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Strange

Metals

Parenting

LGBTQ

Kids

The Fight for an

Ancient Forest

What We're Learning from

AI

How to decode ancient scrolls, prove theorems
and study intelligence itself

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Sample Return

Bringing outer space to Earth is a tough challenge

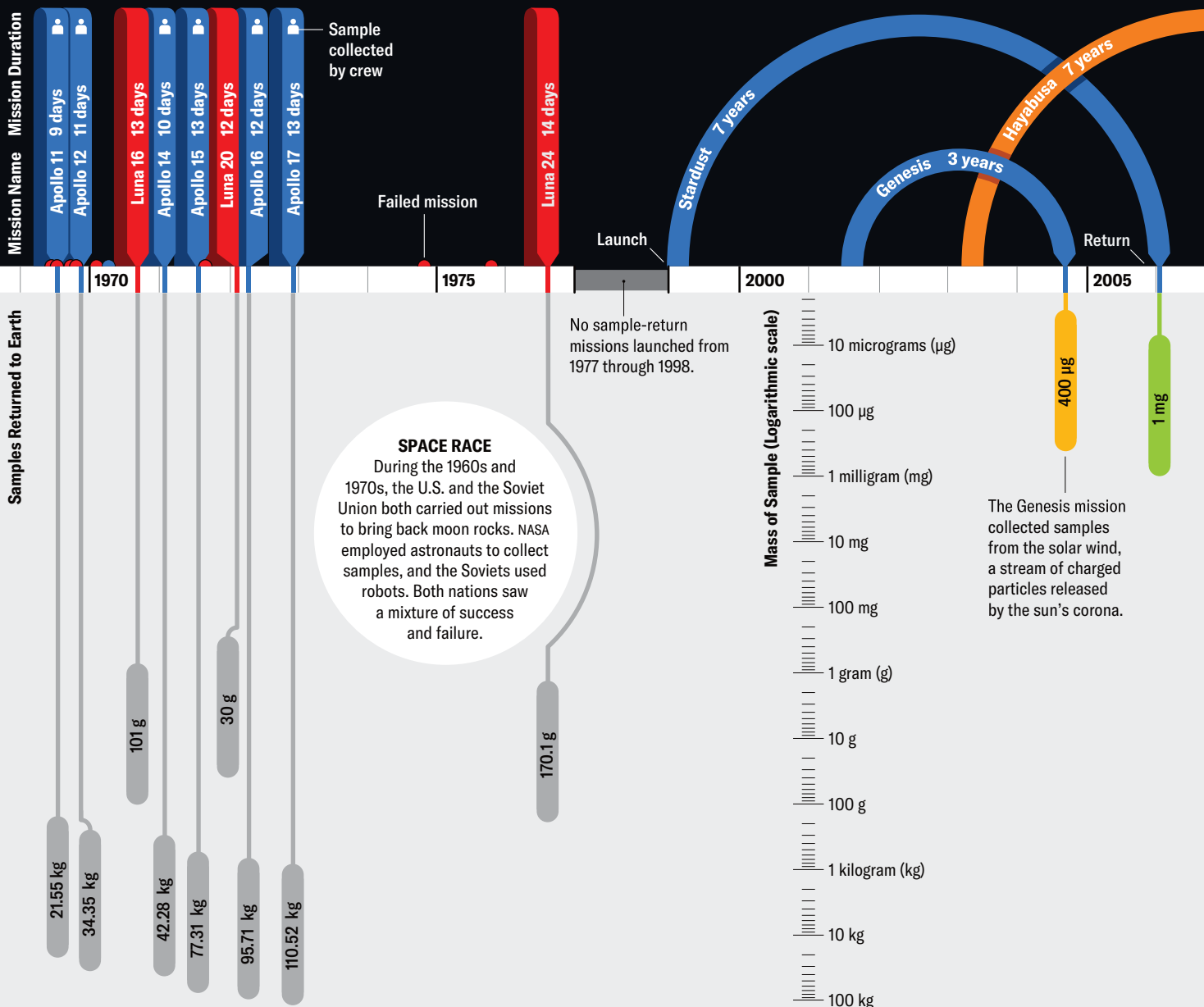
TEXT BY CLARA MOSKOWITZ

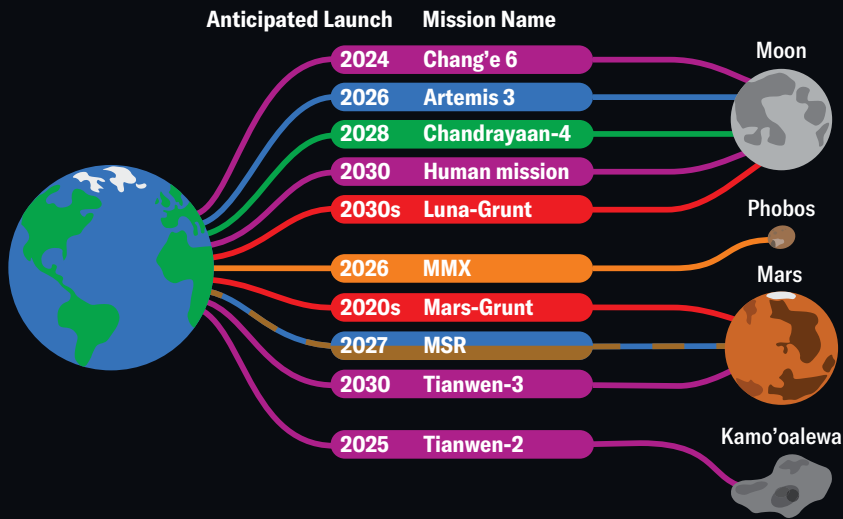
GRAPHIC BY JOHN KNIGHT

VISITING MOONS, ASTEROIDS and planets is great, but taking a piece of them home is even better, according to traditional space wisdom. Bringing samples to Earth allows scientists to study them with the full breadth of existing laboratory technology, whereas only limited analyses are possible on other worlds. Yet retrieving samples from such locations requires not just getting there but launching off the surface and getting home, too. “It’s hard to do, and as a result, it hasn’t

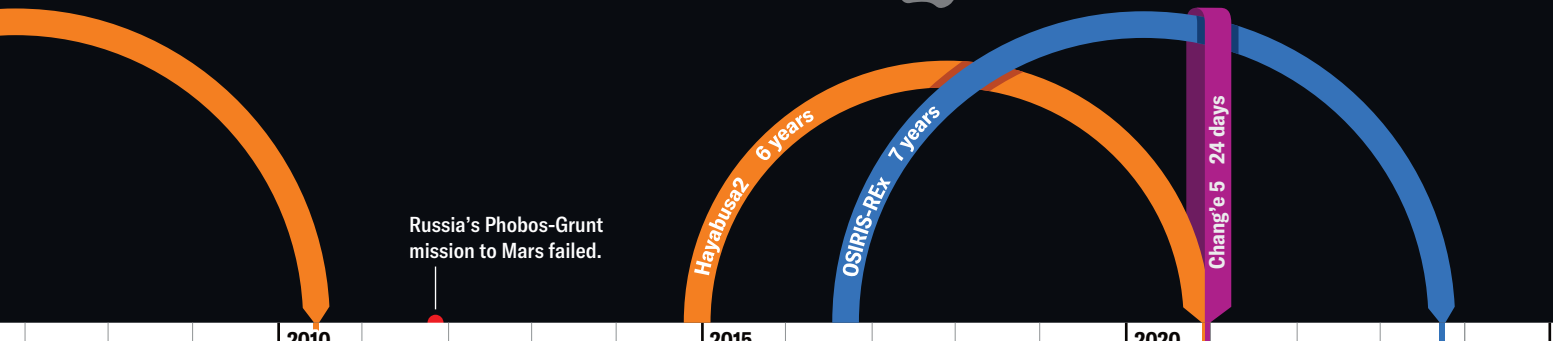
been done very often,” says space historian Roger Launius.

Although humans have sent 10 successful landers to Mars, no one has yet brought bits of Mars to Earth. That could change in the coming decade, though, as NASA and space agencies in Europe, China, Russia and Japan have proposals in the works to achieve this milestone. NASA’s Perseverance rover has already collected samples on the Red Planet in preparation for a future retrieval mission.

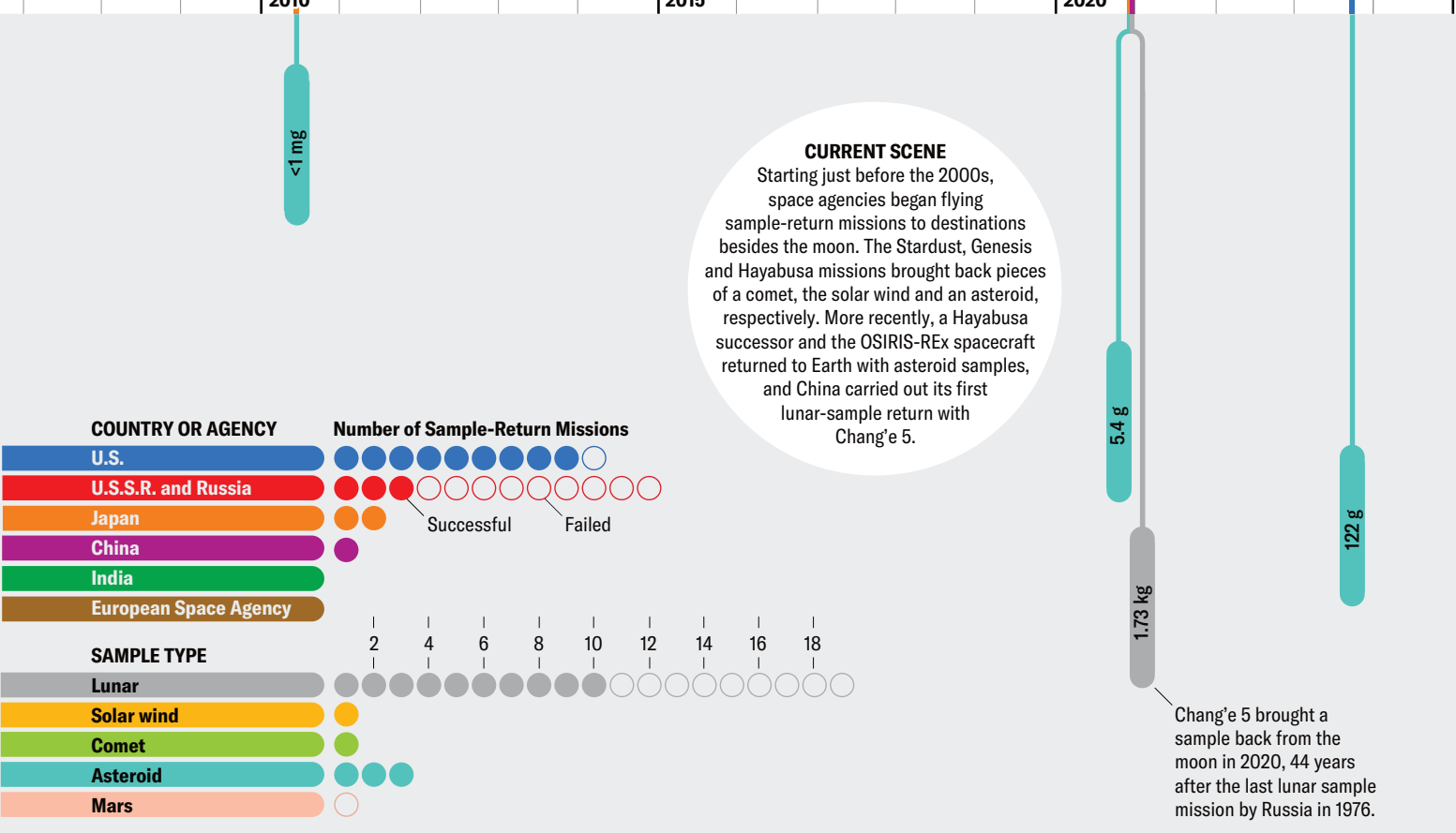




FUTURE PLANS
 China and India are planning their own missions to retrieve asteroid samples, and multiple nations are targeting the big prize: Mars.



CURRENT SCENE
 Starting just before the 2000s, space agencies began flying sample-return missions to destinations besides the moon. The Stardust, Genesis and Hayabusa missions brought back pieces of a comet, the solar wind and an asteroid, respectively. More recently, a Hayabusa successor and the OSIRIS-REx spacecraft returned to Earth with asteroid samples, and China carried out its first lunar-sample return with Chang'e 5.



Chang'e 5 brought a sample back from the moon in 2020, 44 years after the last lunar sample mission by Russia in 1976.