

SCIENCE CENTRE NEWS LETTER

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SCIENCE CENTRE

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WHAT'S NEW IN SCIENCE?

System to create bioplastic

Scientists from Texas A and M Agrilife, United States developed a system that uses carbon dioxide (CO₂) to produce biodegradable plastics, or bioplastics, that could replace the non-degradable plastics used today. The research addresses two challenges: the accumulation of non-degradable plastics and the remediation of greenhouse gas emissions.

Published in Journal Chem on 28th September 2022, the research was a collaboration of Susie Dai, Associate Professor in the Texas A and M Department of Plant Pathology and Microbiology, and Joshua Yuan, Professor and Chair in the Washington University, United States in St. Louis Department of Energy, Environmental and Chemical Engineering.



Susie Dai said "today's petroleum-based plastics do not degrade easily and create a massive issue in the ecosystems and, ultimately, oceans." To address these issues, the Texas A and M College of Agriculture and Life Sciences researchers worked for almost two years to develop an integrated system that uses CO₂ as a feedstock (is a raw material uses for processing

or manufacturing another product) for bacteria to grow in a nutrient solution and produce bioplastics.

"Carbon dioxide has been used in concert with bacteria to produce many chemicals, including bioplastics, but this design produces a highly efficient, smooth flow through our carbon dioxide-to-bioplastics pipeline. In this theory, it is kind of like a train with units connected to each other. The first unit uses electricity to convert the carbon dioxide to ethanol and other two-carbon molecules -

a process called Electrocatalysis. In the second unit, the bacteria consume the ethanol and carbon molecules to become a machine to produce bioplastics, which are different from petroleum-based plastic polymers that are harder to degrade." Susie Dai said.

Using CO₂ in the process could also help reduce green house gas emissions. Many manufacturing processes emit CO₂ as a waste product. "If we can capture the waste carbon dioxide, we reduce greenhouse gas emission and can use it as a feedstock to produce something." Susie Dai said.

SCIENTIST OF THE MONTH

Amar Gopal Bose

Amar Gopal Bose was born on 2nd November, 1929 in Philadelphia, Pennsylvania, U.S. He was graduated from Massachusetts Institute of Technology (MIT) in Electrical Engineering in 1950. Following graduation, Amar Bose became an Assistant Professor at the Massachusetts Institute of Technology. During his early years as a Professor Amar Bose brought a high-end stereo speaker system in 1956 and he was disappointed to find that "speakers with impressive technical specifications failed to reproduce the realism of a live performance."

This would eventually motivate his extensive speaker technology research, concentrating on key weakness in the high-end speaker systems available at the time.

In the 1980s, Amar Bose developed an electromagnetic replacement for automotive shock absorbers. In 2007, Amar Bose was listed in Forbes 400 as the 271st richest man in the world.



He earned the Baker Teaching Award in 1963-64. The Bose Award for Excellence in teaching in 1989 and later the Junior Bose Award in 1995 were established in his honour to recognise outstanding teaching in the MIT School of Engineering. He was also the founder and chairman of

Bose Corporation. He died on 12th July, 2013 at the age of 83 at Wayland, Massachusetts, U.S.

SCIENCE FACTS NOVEMBER 2022

Aviation Month, Good Nutrition Month, National Diabetes Awareness Month

3 rd Nov 1957	Soviet Union launched an artificial Earth Satellite "Sputnik-2" which was the first satellite to carry a living organism i.e. A dog named 'Laika'.
3 rd Nov 1960	America launched "Explorer 8" satellite into the space to discover atmospheric Composition of the Ionosphere.
5 th Nov 1855	French Meteorologist Leon Teisserenc de Bort (Discoverer of Stratosphere) was born.
6 th November	International Day for preventing the Exploitation of the Environment in war and Armed conflict. (Recognised by U.N.)
7 th Nov 1867	French Scientist Mary Curie (Discoverer of Radium) was born.
7 th Nov 1888	Indian Famous Scientist Chandrashekhar Raman (Discoverer of Raman Effect) was born.
8 th Nov 1922	South African Surgeon Christian Bernard (Who made first successful Heart Transplant) was born.
9 th Nov 1801	Gail Borden (Father of Modern Dairy Industry) was born.
9 th Nov 1897	British Chemist Ronald G.W. (Inventor of Flash Photolysis Methodology) was born.
10 th November	World Science Day for Peace & Development (by UNESCO)
12 th Nov 1896	Dr. Salim Ali (Internationally honoured Indian Ornithologist known as "Birdman of India") was born.
13 th Nov 1893	American Bio-chemist Adverd A Doicy (Inventor of process to make Vitamin K1) was born.
14 th November	World Diabetes Day [by WHO]
14 th Nov 1776	Henri Dutrochet (discoverer of process of Osmosis) was born on this day
14 th Nov 1863	Belgian Chemist Leo Baekeland (Inventor of Bakelite) was born.
18 th Nov 1897	British Physicist Petrik M.S.Bleckett (Discoverer of Nuclear Reaction) was born.
19 th Nov 1997	Kalpna Chawala's (First Woman Astronaut of Indian Origin) first flight in space.
19 th Nov 1912	Cell Biologist George E Palade (Discoverer of Ribosomen) was born.
20 th November	Universal Children's Day. (by U.N.)
21 th November	World Television Day. (by U.N.)
29 th Nov 1803	Austrian Physicist Christian Doppler (Discoverer of Doppler effect Radar) was born.
30 th Nov 1858	Sir Jagdishchandra Bhagwanchandra Bose (Great Indian Scientist and Botanist) was born.
30 th Nov 1917	Sir Jagdishchandra Bose started "Bose Research Institute" for research on Plants and Animals at Calcutta.
<p>U. N. : United Nations WHO : World Health Organization UNESCO : United Nations Educational Scientific & Cultural Organization</p>	

Answers: 1) a, 2) b, 3) a, 4) c, 5) a, 6) c, 7) c



Timings

Tuesday to Sunday
& Public Holidays
9.30 am to 4.30 pm

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SCIENTIFIC QUESTION

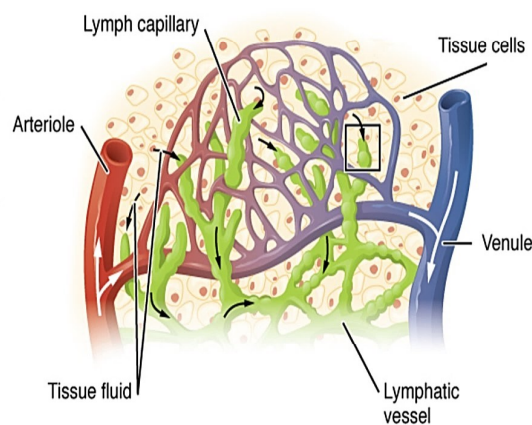
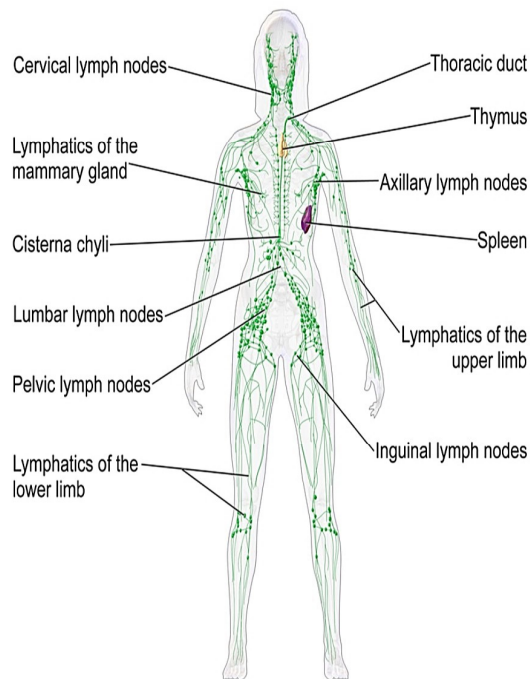
What is Lymphatic system?

The lymphatic system, or lymphoid system, is an organ system in vertebrates that is part of the circulatory system and the immune system. It is made up of a large network of lymph, lymphatic vessels, lymph nodes, lymphatic or lymphoid organs, and lymphoid tissues. The vessels carry a clear fluid called lymph towards the heart. Unlike the cardiovascular system, the lymphatic system is not a closed system. The human circulatory system processes an average of 20 litres of blood per day through capillary filtration, which removes plasma from the blood. Roughly 17 litres of the filtered blood is reabsorbed directly into the blood vessels, while the remaining three litres are left in the interstitial fluid. One of the main functions of the lymphatic system is to provide an accessory return route to the blood for the surplus three litres.

The other main function is that of immune defence. Lymph is very similar to blood plasma, in that it contains waste products and cellular debris, together with bacteria and proteins. The cells of the lymph are mostly lymphocytes. Associated lymphoid organs are composed of lymphoid tissue, and are the sites either of lymphocyte production or of lymphocyte activation. These include the lymph nodes (where the highest lymphocyte concentration is found), the spleen, the thymus, and the tonsils. Lymphocytes are initially generated in the bone marrow. The lymphoid organs also contain other types of cells such as stromal cells (they are found in abundance within bone marrow but also can be seen all around the body) for support.

Fluid from circulating blood leaks into the tissues of the body by capillary action, carrying nutrients to the cells. The fluid bathes the tissues as interstitial fluid, collecting waste products, bacteria, and damaged cells, and then drains as lymph into the lymphatic capillaries and lymphatic vessels. These vessels carry the lymph

throughout the body, passing through numerous lymph nodes which filter out unwanted materials such as bacteria and damaged cells. Lymph then passes into much larger lymph vessels known as lymph ducts. The right lymphatic duct drains the right side of the region and the much larger left lymphatic duct, known as the thoracic duct, drains the left side of the body. The ducts empty into the subclavian veins (it is paired vein, one on either side of the body, that is draining blood from the upper extremities, allowing this blood to return to the heart) to return to the blood circulation. Lymph is moved through the system by muscle contractions. In some vertebrates, a lymph heart is present that pumps the lymph to the veins.



The lymphatic system was first described in the 17th century independently by Scientists Olaus Rudbeck and Thomas Bartholin.

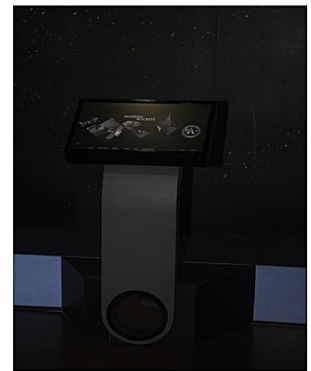
KNOW THE EXHIBIT

Modern Rocket - Apollo

'Apollo' was American's space programme to land men on the Moon and bring them back safely to the Earth. Out of 13 launches till date, 12 were successful. Apollo was the American programme for space flight during the Cold War period. The competitor USSR (Union of Soviet Socialist Republics) already had placed Sputnik in the orbit and sent Yuri Gagarin in the space. Under tremendous political pressure, the Apollo programme started as 'Urgent National Needs' by President John F. Kennedy.

Abe Silverstein was the Director of the programme. Nearly 40,000 men worked day and night for 8 years to shape it. The first space flight was named Apollo after the Greek God. The Configuration was Apollo as the space craft along with Lunar Module Eagle which was supposed to land on the Lunar surface carried over to Moon and back by the Rocket Launcher Saturn V. On 16th July 1969, Saturn V blasted off, carrying 3 Astronaut Neil Armstrong, Michel Collins and Edwin Aldrin. On 22nd July, at 8:26:15 a.m. IST (Indian Standard Time), Neil Armstrong, the first ever man, stepped on to Moon, followed by Edwin Aldrin. American flag was unfurled and they talked to US President Richard Nixon. A plaque was left there with the message- "Here, man from the planet Earth, first set foot on the Moon July, 1969 A.D (Anno Domini). We came in peace for all mankind." In all 11 manned Apollo missions spanning over 1968-1972, Scientists carried out tremendous scientific explorations in space and on Moon surface.

This Exhibit is situated at "Entering Space Gallery" between Fun Science Gallery and Power of Play Gallery at the first floor of Science Centre.



QUIZ

1. What is called the waves produced on the Earth's surface?
a) Seismic Wave b) Longitudinal Wave c) Micro Wave d) Radio Wave
2. What radiations are absorbed by CO₂?
a) Ultrared Radiations b) Infrared Radiations c) Ultraviolet Radiations d) None of These
3. What is the major cause of air pollution?
a) Burning of Coal and Petroleum b) Afforestation c) Deforestation d) Recycling of Paper
4. Polythene and PVC are examples of what?
a) Biodegradable Substance b) Thermosetting Plastics c) Thermoplastics d) Rayon
5. What is called the process of conversion of Sugar into Alcohol by yeast?
a) Fermentation b) Pasteurisation c) Alcoholism d) All of the Above
6. Which is the least dense planet in the following?
a) Earth b) Jupiter c) Saturn d) Uranus
7. Due to what the Earth's temperature is increasing because of Global Warming?
a) The Sun giving out more heat b) The Earth slowly moving towards the Sun
c) Increased use of fossil fuel d) Less duration of winter every year