

NEWS IN FOCUS

ANCIENT GENOMES DNA analysis delivers Spirit Cave Mummy to US tribe **p.178**

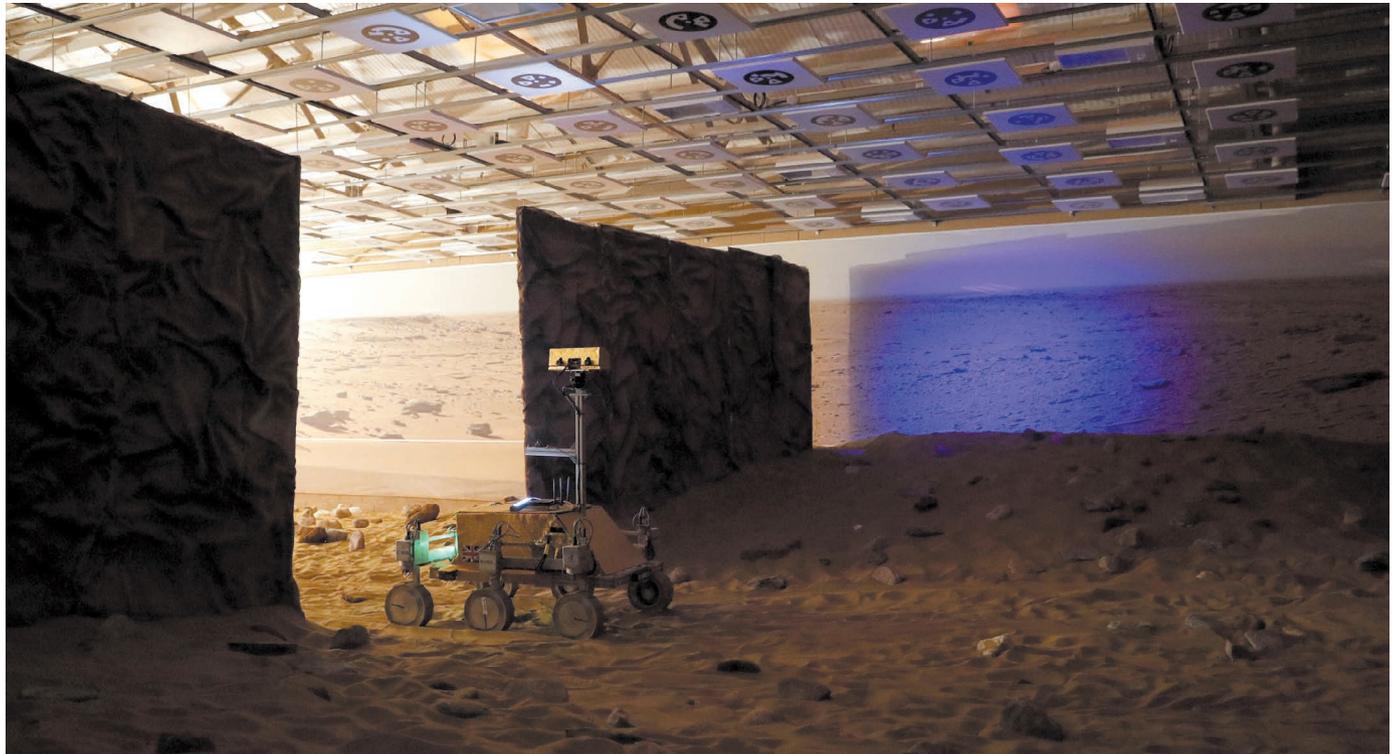
MEXICO Proposal to ban embryo research could stifle science **p.180**

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GENOMICS DNA used to trace the roots of freed slaves **p.184**

ADRIAN DENNIS/AFP/GETTY



A prototype of the ExoMars rover explores a simulated Mars environment.

PLANETARY SCIENCE

Mars rover goes ahead despite crash of test craft

But the European Space Agency's role in a mission to deflect an asteroid moon is over.

BY ELIZABETH GIBNEY

Europe's space agency has secured the cash that it needs to land its first rover on Mars — despite rising costs and the failure of its test Mars lander, Schiaparelli, in October.

“After the many challenging, difficult and rewarding moments of 2016, this is a great relief and a fine result for European space exploration,” says Don McCoy, project manager for the overall ExoMars project, which includes the rover and Schiaparelli, at

the European Space Agency (ESA).

The launch of the Mars rover, a joint project with the Russian space agency Roscosmos, had already been delayed to 2020 from a planned 2018 — a major cause of the cost increase. And the future of the rover mission, called ExoMars 2020, looked to be on shakier ground following the failure of Schiaparelli, which was designed to test Europe's ability to land a craft on the red planet.

But at a meeting of European government ministers in Lucerne, Switzerland, on 1–2 December, ESA member states agreed to

provide an extra €339 million (US\$365 million) for ExoMars 2020, on top of the more than €1 billion already committed to the ExoMars programme. ESA also announced that it will find a further €97 million by moving funds internally. Speaking at a press briefing after the meeting, ESA director-general Jan Wörner said that this would be done “without detriment” to ESA's wider science budget. Together, these sums provide the €436 million needed for ExoMars 2020 to go ahead.

ESA hopes to learn lessons from Schiaparelli. Last week, the agency confirmed ▶

▶ that the crash was caused by errors in the sensor systems that made the craft behave as if it was closer to the Martian surface than it really was. This prompted Schiaparelli to jettison its parachute too early, before falling from a height of about 3.7 kilometres.

“We will have learned much from Schiaparelli that will directly contribute to the second ExoMars mission,” said David Parker, ESA’s director of human spaceflight and robotic exploration at the European Space Research and Technology Centre in Noordwijk, the Netherlands, in a statement.

If successful, the rover will be the first that either Europe or Russia has operated on Mars’s surface. Its major selling point is a drill that can extend to 2 metres, which would allow the robot to dig to a depth where signs of ancient life could have been preserved, protected from the red planet’s harsh radiation.

ASTEROID FAIL

But the meeting also brought bad news for another project. Member states did not commit the €250 million needed to fund a plan for ESA to participate in a mission to deflect the moon of an asteroid.

The Asteroid Impact Mission (AIM) was designed to test a strategy for protecting Earth

from incoming asteroids by subtly changing their course using projectiles. Insiders say that AIM missed its target sum by perhaps a few tens of millions of euros.

“A cool project has been killed because of a lack of vision — even short term — and courage, and this is really sad,” says Patrick Michel, a planetary scientist at the French National Centre for Scientific Research in Nice, who leads the AIM project.

AIM would have sent a probe, two miniature satellites known as CubeSats and a lander to the asteroid Didymos. There, the scientists planned to watch a NASA craft, known as the Double Asteroid Redirection Test (DART), smash into a 165-metre-wide rock that orbits the asteroid, called Didymos.

ESA had hoped to study how the impact would alter the moon’s orbit. In 2022, Didymos will be close enough to Earth to monitor the deflection from the ground, meaning that DART — which is awaiting its own approval decision in March 2017 — can go ahead without AIM. But the ESA craft would have provided more-detailed knowledge, says Michel.

Wörner left the door open for exploring similar asteroid missions in the future. And ministers supported making a smaller amount of funding available to investigate ways of

taking planetary-protection projects forward, he said.

AIM’s cancellation means that ESA now has no small-body missions planned for at least the next 15 years, a particularly bitter disappointment following the success of ESA’s Rosetta mission, which orbited and landed on a comet. AIM would also have been ESA’s first test of laser communication in deep space, and of its interplanetary CubeSats.

Overall, ESA was able to obtain €10.3 billion of the roughly €11 billion it had requested from its 22 member states, plus Slovenia and Canada, for a variety of programmes. This included funding for the International Space Station up to 2024 and for a future space-weather mission in cooperation with NASA and the Japanese space agency, JAXA.

Ministers also agreed to further finance plans for ESA to work with Roscosmos on the Moon lander Luna 27, a collaboration first pitched in 2014.

ESA will spend around €30 million on preparatory work for the mission, which is scheduled for 2020. European scientists and industry hope to contribute landing, communications and drilling and analysis instruments to the craft, which is designed to study soil and the atmosphere at the Moon’s south pole. ■

ANCESTRY

Ancient genome delivers ‘Spirit Cave Mummy’ to US tribe

Sequencing proves Native American roots of 10,600-year-old skeleton.

BY EWEN CALLAWAY

The sequencing of a 10,600-year-old genome has settled a lengthy legal dispute over who should own the oldest mummy in North America — and given scientists a rare insight into early inhabitants of the Americas.

The controversy centred on the ‘Spirit Cave Mummy’, a human skeleton unearthed in 1940 in northwest Nevada. The Fallon Paiute-Shoshone Tribe has long argued that it should be given the remains for reburial, whereas the US government opposed repatriation. Now, genetic analysis has proved that the skeleton is more closely related to contemporary Native Americans than to other global populations. The mummy was handed over to the tribe on 22 November.

The genome of the Spirit Cave Mummy is significant because it could help to reveal how ancient humans settled the Americas, says

Jennifer Raff, an anthropological geneticist at the University of Kansas in Lawrence. “It’s been a quest for a lot of geneticists to understand what the earliest peoples here looked like,” she says.

The case follows the US government’s decision this year that another controversial skeleton, an 8,500-year-old human known as Kennewick Man, is Native American and qualifies for repatriation on the basis of genome sequencing. Some researchers

lament such decisions because the buried skeletons are then unavailable for scientific study. But others point out that science could benefit if Native American tribes use ancient DNA to secure the return of more remains, because this may deliver long-sought data on the peopling of the region. “At least we get the knowledge

before the remains are put back in the ground,” says Steven Simms, an archaeologist at Utah State University in Logan, who has studied the Spirit Cave Mummy. “We’ve got a lot of material in this country that’s been repatriated and never will be available to science.”

SPIRIT CAVE LAWSUIT

The Spirit Cave Mummy is one of a handful of skeletons from the Americas that are more than 10,000 years old (see ‘Sequencing North American skeletons’). Archaeologists Georgia and Sydney Wheeler discovered it in Nevada’s Spirit Cave in 1940. The skeleton, an adult male aged around 40 at the time of his death, was shrouded in a rabbit-skin blanket and reed mats and was wearing moccasins; he was found with the cremated or partial remains of three other individuals. The Wheelers concluded that the remains were 1,500–2,000 years old. But when radiocarbon dating in the 1990s determined that they were much older, the finds drew

“At least we get the knowledge before the remains are put back in the ground.”