



SPARC WEEKLY



SPACEX LAUNCHES STARSHIP ROCKET AND CATCHES BOOSTER IN GIANT METAL “CHOPSTICKS”

Starship, which blasted off from the Boca Chica starbase at 7.25am local time (1325 BST) on Sunday.

As the rocket’s 71-metre (233ft) Super Heavy booster separated 40 miles (65km) above the Earth, the upper stage pushed on to an altitude of nearly 90 miles, looping around the planet at 17,000 mph before splashing down in the Indian Ocean as planned.

SpaceX staff erupted in cheers and applause as the falling booster reignited three of its Raptor engines, slowed its rapid descent and swung towards the “mechazilla” launch tower, where it was held fast by the mechanical arms, labelled “chopsticks”.

It is the first time SpaceX has attempted the bold manoeuvre, one it sees as crucial to its goal of developing fully reusable rockets capable of ferrying humans, scientific equipment and supplies to the moon and onwards to Mars.

<https://www.theguardian.com/science/2024/oct/13/spacex-elon-musk-launches-and-lands-starship-rocket-in-first-test-of-giant-robotic-arms>

<https://www.space.com/spacex-starship-flight-5-launch-super-heavy-booster-catch-success-video>

Elon Musk’s huge rocket sets off on test flight before upper stage splashdown and explosion in Indian Ocean

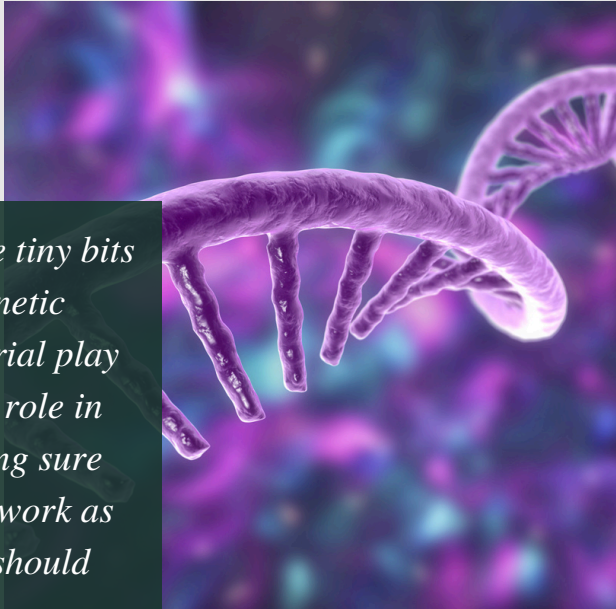


The most powerful rocket ever built took to the skies again — but this time, it came back.

Elon Musk’s SpaceX achieved a significant milestone on Sunday by catching the massive booster stage from its Starship rocket in a pair of robotic arms as it fell back to the company’s launchpad in southern Texas.

The historic feat, which drew praise from astronauts and space experts, topped a successful fifth test flight for the uncrewed

THE DISCOVERY OF MICRORNA WINS THE 2024 NOBEL PRIZE IN PHYSIOLOGY



These tiny bits of genetic material play a big role in making sure cells work as they should

An unexpected discovery about what made a tiny worm refuse to grow up has now led to the 2024 Nobel Prize in physiology or medicine.

Victor Ambros, now at the University of Massachusetts Chan Medical School in Worcester, and Gary Ruvkun, of Harvard Medical School, found that small snippets of RNA called microRNAs can help control production of proteins throughout the body. These minuscule RNAs may play an outsize role in health and disease.

“The seminal discovery of microRNA has introduced a new and unexpected mechanism of gene regulation,” said Olle Kämpe, Vice Chair of the Nobel Committee for Physiology or Medicine at the Karolinska Institute in Stockholm.

Their work helped explain how, despite all our cells carrying the same DNA, they can produce different proteins and have different characteristics. For example, nerve cells and muscle cells are highly specialised for different functions.

MicroRNAs are important for our understanding of embryological development, normal cell physiology, and diseases such as cancer.



<https://www.washingtonpost.com/science/2024/10/07/nobel-prize-medicine-victor-ambros-gary-ruvkun-2024/>

In Short

- *microRNA (miRNA) is different from messenger RNA (mRNA)*
- *microRNA works by binding to specific mRNA molecules*
- *It prevents them from being translated into proteins or by degrading the mRNA altogether.*

<https://www.sciencenews.org/article/microrna-2023-nobel-physiology-medicine>

<https://www.nobelprize.org/prizes/medicine/2024/summary/>

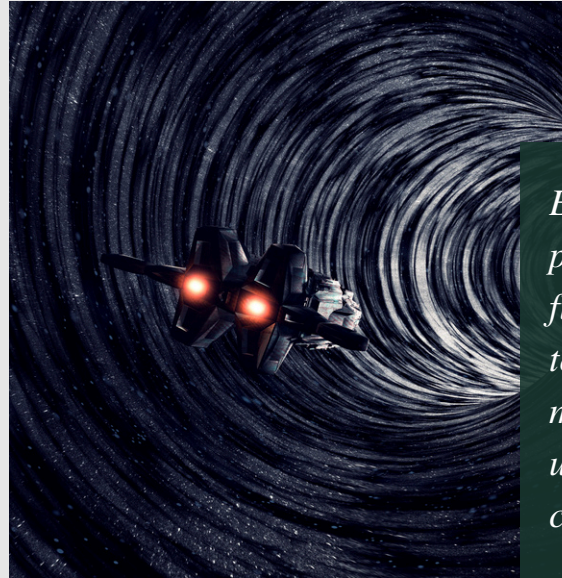
<https://www.theguardian.com/science/2024/oct/07/nobel-prize-in-medicine-awarded-to-scientists-for-work-on-microrna-victor-ambros-gary-ruvkun>

SPACECRAFT NEED AN EXTRA BOOST TO TRAVEL BETWEEN STARS

In *Star Wars*, pilots enter a dimension — hyperspace — to travel between different worlds. To merge onto this cosmic highway, the ships are equipped with special engines called hyperdrives. Once inside hyperspace, these speedsters zoom faster than light. With a push of a lever, the spacecraft can travel between star systems in a few hours to days.

Science fiction makes space travel look easy. But many of these stories break the laws of physics to get from planet to planet. Off-screen, the technology needed to reach another star system doesn't yet exist. However, emerging propulsion methods could brighten the future of interstellar travel.

Astronomers measure space using light-years, or the distance light travels in one year. Light speeds through interstellar space at around 300,000 kilometers (186,000 miles) per second. Proxima Centauri, the nearest non-sun star to Earth, is 4.24 light-years away. The fastest any humanmade object has traveled is only about 0.05 percent of the speed of light. At this speed, it would take about 7,700 years to reach the exoplanet Proxima Centauri b.



Experts ponder how future technology might take us to the cosmos

For now, the longest distance we're looking to transport people is to Mars, says Jarred Young. This engineer studies propulsion systems at the University of Maryland, College Park. Researchers are eyeing new methods that could bring people to and from the Red Planet safely, he says.

One of these is ion engines. These thrusters create force by shooting charged atoms from the back of a spacecraft. Ion engines aren't as powerful as the chemical propellants used in rockets. Chemical rockets create thrust by combusting fuel and oxygen-releasing substances called oxidizers. But chemical rockets only burn for a short time. Ion engines can last months or even years, possibly helping fuel future trips to Mars. These thrusters, though, aren't yet strong enough to propel massive spacecraft that far, Young says.

And for now, reaching new worlds is only possible in fictional galaxies far, far away.

<https://www.snexplores.org/article/spacecraft-tech-star-space-travel>



Fungi don't have eyes or a brain, but their intelligent behaviors may surprise you.

Can organisms without a brain still show signs of intelligence? Researchers at Tohoku University and Nagaoka College had this question in mind when conducting a study to measure the decision-making processes in fungi. While it may sound like science fiction, this level of basal cognition is possible even in fungi.

"You'd be surprised at just how much fungi are capable of," remarks Yu Fukasawa of Tohoku University, "They have memories, they learn, and they can make decisions. Quite frankly, the differences in how they solve problems compared to humans is mind-blowing."

Fungi grow by releasing spores, which can germinate and form long, spidery threads underground (a mycelium). We typically only see the tiny mushrooms on the surface without realizing that there's a vast network of interconnected mycelium beneath our feet.

DO FUNGI RECOGNIZE SHAPES?

It is through this network that information can be shared, somewhat like neural connections in the brain.

The present study examined how a wood-decaying mycelial network responded to two different situations: wood blocks placed in a circle versus cross arrangement.

For example, if the fungi didn't display decision-making skills, they would simply spread out from a central point without consideration for the position of the blocks.

These findings suggest that the mycelial network was able to communicate information about its surroundings throughout the entire network, and change its direction of growth accordingly based on the shape.

This research will help us better understand how biotic ecosystems function and how different types of cognition evolved in organisms.

<https://www.sciencedirect.com/science/article/pii/S1754504824000588?via%3Dihub>

<https://www.sciencedaily.com/releases/2024/10/241009122809.htm>



NEW RESEARCH REVEALS TIME OF DAY COULD IMPACT ALZHEIMER'S DIAGNOSIS

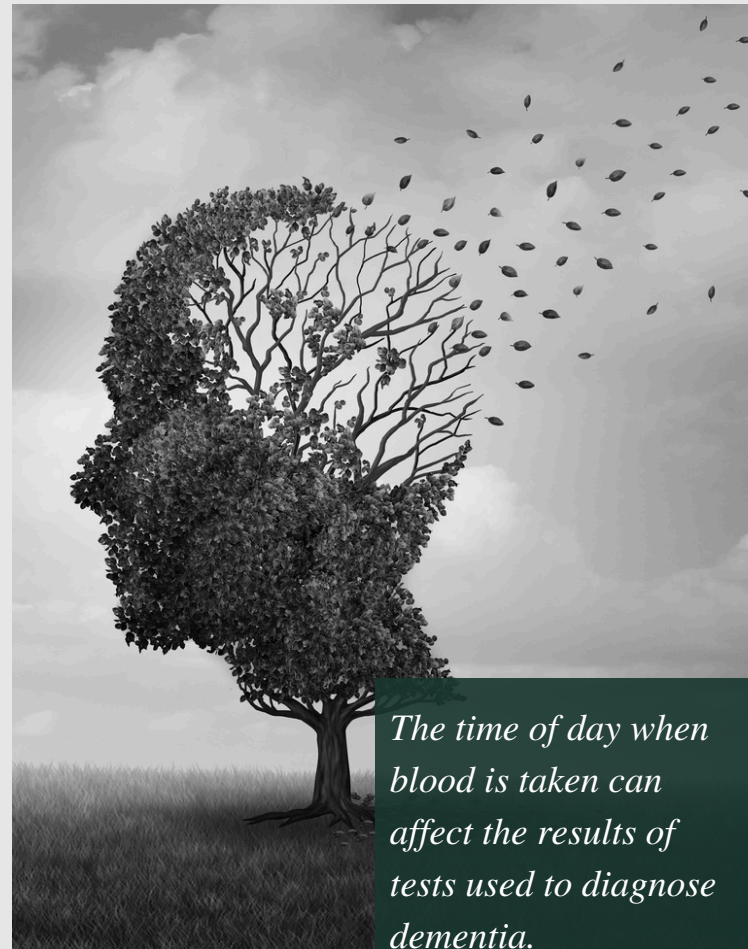
Blood tests for Alzheimer's diagnosis vary by time of day, with biomarkers being lowest in the morning and highest in the evening. Researchers suggest standardizing sampling times to improve diagnostic accuracy.

New research from the University of Surrey indicates that the time of day when blood is drawn can influence the outcomes of tests used to diagnose dementia.

Researchers found that the biomarkers used to diagnose Alzheimer's, including a promising marker for early diagnosis of the condition, varied significantly depending on the time of day. Biomarker levels were at their lowest in the morning when participants woke and highest in the evening.

The p-tau217 biomarker, which could help with early diagnosis of dementia, showed big differences depending on the time of day. Researchers discovered that the variation between morning and evening levels was similar to the changes seen in people whose mild memory problems get worse over a year.

Dr. Monica della Monica, research fellow at the Surrey Sleep Research Centre at the University of Surrey and first author of the publication, said:



The time of day when blood is taken can affect the results of tests used to diagnose dementia.

“This work shows the importance of considering the time of day when taking clinical diagnostic samples and how the clinical picture for an individual may be affected by varying sample times. By standardizing the time of day that a sample is taken, the diagnosis of dementia and tracking disease progression can become more accurate.”

<https://www.nature.com/articles/s41398-024-03084-7>
<https://scitechdaily.com/new-research-reveals-time-of-day-could-impact-alzheimers-diagnosis/>

WHO ARE WE?

SPARC Robotics Team's mission and vision is to make our environment the best it can be. On a volunteer basis, we look at the problems that are happening around us and make them our problems, both as SPARC and individually, and help as much as we can with appropriate projects. NASA ACCP (Astro Camp Community Partners) was only in the US until four years ago. This year they came to Turkey with us after four years of traveling to many countries. ACCP educates school-age children from kindergarten to high school on science-related topics of interest with practical knowledge and application, while also supporting children's craft development, general culture and questioning skills. As SPARC, we have brought this training provided by NASA to our country in the most comprehensive way and our continuous communication with NASA not only enables us to improve our trainings day by day, but also gives us the opportunity to learn about the innovations in the field of STEM instantly, from the most accurate source and to spread the knowledge we have around us.



EDITOR

Hello, I'm Defne and I'll be the editor of this newsletter. I'll have a partner for future news but for now we'll be together. I hope you find it useful and I hope it has helped you to keep your mind out of your problems while reading it. Have a good week. See you next week!!