



SPARC WEEKLY



WASTEWATER BACTERIA CAN BREAKDOWN PLASTIC FOR FOOD



Finding could lead to bioengineering solutions to clean up plastic waste

Ubiquitous and extensive usage of plastic materials has led to the accumulation of plastic wastes, which are projected to reach

33 billion tons by the year 2050. Plastic wastes have been reported in various environments including marine water and freshwater, sediments, and soils.

Microplastics (MPs) and nanoplastics (NPs), defined operationally as plastic fragments with sizes smaller than 5 mm and 1 μm , respectively, are considered to be a threat to both aquatic and terrestrial ecosystems, as organisms can easily ingest these small particles.

Wastewater effluents contain various types of MPs, among which polyethylene terephthalate (PET) MPs are the most abundant, constituting approximately 50% of MPs in the effluents. There is increased research interest focusing on biodeterioration and biodegradation of PET plastic materials by WWTP-associated microorganisms.

Comamonadaceae is a family of bacteria often found growing on plastics in water. New study finds a bacterium in this family can break down the plastic for food. Researchers also identified the enzyme the bacterium use to degrade plastic.

The discovery opens new possibilities for developing bacteria-based engineering solutions to help clean up difficult-to-remove plastic waste, which pollutes drinking water and harms wildlife.

<https://pubs.acs.org/doi/10.1021/acs.est.4c06645>

<https://www.sciencedaily.com/releases/2024/10/241003123307.htm>



PET accounts for 12% of global solid waste.

ESPREAD ICE DEPOSITS ON THE MOON

Over the last few decades, several independent studies have found evidence that heterogeneous distributions of water ice and other hydrogen-bearing volatiles exist toward the Moon's poles.

Prior studies found signs of ice in the larger permanently shadowed regions (PSRs) near the lunar South Pole



COULD AI FIND ALIEN LIFE BEFORE US?

Scientists have created an artificial intelligence model that can detect alien life, said a study published in the journal PNAS. The algorithm can "distinguish between samples of biological and nonbiological origin 90% of the time," after being "trained using living cells, fossils, meteorites and lab-made chemicals," Live Science said. "Put another way, the method should be able to detect alien biochemistries, as well as Earth life," Robert Hazen, a co-author of the study, said in a statement. The AI "does not involve a machine having to look for specific things," but rather "looks for differences between samples," BBC said.

According to a new analysis of data from NASA's LRO (Lunar Reconnaissance Orbiter) mission, deposits of ice in lunar dust and rock (regolith) are more extensive than previously thought.

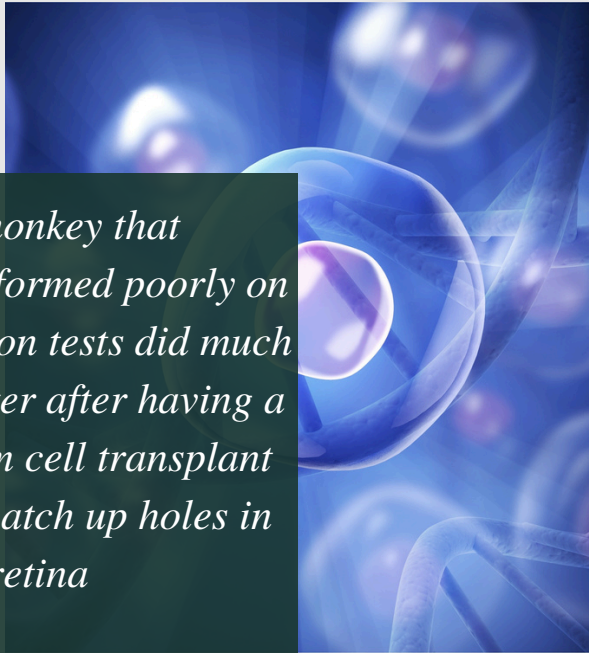
Ice would be a valuable resource for future lunar expeditions. Water could be used for radiation protection and supporting human explorers, or broken into its hydrogen and oxygen components to make rocket fuel, energy, and breathable air.

<https://iopscience.iop.org/article/10.3847/PSJ/ad5b55>
<https://phys.org/news/2024-10-lunar-mission-analysis-widespread-evidence.html>
<https://science.nasa.gov/solar-system/moon/nasas-lro-lunar-ice-deposits-are-widespread/>
<https://www.sciencedaily.com/releases/2024/10/241003123252.htm>



"These results mean that we may be able to find a lifeform from another planet, another biosphere, even if it is very different from the life we know on Earth," Hazen said. "And, if we do find signs of life elsewhere, we can tell if life on Earth and other planets derived from a common or different origin."

<https://theweek.com/science/could-ai-find-alien-life-before-us>
<https://theweek.com/health-and-science/1019386/recent-scientific-breakthroughs>
<https://www.pnas.org/doi/10.1073/pnas.2307149120>



A monkey that performed poorly on vision tests did much better after having a stem cell transplant to patch up holes in its retina

A transplant of human stem cells sealed a hole in a monkey's retina, which seems to have improved its vision, offering hope for a new approach to treat a type of age-related sight loss. As we age, a clear gel-like fluid in the eye can thicken and tug on the retina. This can tear holes in the tissue, causing blurred or patchy vision. Doctors can usually transfer tissue from other parts of the eye into the retinal holes, but in some cases, they reoccur.

To test other approaches, Michiko Mandai at the Kobe City Eye Hospital in Japan and her colleagues grew stem cells derived from a human embryo into cells that were precursors of retinal cells. They transferred the precursor cells into a 1mm wide hole in the retina of the right eye of a snow monkey (*Macaca fuscata*) that had struggled in vision tests in a different study. The results suggest the transplant improved the monkey's vision, but obviously the animal cannot explain exactly how much better it is, says Marius Ader at Dresden University of Technology in Germany.

STEM CELL TRANSPLANT GIVES HOPE FOR TREATING AGE-RELATED SIGHT LOSS

More studies need to be carried out on a larger group of non-human animals, but if these are successful, the approach would probably work in people, as our eyes are very similar to those of other primates, he says.

<https://www.newscientist.com/article/2450479-stem-cell-transplant-gives-hope-for-treating-age-related-sight-loss/>

ALZHEIMER'S GAME CHANGER: DUAL-ACTION DRUG ATTACKS DISEASE AT ITS CORE

The global societal cost of dementia was estimated at US \$1 trillion in 2018 and is predicted to increase to US \$2 trillion by 2030.

A new peptide inhibitor, RI-AG03, targets two key areas of the Tau protein in Alzheimer's disease, showing effectiveness in lab and fruit fly models. This innovative approach could lead to treatments that slow disease progression with minimal side effects. An international team of scientists led by Lancaster University has made a significant breakthrough in the fight against Alzheimer's Disease. For the first time, researchers have developed a drug that works on both major aggregation-promoting 'hotspots' of the Tau protein in the brain — a key driver of neurodegeneration. The drug, a peptide inhibitor called RI-AG03, was effective at preventing the build-up of Tau proteins in both lab and fruit fly studies.

<https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/alz.14246>

<https://scitechdaily.com/alzheimers-game-changer-dual-action-drug-attacks-disease-at-its-core/>

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.

5665



EDITOR

Hello, I'm Defne and I'm the editor of this newsletter. I'll have a partner for future issues 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!!