

New Scientist

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Health

Sweat monitor reveals if you are exercising too hard

Michael Le Page

ELASTIC bands embedded with colour-changing sensors can tell how hard muscles are working by measuring the acidity of your sweat.

The device could be used to improve worker safety in physically demanding jobs, such as the construction industry, as well as to help sportspeople optimise their training, says John Rogers at Northwestern University in Illinois.

“If you see your pH dropping down to very low levels, it’d be a good idea to stop working out,” says Rogers. “Otherwise you end up with sore muscles. But it’ll also tell you if you haven’t worked out enough.”

During high-intensity exercise, muscles produce a chemical called lactate. With continued exercise, levels of this in the blood start to shoot up as people near their limits of physical endurance. This can lead to a burning sensation in muscles, sudden loss of energy and extreme fatigue. The fitter people are, the longer and harder they can exercise before blood lactate gets high.

Rogers and his team have come up with an elastic band with a series of tiny reservoirs that fill with sweat at different intervals. Inside each reservoir is a sensor that changes colour depending on things such as the concentration of lactate or the acidity of sweat. The results are read by taking a photo with a smartphone or attaching an electronic monitor.

When the team tested the sweat monitors on 12 volunteers on exercise bikes, sweat lactate levels didn’t correspond well with blood lactate levels, but the acidity of sweat did (*Science Translational Medicine*, doi.org/ngd4).

However, this was only the case for sweat from skin near the working muscles, which in this case was monitored by the bands being around the ankles. Measurements by bands on the wrists of the cyclists didn’t reflect blood lactate levels. ■

Astronomy

The day a surprise asteroid hit Earth – harmlessly

Matthew Sparkes



ALLANMADELAR/FACEBOOK

AN ASTEROID slammed into Earth’s atmosphere and burned up near the Philippines on 5 September. It was spotted by astronomers only hours before it streaked across the sky in a bright fireball, but went unseen by many on the ground who found clouds blocking the view.

The asteroid, estimated to be roughly 1 metre across, was spotted by the NASA-funded Catalina Sky Survey and initially given the designation CAQTDL2, before being named 2024 RW1. As predicted, it struck at around 0046 local time, just east of the northernmost island of the Philippine archipelago. It is thought to have hit the atmosphere at a speed of 17.6 kilometres per second, or 63,360 kilometres per hour, which Alan Fitzsimmons at Queen’s University Belfast in the UK says is about average for such objects.

“Don’t be fooled by Hollywood movies where you can see the thing coming screaming through the sky and you’ve got time to run out the

Asteroid 2024 RW1 was seen arriving over the Philippines

house, get the cat, jump in the car and drive somewhere. You don’t have the time to do that,” he says.

Fortunately, there was no need for an evacuation: NASA’s Planetary Defense Coordination Office posted on social media that the asteroid had “safely impacted Earth’s atmosphere”.

“Survey telescopes are now good enough to spot these things coming in and give us a bit of warning”

“An object this small can’t do any damage on the ground. We’re protected from them by the Earth’s atmosphere,” says Fitzsimmons. A video shared on social media shot from the province of Cagayan at the northern tip of the Philippines shows a flickering green fireball appear behind the clouds, followed by an orange tail.

Fitzsimmons says that two

or three objects this size strike Earth every year. We are increasingly able to spot them early, with the first incoming asteroid that was detected by astronomers before landing being in 2008. 2024 RW1 is the ninth accurately predicted asteroid strike on Earth. “The really positive aspect about this is that the survey telescopes are now good enough to spot these things coming in and give us a bit of warning,” he says.

Larger space rocks are also of limited concern. “We believe we know more than 90 per cent of [near-Earth] asteroids that are about 1 kilometre in size, where 1 kilometre is considered not a planet killer, but something that would destroy a whole region or a whole continent,” says Ian Carnelli at the European Space Agency (ESA).

Both NASA and ESA now have dedicated programmes for spotting and tracking asteroids, which involve a large network of dedicated observatories, existing and new, as well as amateur astronomers who take readings of the positions of known objects so that their orbits can be better predicted.

Carnelli is also part of efforts to hone asteroid defences. He is project manager of ESA’s Hera mission, which is designed to study the aftermath of an earlier NASA mission that smashed into an asteroid to try to change its orbit. Hera will launch next month to verify the results of the impact up close, and further improve our understanding of planetary defence. “We have developed, and we are developing, real planetary defence systems,” he says. ■

Additional reporting by James Dinneen