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IS DIGGING A HOLE
ON MARS

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China's groundbreaking grab-and-go moon mission

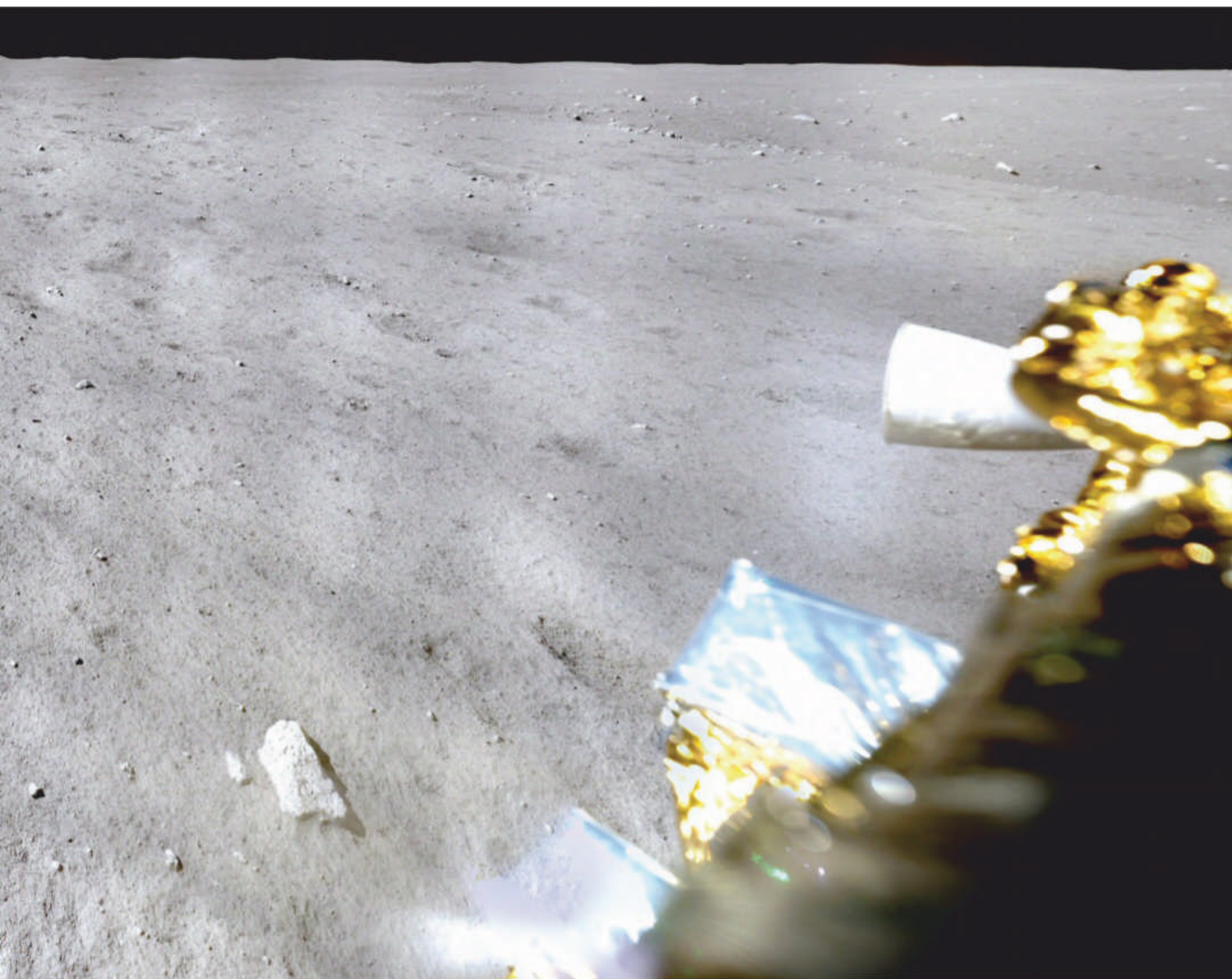
The last time a robot landed on the moon to collect samples and return them to Earth, Apollo astronauts had been roaming the surface only a few years earlier. The Soviet Luna 24 spacecraft brought back six ounces of soil in August 1976—an impressive technical feat at the time.

Fast forward to December 1, 2020, when China's Chang'e-5 touched down on the Ocean of Storms (above) to gather moon rocks, 21st-century style.

It was the third Chinese lunar landing in seven years, and the most sophisticated.

As on previous Chang'e missions, the lander used onboard navigation to autonomously tweak its descent trajectory, avoid hazards, and come down in a smooth, safe spot in its pre-planned target area near Mons Rümker, a volcanic formation that rises more than a kilometer above the surrounding plain.

Within hours the lander deployed a sampling



arm and coring drill to collect material from the surface and dig as deep down as two meters. It also used ground-penetrating radar to scan the local subsurface and reveal its geology.

The most innovative part of the mission came next. After liftoff from the moon on December 3, the ascent vehicle rendezvoused and docked with a lunar orbiter and the samples were transferred to a capsule that returned to Earth on December 16. All of these steps were automated—no astronauts or ground controllers guided the complex and precise maneuvers. That was a first, and a necessity for future sample-return missions to Mars.

Chang'e-5's landing zone had been carefully

chosen so that scientists could get volcanic rocks of a much younger age than the ones Apollo 11 and 12 astronauts collected in 1969. That should give them insight into the moon's geologic evolution, and help them more accurately date other planetary surfaces in the solar system.

The four and a half pounds of lunar material were delivered to the National Astronomical Observatories of China in Beijing for initial analysis and careful storage. And, as NASA has done for 50 years, some will be loaned to outside researchers—but only under very strict protocols. This kind of scientific treasure is hard to come by.

■ TONY REICHHARDT