity of Orbit	.173	.042
Rotational Period		
(Hours: Minutes)	7:03	4:38
Absolute Magnitude	12.9	11.05
Asteroid Type	S	S

About the Image

Asteroid 243 Ida appears here with its moon, Dactyl (to the right). This image taken by Galileo in August 1993, provides conclusive evidence that natural satellites of asteroids exist. The asteroid 951 Gaspra (inset) image is a mosaic of two images taken by Galileo from a range of 5,300 km some 10 minutes before closest approach, on October 29, 1991. Images are not to the same scale. These asteroids are located in the main asteroid belt between Mars and Jupiter.

Significant Dates

1801	Piazzi discovered first asteroid, named 1 Ceres
1884	Palisa discovered asteroid 243 Ida
1898	Witt discovered asteroid 433 Eros
1916	Neujmin discovered asteroid 951 Gaspra
1991	<i>Galileo</i> encountered asteroid 951 Gaspra
1993	<i>Galileo</i> encountered asteroid 243 Ida
1994	Dactyl discovered on <i>Galileo</i> images data
1996	NEAR mission will launch
1999	NEAR will encounter asteroid 433 Eros

References

1. *Galileo Fact Sheet*, NASA Headquarters, Washington DC. 3/92.
2. *Our Solar System, a Geologic Snapshot*, NP-157, NASA Headquarters, Washington, DC. 5/92.
3. *Our Solar System at a Glance*, Information Summaries, PMS 010-A, Jet Propulsion Laboratory, Pasadena, CA. 6/91.

* The number assigned to an asteroid (e.g., 951) denotes the order in which the asteroid's orbit was catalogued.