

Scientists cheer as space probe lands on comet

By Los Angeles Times, adapted by Newsela staff

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Experts watch their screens at the control center of the European Space Agency (ESA) in Darmstadt, Germany, Aug. 6, 2014. A mission to land the first space probe on a comet reached a major milestone when the unmanned Rosetta spacecraft caught up with its quarry on Wednesday.

Scientists from the European Space Agency (ESA) made history this week: they successfully landed a spacecraft on a comet for the first time.

Philae is a mobile laboratory the size of a washing machine. A few years ago, the agency sent it deep into space, and on Wednesday, it landed on comet 67P.

Before Philae, spacecraft had slammed into comets, but had never landed gently on one.

The scientists are hoping to study what exactly comets are made of. They believe comets may contain material from the earliest days of the solar system. Studying the comets more closely may help us to learn about the history of the solar system.

Careful Landing Planning

Philae, the landing craft, had been attached to the Rosetta orbiter for a decade. At 3:35 a.m. EST Wednesday, the lander detached and began its slow, seven-hour free-fall toward the comet. The craft had been circling the comet for months.

To safely land Philae on the comet's surface, scientists had to face many potential dangers. If the lander was going a little too fast or too slow, a safe landing would have been impossible. Scientists could not steer the probe once it separated. The operation relied on communication between the two spacecraft because only the Rosetta orbiter could send signals back to Earth.

The landing was successful but it was not entirely smooth. The Philae lander was supposed to fire two harpoons that would attach the spacecraft to the comet. These did not fire, the agency confirmed, and scientists are looking at options to be able to fire them again, even though that operation could create problems of its own.

Comet, Orbiter Get To Know Each Other

This project began in 1993, when the European Space Agency approved the plan. When they began to design and build the spaceship and lander, the agency had a certain comet in mind. But after the launch was delayed due to a problem with a rocket, a new target had to be found—67P was chosen.

Rosetta launched in March 2004. It traveled through space for seven years until the ESA scientists put it in a three-year hibernation to save energy.

So, the Rosetta orbiter has chased 67P through space for the last 10 years. The orbiter will continue to fly with the comet through 2015, collecting data on what the comet looks like, what it's made of, and how much water it is sending into space.

Back on Jan. 20, alarm clocks on the craft woke it up to prepare it for landing.

The orbiter started flying alongside the comet in early August as it headed toward the sun, scanning the surface to pick the best landing site.

Philae Sends Selfies To Earth

As the lander sits on the comet, it is expected to provide some of the best images yet of a comet's nucleus---the solid center. Philae has sensors on its underside that will gather data on the texture of the comet's surface.

At just after 3 a.m. EST Wednesday, the three mechanical screws on the Rosetta orbiter started to turn, the Philae lander detached, and began its 14-mile free-fall to the surface of comet 67P/Churyumov-Gerasimenko.

Philae was falling, but it was falling much slower than it would have on Earth. The gravity of the

mountain-sized comet is much, much weaker than the gravity on Earth—only 1/60,000 the gravity here. Scientists estimated it would take the lander between seven and 10 hours to fall to the comet's surface.

Once on the surface, Philae was supposed to send out two harpoons—hooked metal spears—to keep it from bouncing off. ESA confirmed that those harpoons did not work. Still, agency officials said the lander was in great shape and they were looking for ways to refire the harpoons.

Mark Bentley, an Austrian scientist who is a lead investigator on the Rosetta project, said that deciding whether to refire the harpoons is “tricky.” Because the comet has such low gravity, it is possible that firing the harpoons could actually push Philae off the comet.

Philae To Rosetta To Earth: Success!

Once it landed, Philae sent a message to the Rosetta orbiter to let it know where it was. From there, Rosetta sent the information to Earth. The data took 28 minutes to cross 300 million miles of space. When the message arrived at the command center in Germany, cheers broke out.

Scientists had warned that there was a real chance that the Philae landing would fail. The lander needed to be upright to work properly. The surface of comet 67P is covered with boulders, and if it landed on one, it could have fallen over. Thankfully, it did not.

Scientists are hoping the Rosetta mission will provide answers to many scientific questions: what comets are made of, if they are responsible for bringing water to the early Earth, what their insides are like, and why their surfaces are so inky black.

Researchers believe that the nuclei of comets contain materials from the very earliest days of the solar system. It is possible the ingredients for life were originally brought to Earth by comets. These space scientists hope to see the origins of our planets, and ourselves, up close.

NAME _____

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Quiz

1. Each answer option contains two sentences from the article. Select the option where both sentences suggest that the mission did not go entirely as planned.

- (a) But after the launch was delayed due to a problem with a rocket, a new target had to be found—67P was chosen. The Philae lander was supposed to fire two harpoons that would attach the spacecraft to the comet.
- (b) Philae was falling, but it was falling much slower than it would have on Earth. Once on the surface, Philae was supposed to send out two harpoons—hooked metal spears—to keep it from bouncing off.
- (c) Scientists could not steer the probe once it separated. The landing was successful but it was not entirely smooth.
- (d) The data took 28 minutes to cross 300 million miles of space. The surface of comet 67P is covered with boulders, and if it landed on one, it could have fallen over.

2. Read the sentences from the article.

If the lander was going a little too fast or too slow, a safe landing would have been impossible. Scientists could not steer the probe once it separated.

Which sentence from the article BEST explains why scientists could not steer the probe?

- (a) Philae is a mobile laboratory the size of a washing machine.
- (b) The data took 28 minutes to cross 300 million miles of space.
- (c) At 3:35 a.m. EST Wednesday, the lander detached and began its slow, seven-hour free-fall toward the comet.
- (d) The Philae lander was supposed to fire two harpoons that would attach the spacecraft to the comet.

3. Which of the following BEST describes the interactions between Rosetta and Philae?

- (a) Philae relied on Rosetta to carry it into space, bring it to the comet, and communicate with Earth.
- (b) Rosetta relied on Philae to carry it into space, bring it to the comet, and communicate with Earth.
- (c) Rosetta and Philae were supposed to cooperate on a successful comet landing, but Philae's harpoons did not launch.
- (d) Rosetta and Philae were supposed to cooperate on a successful comet landing, but Rosetta's harpoons did not launch.

4. Read the sentence from the article.

When the message arrived at the command center in Germany, cheers broke out.

All of the following provide context for the scientists' excitement EXCEPT:

- (a) Before Philae, spacecraft had slammed into comets, but had never landed gently on one.
- (b) To safely land Philae on the comet's surface, scientists had to face many potential dangers.
- (c) Back on Jan. 20, alarm clocks on the craft woke it up to prepare it for landing.
- (d) So, the Rosetta orbiter has chased 67P through space for the last 10 years.