

SCIENCE CENTRE NEWS LETTER

October 2019
Issue 54



Published by
Banchhanidhi Pani

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Commissioner

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SCIENCE CENTRE

Volume 5, Issue 6

How memories form and fade?

Chandrayaan-2

Why is it that you can remember the name of your childhood best friend that you haven't seen in years yet easily forget the name of a person you just met a moment ago? In other words, why are some memories stable over decades, while others fade within minutes?

Using mouse models, researchers of Caltech (California Institute of Technology), California have now determined that strong, stable memories are encoded by "teams" of neurons, providing redundancy that enables these memories to persist over time. The research has implications for understanding how memory might be affected after brain damage, such as by strokes or Alzheimer's disease. The work was done in the laboratory of Carlos Lois, research professor of biology and is described in a paper that appears in the Issue of August 23rd 2019, the Journal of Science.



Led by postdoctoral scholar Walter Gonzalez, the team developed a test to examine mice's neural activity as they learn about and remember a new place. In the test, a mouse was placed in a straight enclosure, about 5 feet long with white walls. Unique symbols were marked at different locations along the walls - for example, a bold plus sign (+) near the right-most end and an angled slash near the center. Sugar water (a treat for mice) was placed at either end of the track. While the mouse explored, the researchers measured the activity of specific neurons in the mouse hippocampus (the region of the brain where new memories are formed) that are known to encode for places. When a mouse was

initially placed in the track, it was unsure of what to do and wandered left and right until it came across the sugar water. In these cases, single neurons were activated when the mouse took notice of a symbol on the wall. But over multiple experiences with the track, the mouse became familiar with it and remembered the locations of the sugar. As the mouse became more familiar, more and more neurons were activated in synchrony by seeing each symbol on the wall. To study how memories fade over time, the researchers then withheld the mice from the track for up to 20 days. Upon returning to the track after this break, mice that had formed strong memories encoded by higher numbers of neurons remembered the task quickly. Even though some neurons showed different activity, the mouse's memory of the track was clearly identifiable when analyzing the activity of large groups of neurons. Memory is so fundamental to human behavior that any impairment to memory can

severely impact our daily life. Memory loss that occurs as part of normal aging can be a significant handicap for senior citizens. Moreover, memory loss caused by several diseases, most notably Alzheimer's, has devastating consequences that can interfere with the most basic routines including recognizing relatives or remembering the way back home. This work suggests that memories might fade more rapidly as we age because a memory is encoded by fewer neurons, and if any of these neurons fail, the memory is lost.

Courtesy : Lourdes Convent High School

SCIENTIST OF THE MONTH

Dr. Atma Ram

Dr. Atma Ram was born on October 12, 1908 at Pilaina in Uttar Pradesh. He did B.Sc. from Kanpur in 1929 and M.Sc in 1931. He did Ph.D from Allahabad. Dr. Atma Ram contributed immensely in the study of photochemical reaction and photo-oxidation. He was the architect of the Central Glass and Ceramic Research Institute, where a section for the production of indigenous optical glasses, homogeneous optically-clear and corrosion-resistant lead glass sheets was established by him. He made outstanding pioneering contribution to the development of glass ceramics and mica industries in India. He had published more than 200 research papers in various journals.

He received the Shanti Swarup Bhatnagar prize and the Padma Shri in 1959. He was

made Honorary Fellow of Society of Glass Technology, Sheffield in 1966. He was the Principal Advisor to the Prime Minister and the Union Cabinet of Science and Technology from 1977 to 1983. He died on February 6, 1983 in Delhi at the age of 74.



Courtesy : Lourdes Convent High School

SCIENCE FACTS OCTOBER 2019



Timings

Tuesday to Friday
9.30 am to 4.30 pm

Saturday - Sunday
& Public Holidays
11.00 am to 6.30 pm

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Breast Cancer Awareness Month

1st Oct	World Habitat day (1st Monday of October) (by U.N.)
3rd Oct 1803	Johan Gorrie (Inventor of a Cold Air Process of Refrigeration) was born.
4th Oct 1832	William Griggs (Inventor of Photo Chromo Lithography) was born.
4th Oct 1957	Soviet Union launched first artificial Earth Satellite named "Sputnik-1"
4th Oct	World Space Week (by U.N.)
5 th Oct	World Teachers Day. (by UNESCO)
5 th Oct 1864	Louis Lumiere (Inventor of first Motion Picture Camera) was born.
6 th Oct 1893	Maghnad Saha (Great Indian Astrophysicist) was born.
8th Oct 1917	Rodney Rabert Porter (Discoverer of exact Chemical Structure of Antibody) was born
10th Oct 1731	Henry Cavendish (Discoverer of Hydrogen gas) was born.
11th Oct	International Day of the Girl Child (by U.N.)
12th Oct 1860	Elmer Sperry (Inventor of the Gyro Scope) was born
16th Oct	World Food Day (by U.N.)
19th Oct 1783	The first manned balloon flight done by Scientist Jean Francois Pilatre de Rozier.
19th Oct 1910	Subrahmanyam Chandrasekhar (Nobel Prize winner Astrophysicist of India) was born.
20th Oct 1891	James Chadwick (Discoverer of Neutron) was born.
21th Oct 1833	Alfred Nobel (Inventor of Detonator for Dynamite & Nitro-Glycerine) was born.
22th Oct 1896	Charles Glen King (Discoverer of Vitamin C) was born.
22th Oct 1905	Karl Jansky (Discoverer of Cosmic Radio Wave Emission) was born.
27th Oct 1811	Issac Singer (Inventor of Home Sewing Machine) was born.
28th Oct 1914	Jonas Salk (Inventor of Polio Vaccine) was born.
29th Oct 1656	Edmond Halley (Discoverer of Halley's Comet) was born.

U. N. : United Nations

WHO : World Health Organization

Answers: 1) b, 2) a, 3) d, 4) b, 5) a.

KNOW THE EXHIBIT AT FUN SCIENCE GALLERY

Deceptive Reality

Look at the rotating cubical frames inside the three chambers of this display. Now press the switch once and release. As you keep on looking, two different geometrical figures will appear from no where and will start rotating inside the cubical frames in the inner chambers. Keep on observing and notice that they will again disappear after sometime. Out of the three cubical frames only the one in the front is a real object and the other two are merely virtual images formed by the partial mirrors that partition the two inner chambers. The tetrahedral and spheroid figures that appear and disappear are also real objects placed inside the two inner chambers and are being rotated. When these figures are not illuminated we do not see them at all because the partial mirrors behave as true mirrors and hence from virtual images of the cube rotating outside. But when these figures are illuminated we see both these real figures as well as the virtual image of the cube at the same place.



SCIENTIFIC QUESTION

What is Acid and Base?

Two special kinds of chemicals are called acid and base. An acid is a substance that dissolves (usually in water) and forms ions of hydrogen. This means, as the acid dissolves, each hydrogen atom separates from the rest of its acid molecule and floats freely in solution. It also loses its single electron to become a positive particle called a hydrogen ion, written H^+ . These hydrogen ions are available to take part in chemical changes or reactions. Strong acids are corrosive. They dissolve or chemically wear away many other substances. A base is the "opposite" of an acid. It can take up hydrogen ions. Strong bases and alkalis have a slimy feel and like acids are chemically corrosive. A base that dissolves in water is known as an alkali.

The chemicals of digestion

Acids and alkalis are not limited to the chemistry laboratory or factory. They are common in daily life and even in our own bodies. The lining of the stomach makes

a digestive juice containing a strong acid, hydrochloric acid (HCL). This chemically attacks swallowed food, breaking it a part and dissolving it to get nutrients from food. Another digestive part, the pancreas gland, produces strong alkalis. As the acid food leaves the stomach and goes into the intestine, the alkaline pancreatic juices pour onto it. The acids and alkalis combine and cancel each other. This prevents damage by these powerful natural chemicals.

Natural Acids and Bases

Acids and Bases are common in the nature world. The stinging spray that an ant can shoot from its rear end contains formic acid. The ant bites an intruder with its strong pincer like jaws, then squirts the spray into the wound to cause discomfort and pain.

Alkaloids are natural bases found in certain plants, especially in their sap, leaves or seed. Many have powerful effects on the human body. Some alkaloids are incredibly poisonous even in tiny amounts. Others can be helpful. The opiate alkaloids extracted from some types of poppies have pain-deadening effects. Their study has helped medical scientist to develop some type of pain killing drugs. Acetic acid, correctly known as ethanoic acid has the chemical formula CH_3COOH . Mixed with water in the proportions of 1 part of

acid to 20 parts of water, it is familiar as vinegar. It occurs naturally in the process of fermentation as fruits go bad or rotten.



An ant's stinging spray contains formic acid



Vinegar contains acetic acid



SCIENCE QUIZ

1. Which metal is not in the solid form?

- a) Bronze b) Mercury c) Copper d) Gold

2. Which non-metal has luster?

- a) Iodine b) Sulfur c) Phosphorus d) Potassium

3. Which metal catch fire if kept in open?

- a) Nitrogen b) Sulfur c) Krypton d) Sodium

4. To protect the metal from catching fire, in which liquid it should be placed?

- a) Water b) Kerosene c) Oil d) Petrol

5. Which is World's hardest non-metal?

- a) Diamond b) Carbon c) Radon d) Neon

EVENTS OF SCIENCE CENTRE

SCIENCE FAIR

Surat Municipal Corporation had organized 'Science Fair' at Art Gallery, Science Centre, Surat on 30th and 31st August 2019. Students have made projects on; Health and Epidemic Control, Transport and Communication, Mathematical Modelling and Use of Technology in Grievance/Problems resolution. There were two age groups of students Group A: std. 8 to 10 and Group B: std 11, 12. In this Science Fair 27 School, 213 Students (Group A: 156 and Group B: 57) and 55 Teachers have participated and demonstrated 67 innovative projects. More than 400 visitors had visited this Science Fair. In the closing ceremony of Science Fair, the Cultural Committee Chairman Smt Rashmikaben Patel and Dandak Smt. Daxaben Jariwala were present. Certificate and Memento were presented to all participants.



SCIENCE FILM SCREENING

As a part of the Celebration of Vikram Sarabhai's 100th birth anniversary year, Screening of Science Film was done on 30th and 31st August, 2019 at the Auditorium of the Science Centre. A Science Film Screening of "The Pioneer" developed by Mr. Bhargav Thakkar, a retired Scientist/Engineer from ISRO was done. School students and public had viewed the contribution of Vikram Sarabhai in the field of Science and technology. There was a question-answer session after Screening of Film, in which Mr. Bhargav Thakkar had interacted with public and gave answers to their questions.



SCIENCE PROJECT

Surat Municipal Corporation had organized 'Science Fair' at Art Gallery, Science Centre, Surat on 30th and 31st August 2019. Lourdes Convent High School had presented their project on 'Measuring Sugar Concentration of a liquid using Prism.' The device prepared by them uses the laws of refraction and Snell's law to detect the amount of sugar present in a solution.

This device is used to detect sugar. So, it can be used for detecting Diabetes Mellitus and its severity. Also, in space, many devices which are using solutions to know various densities, do not work due to reasons like lack of gravity, varying weight, etc. Whereas, since Laser is a monochromatic wave and also an electromagnetic wave. It doesn't need any medium to propagate. This device can be used anywhere on Earth as well as in Space, gives uniform results and is also very precise.

