French space agency CNES — onto the Martian ground. The instrument will nestle beneath a protective wind shield as its three delicate pendulums measure even tiny tremors. "It is pretty much the most sensitive seismometer that's ever been built," says Renee Weber, a planetary scientist at NASA's Marshall Space Flight Center in Huntsville, Alabama.

MARTIAN MYSTERY

The big question is how many marsquakes it will capture. With no actual data on Martian seismicity, researchers have used maps of geological faults on the planet's surface[2], along with calculations of how its interior has cooled over time[3], to estimate that Mars probably has fewer quakes than Earth but more than the Moon. (Tectonic fractures and Earth's tidal pull trigger moonquakes.)

InSight will land in Elysium Planitia, a safe, flat and geologically boring site near the Martian equator[4]. There, it might measure one local marsquake each year between magnitude 2.7 and 4.2, says Weber. It could also detect bigger marsquakes from regions much farther away, such as the fault-riddled Cerberus Fossae. "Our goal is to collect something like 30 quakes over the mission," says Philippe Lognonné, a geophysicist at the Paris Institute of Earth Physics who leads the seismometer team.

The bigger the marsquake, the more it will reveal about the planet's interior, because only the largest seismic events penetrate all the way to the core. InSight might see one or two such quakes during the two Earth years that NASA hopes to operate the mission.

Marsquake data will help InSight to map the boundaries between Mars's crust, mantle and core. That could reveal the depth to which the planet's primordial magma ocean once churned, and whether Mars ever had anything resembling plate tectonics. Pinning down the size of the Martian core, thought to be roughly half as big as Earth's, would reveal its density and composition[5]. Mars's internal layers represent a record of its first tens of millions of years, says Banerdt. And studying its interior might help to reveal the early history of Earth, which probably went through similar changes soon after it formed.

Meanwhile, a radio-science experiment on InSight will measure how Mars wobbles on its axis, as a way to further understand the core's size. And a heat-flow probe, built by a team at the DLR, will penetrate up to 5 metres beneath the surface to measure how temperature changes with depth and time.

The plan is to land InSight on Mars on 26 November. For Lognonné, who has been trying to get a seismometer to Mars for more than two decades, that day can't come soon enough.

"I'll be much more happy when I get the first data," he says. ■

1. Lorenz, R. D., Nakamura, Y. & Murphy, J. R. *Earth Space Sci.* **4**, 681–688 (2017).
2. Knapmeyer, M. *et al. J. Geophys. Res.* **111**, E11006 (2006).
3. Plesa, A.-C. *et al. Geophys. Res. Lett.* **45**, 2580–2589 (2018).
4. Golombek, M. *et al. Space Sci. Rev.* **211**, 5–95 (2017).
5. Hellfrich, G. *Prog. Earth Planet. Sci.* **4**, 24 (2017).

PUBLIC HEALTH

Trial helps African children

Pre-emptive antibiotic treatment reduces deaths in at-risk kids, but raises fears about the development of drug resistance.

BY AMY MAXMEN

To stem the rise in antibiotic resistance, researchers recommend that people take these drugs only after they are diagnosed with a bacterial infection. But a trial involving nearly 200,000 children in Niger, Tanzania and Malawi went against that guidance in an attempt to save youngsters in regions where as many as one in ten die before their fifth birthday.

The results, published on 25 April in *The New England Journal of Medicine*, suggest that widespread distribution of antibiotics could prevent thousands of deaths (J. D. Keenan *et al. N. Engl. J. Med.* https://doi.org/10.1056/NEJMoa1715474; 2018). But health officials and researchers are wary of starting a massive drug programme on the basis of the results because it would drive antibiotic resistance.

"It goes against dogma at the moment because everyone else is trying to reduce antibiotic use," says Per Ashorn, who specializes in paediatric infectious diseases at the World Health Organization (WHO). The study's results are exciting, he says, but the WHO needs more data to evaluate the approach.

Some officials sound more enthusiastic about the strategy. "As a person who was born in one of the poorest countries in the world, I welcome this," says Samba Sow, the health minister in Mali, where 11% of children die before the age of 5. "My older brother died as a child, more than one of my cousins died as a child — children die here, and they die fast."

Mass drug administration fell out of favour in the late 1960s, after programmes to prevent malaria through the large-scale distribution of a drug called chloroquine backfired. Resistance developed rapidly because thousands of people with insufficient levels of chloroquine in their systems became infected with malaria parasites. Strains that were susceptible to the drug died, but more-resilient ones multiplied. Eventually, chloroquine stopped working.

But opinions on mass drug administration seem to be changing. Since 2012, several African countries have reduced deaths from malaria by pre-emptively treating millions of children during the rainy season. And the WHO now recommends the distribution of some antibiotics to certain populations impacted by neglected

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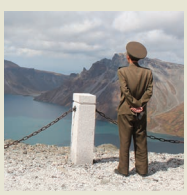

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NATURE PODCAST

Constructing early embryos; how mice react to danger; and an ancient butchered rhino nature.com/nature/podcast

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tropical diseases — a constellation of illnesses affecting roughly one billion people living in poverty around the world.

The idea for the latest study came from an analysis of the pre-emptive use of the antibiotic azithromycin in Ethiopian communities affected by trachoma — a disease that causes blindness — in the late 2000s. Researchers noticed a drop in overall deaths (T. C. Porco *et al. J. Am. Med. Assoc.* **302**, 962–968; 2009), and Thomas Lietman, an infectious-disease researcher at the University of California, San Francisco, and his colleagues followed up with the current trial, dubbed MORDOR (from the French description of the project).

As part of MORDOR, children under five in communities in Niger, Malawi and Tanzania took one dose of azithromycin twice a year for two years. Control populations received a placebo. Childhood mortality rates among treated communities in Niger dropped by 18% compared with control populations; Tanzania had 3% fewer deaths and Malawi saw a 6% reduction.

Lietman says that Niger probably experienced the greatest benefit because it has the highest childhood mortality rate of the three countries. About 9% of children die before the age of 5 in Niger, compared with about 5% in Tanzania and Malawi. Pneumonia and diarrhoea triggered by bacterial infections help to drive up childhood mortality rates, according to a 2017 report from the United Nations. Poor sanitation, unsafe drinking water and malnutrition combine to make children living in poverty especially vulnerable to disease-causing microbes. They're also more likely to die from curable conditions because health care can be unaffordable or too far away to be of help.

But this antibiotics strategy comes at a cost, says Ramanan Laxminarayan, director of the Center for Disease Dynamics, Economics and Policy in Washington DC. If resistance develops against azithromycin, diseases treated by the drug, including gonorrhoea, would become harder to combat. He hopes that, if policymakers decide to implement this approach, they will target only the populations most in need, and then just for a limited time. Groups supporting this approach should also work to reduce childhood mortality in the same way that the developed world did, he says, through improved sanitation, nutrition and health care.

For now, researchers will continue to study the effects of this antibiotics strategy. Later this year, similar trials will launch in Mali and Burkina Faso. And Lietman's team is evaluating data collected during an extension of its trial, to assess how fast antibiotic resistance develops. The WHO plans to release a statement about whether this strategy is justified, and in what circumstances, by the end of 2019. ■

GREGG HALLINAN/CALTECH

The Owens Valley Long Wavelength Array in California hosts the LEDA experiment.

ASTRONOMY

Physicists trawl skies for enigmatic signal

Teams rush to find faint signature from Universe's first stars.

BY DAVIDE CASTELVECCHI

Researchers are heading to some of the most remote spots on Earth — from the Tibetan Plateau to an island in the sub-Antarctic ocean — to try to capture an enigmatic radio signal from the early Universe. This grand search includes some of the first experiments to follow up on a surprise announcement in February that astronomers had seen evidence of the Universe's first stars lighting up[1], a moment known as the cosmic dawn.

And as experimental physicists try to replicate those findings in the few places on Earth that are relatively undisturbed by radio interference, theorists are struggling to make sense of the data. "The signal does not look like anything we expected," says Abraham Loeb, an astrophysicist at Harvard University in Cambridge, Massachusetts.

The original detection was reported by researchers at the Experiment to Detect the Global Epoch of Reionization Signature (EDGES), which uses a pair of table-sized radio antennas in the Australian outback. The experiment measures the long-wavelength part of the cosmic microwave background, the noisy afterglow of the Big Bang. The researchers were searching for a subtle dip in the background spectrum where the microwave radiation is slightly dimmed. Cosmologists have theorized that such a dip should have been caused by the light of the first stars, which made primordial hydrogen in the Universe less transparent at a particular radio wavelength. The details of this absorption should contain information about the early interstellar matter and the stars that cast light on it.

"We might have the most radio quiet place on Earth."

But the blip had an unexpected shape. It suggested that the absorption started to ramp up rapidly around 150 million years after the Big Bang, stayed roughly constant between 200 million and 250 million years ago, and then disappeared relatively quickly. The dip was also deeper than predicted, which implied that the gas was colder than expected during that epoch — perhaps 4 kelvin instead of 7 kelvin.

EXTRA SCRUTINY

The EDGES team spent two years cross-checking their peculiar result before deciding to go public. Researchers have posted dozens of preprints in response, trying to interpret the anomaly. Some physicists have suggested that it was a possible sign of previously undiscovered interactions between ordinary matter and dark matter[2]. Others saw a possible indication of ▶

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