

Astronomy

The world's best-selling astronomy magazine

EARTH IS A PLANET TOO!

How we learn about other worlds from the ground beneath our feet p. 16

» A new age for gravitational waves and cosmic rays p. 24

PLUS

The sky's best planetary nebulae p. 50

Astronomy with a small scope p. 40

Bob Berman on observing accessories p. 13

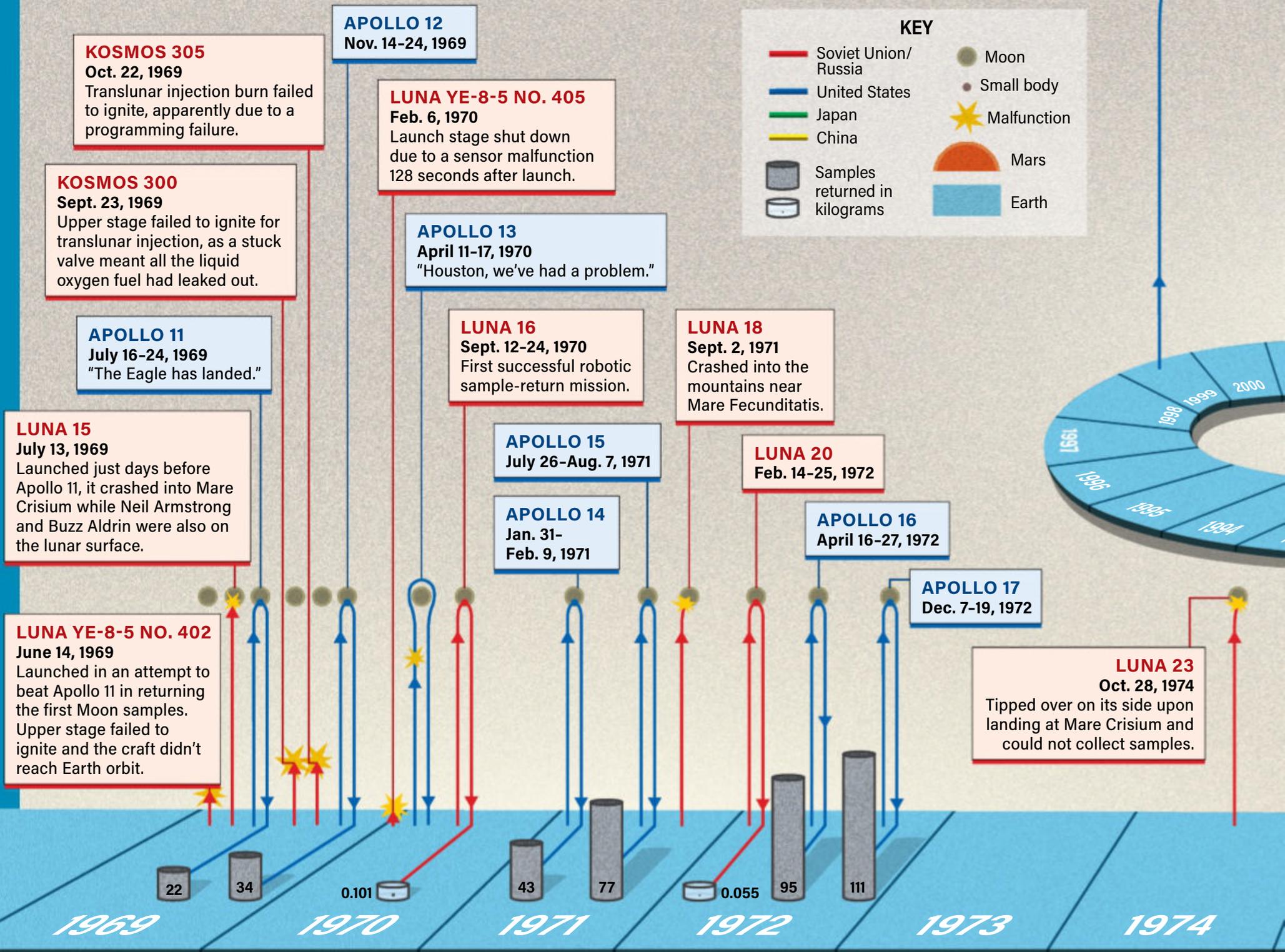
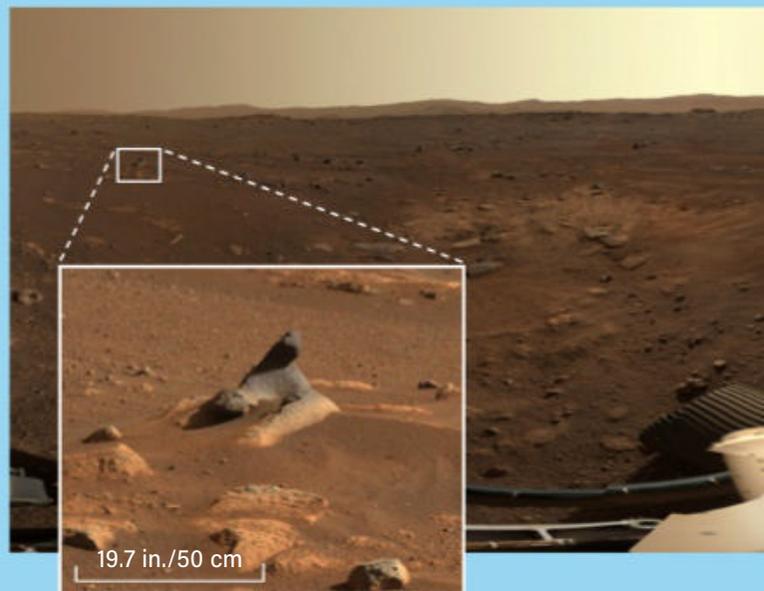
www.Astronomy.com

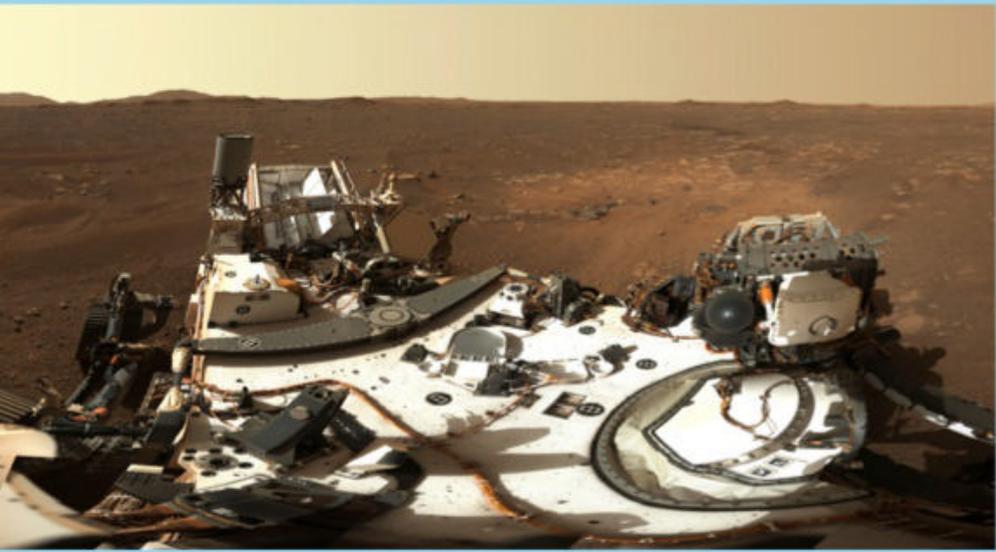
**BONUS
ONLINE
CONTENT
CODE p. 4**

BRING IT BACK HOME

Precious cargo. Intrepid probes that return pictures and data are great; even better is when they return samples that scientists can analyze with lab equipment on Earth. But while astronauts could pick up and haul hundreds of pounds, robotic probes are limited to just a handful of pounds — or even just specks of dust from the wispy atmospheres of comets or asteroids.

The history of deep-space sample-return missions began during the Space Race in the 1960s and '70s, when Soviet robotic probes raced (and nearly beat) the American crewed Apollo missions. In 1999, sample-return missions began again in earnest with the U.S. mission to the comet 81P/Wild. Japan completed two successful Hayabusa missions to near-Earth asteroids, and earlier this year, China joined the club of sample-return nations with its Chang'e 5 mission. — MARK ZASTROW

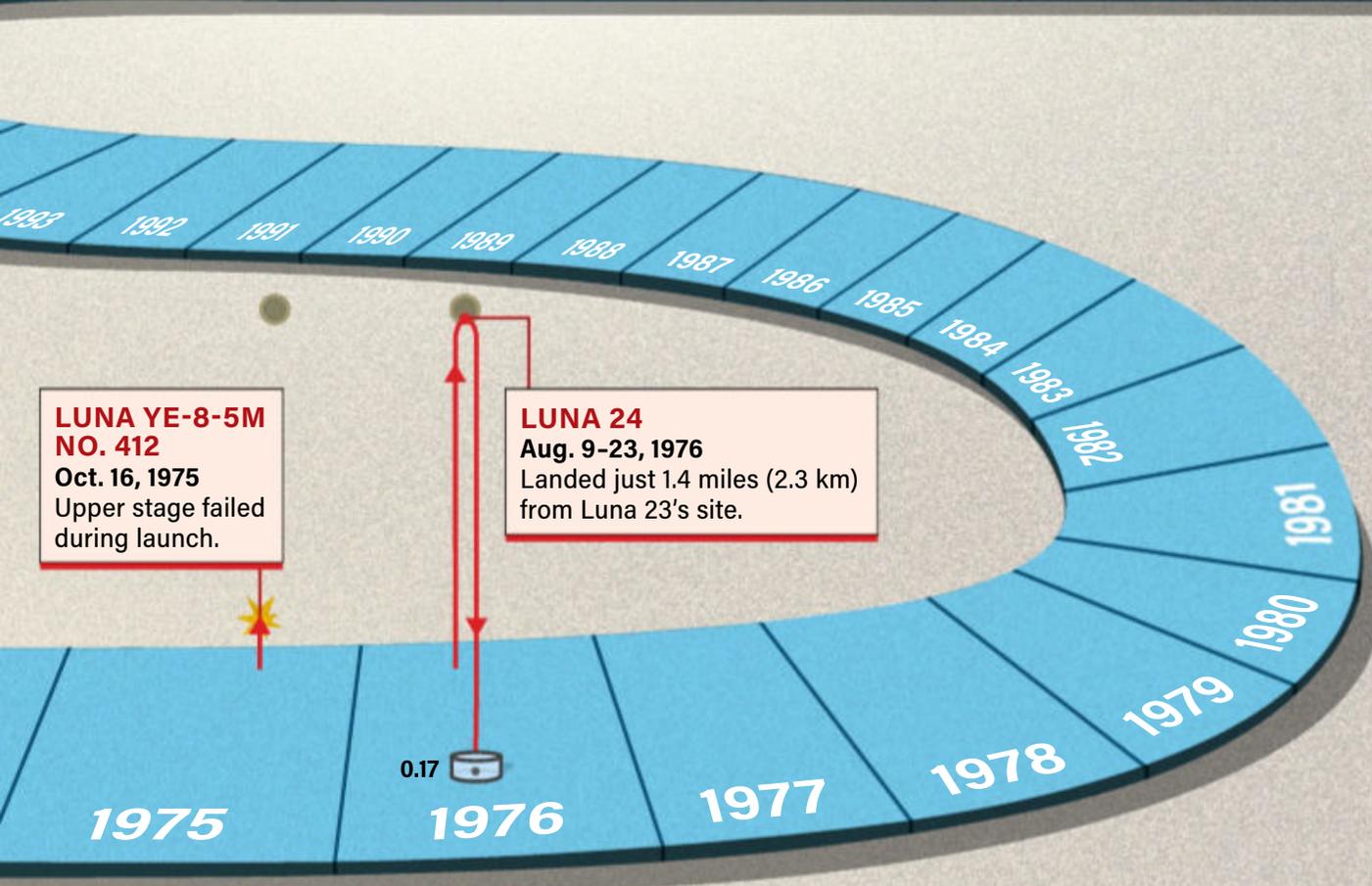
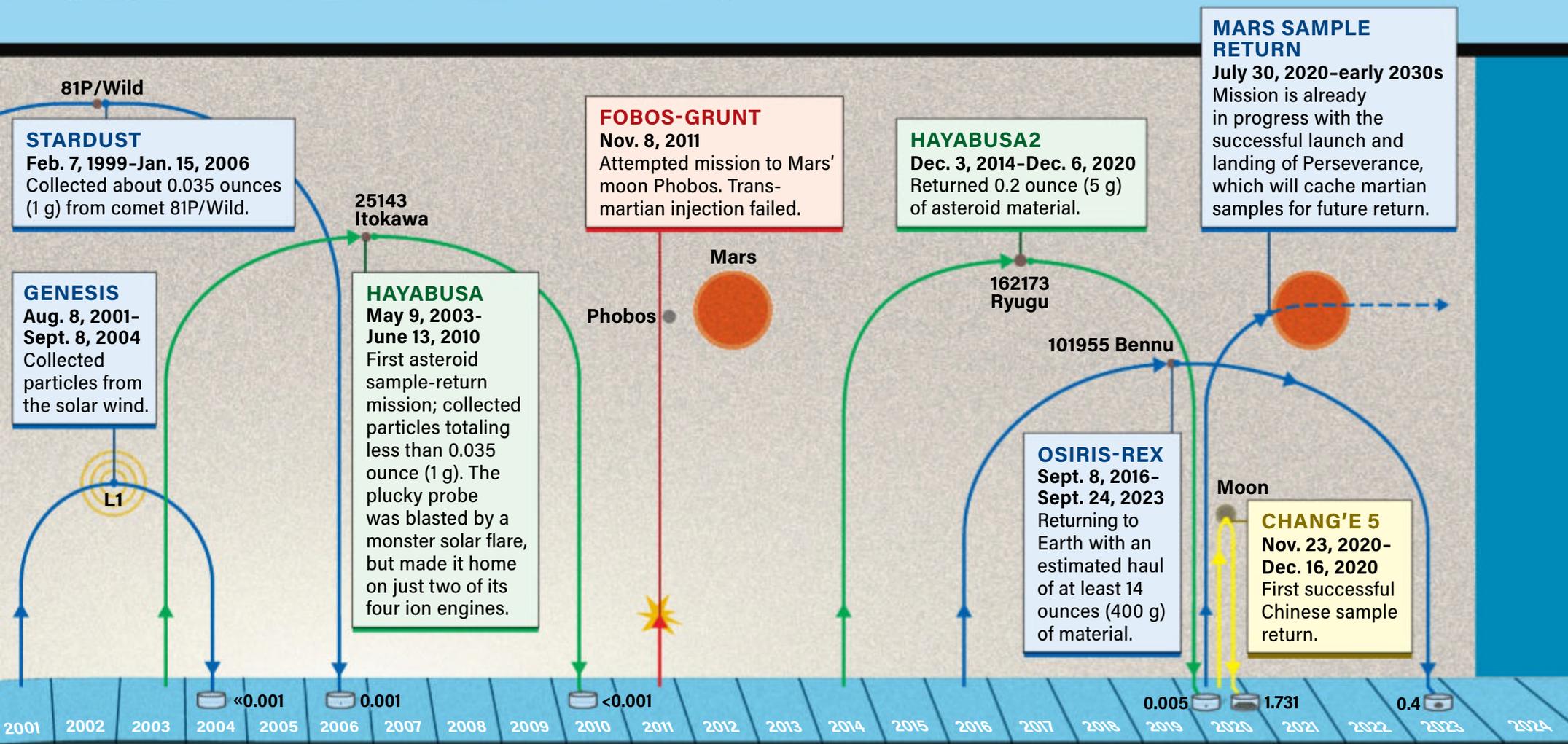




NASA/JPL-CALTECH/ASU/MSSS

Perseverance takes in the view

Mars' Jezero Crater has a new visitor capturing its stunning vistas. NASA's Perseverance rover took this panorama Feb. 21, 2021 — three days after it landed — using a pair of cameras mounted to its mast. About 1 mile (1.6 kilometers) in the distance sits the roughly 200-foot-tall (60 meters) ridgeline of an ancient delta, consisting of a mass of sediment deposited when a long-lost river flowed into Jezero Crater. Beyond that lies the crater rim itself, some 2,000 feet (600 m) high. The inset shows a rock with a unique overhanging shape, carved and eroded by the martian wind. —M.Z.



FUTURE MISSIONS

CHANG'E 6

2023

China's second lunar sample-return mission will use hardware similar to Chang'e 5.

MARTIAN MOONS EXPLORATION (MMX)

2024–2029

This planned Japanese mission to Phobos aims to collect at least 0.35 ounces (10 g) of material.

MARS SAMPLE RETURN

July 30, 2020–early 2030s

NASA and the European Space Agency are planning missions to retrieve the sample caches prepared by Perseverance. The agencies are targeting the early 2030s as a potential launch date.

ASTRONOMY: ROEN KELLY