

SCIENCE CENTRE NEWS LETTER

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SCIENCE CENTRE

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Whats new in Science

Flies possess more sophisticated cognitive abilities than previously known.

Common flies feature more advanced cognitive abilities than previously believed. Using a custom-built immersive virtual reality arena, neurogenetics and real-time brain activity imaging, researchers found attention, working memory and conscious awareness-like capabilities in fruit flies.

A new study, researchers at the University of California San Diego's Kavli Institute for Brain and Mind (KIBM) have found that fruit flies (*Drosophila melanogaster*) have more advanced cognitive abilities than previously believed. Using a custom-built immersive virtual reality environment, neurogenetic manipulations and in vivo real-time brain-activity imaging, the scientists present new evidence in the journal Nature of the remarkable links between the cognitive abilities of flies and mammals.

The multi-tiered approach of their investigations found attention, working memory and conscious awareness-like capabilities in fruit flies, cognitive abilities typically only tested in mammals. The researchers were able to watch the formation, distractibility and eventual fading of a memory trace in their tiny brains.

To arrive at the heart of their new findings the researchers created an immersive virtual reality environment to test the fly's behaviour via visual stimulation and coupled the displayed imagery with an infra-red laser as an adverse heat stimulus. This

gave researchers the ability to train and test flies for

conditioning tasks by allowing the insect to orient away from an image associated with the negative heat stimulus and towards a second image not associated with heat.

The researchers also imaged the brain to track calcium activity in real-time using a fluorescent molecule they genetically engineered into their brain cells. They also found that a distraction

introduced during training - a gentle puff of air - made the visual memory fade more quickly.

"This work demonstrates that fruit flies could serve as a powerful model for the study of higher cognitive functions. Simply put, the fly continues to amaze in how smart it really is."

said Dhruv Grover, a U C San Diego KIBM research faculty member and leading author of the new study.



SCIENTIST OF THE MONTH

Amitabh Joshi

Amitabh Joshi was born on 4 March 1965 (aged-56) in Agra. He did his B.Sc in Botany in 1988 and M.Sc. in Genetics in 1990 from Delhi University and moved to Washington State University from where he obtained a PhD in 1993, under the guidance of John N. Thompson and Michael E. Moody. He stayed in the US until 1996 to complete his post-doctoral studies on Adaptation to larval and adult crowding in fruit flies at the laboratory of Laurence D. Mueller of the University of California, Irvine and returned to India to work as a visitor at the Centre for Ecological Sciences of Indian Institute of Science for a month. In August 1996, he joined Jawaharlal Nehru Centre for Advanced Scientific Research as a member of faculty at the Animal Behaviour Unit and shifted to Evolutionary and Organismal Biology Unit in 1998 where he rose in rank from a faculty fellow (19982001) to an associate professor. He heads the Evolutionary Biology

Laboratory of the institution.

Joshi was selected as a Young Associate by the Indian Academy of Sciences in 1997 for a period of three years and was elected as its fellow in 2001. The same year, he was elected by Berlin Institute for Advanced Study as a fellow for his project, Life History Evolution in *Drosophila*. The Council of Scientific and Industrial Research awarded him the Shanti Swarup Bhatnagar Prize in 2009 for his contributions to Biological Sciences. In 2011, the Indian National Science Academy



elected him as a fellow.



Timings

Tuesday to Sunday
9.30 am to 4.30 pm

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SCIENCE FACTS MARCH 2022

1 March	Self Injury Awareness Day.
3 March 1838	American Astronomer, George W. Hill (who plotted the Moon's Orbit) was born.
3 March 1847	Mr. Alexander Graham Bell (Inventor of Telephone) was born.
3 March 1969	India's first Rajdhani Express train having speed of 140 km/h traveled for first time between Delhi and Hawrah.
4 March 1754	Benjamin Waterhouse (inventor of Smallpox vaccine) was born.
6 March 1937	Valentina Tereskowa (Lady Astronaut who was the first lady to enter into the space) was born.
8 March	International Women's Day (by UN).
8 March 1879	German physicist and chemist, Otto Hahn (Discoverer of radiothorium and actinium) was born.
9 March 1934	Uri Gagarin (world's first Astronaut) was born.
10 March 1876	Mr. Alexander Grehambel experimented for the first time to talk on telephone with his assistant Botish.
13 March 1781	Planet "Uranus" was discovered by well-known Astronomer Herschel.
14 March 1879	Sir Albert Einstein (discoverer of Theory of Relativity) was born.
16 March 1789	George Simon Ohm (discoverer of Ohm's Law) was born.
18 March 1858	German engineer, Rudolf Diesel (inventor of diesel motor) was born.
21 March 2016	It is the day when Day and Night time becomes equal.(Vernal Equinox)
21 March	World Down Syndrome Day.
22 March	World Day for Water.
23 March	World Meteorological Day. (WMO)
24 March 1854	Start of Telegram era in India by delivering first telegram from Kolkata to Agra.
27 March 1845	Wilhelm Conrad Rontgen (Noble prize winner & inventor of invisible 'X' rays) was born.
29 March 1967	Making of world's biggest submarine "9 Redoubtable (S611)" by France, which is having weight of 7780 ton and length of 419 feet.
U. N. : United Nations	
UNESCO United Nations Educational Scientific & Cultural Organization	

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

SCIENTIFIC QUESTION

What is PI in a Oximeter ?

Perfusion Index or PI is the ratio of the pulsatile blood flow to the non-pulsatile static blood flow in a patient's peripheral tissue, such as finger tip, toe, or ear lobe. Perfusion index is an indication of the pulse strength at the sensor site. The Perfusion Index's values range from 0.02% for very weak pulse to 20% for extremely strong pulse. The perfusion Index varies depending on patients, physiological conditions, and monitoring sites.

Perfusion Index is normally monitored with pulse oximeters. Most people that use an oximeter at home would not need a perfusion index Indicator because they are considered to be in general good health. A perfusion Index adds a lot of sensitivity to the oximeter sensor thus adding to the cost of the oximeter.



In a hospital, Perfusion Index, along with many other parameters, is used to monitor critically ill patients. Studies have shown that PI has a high correlation with capillary refill time and central-to-toe temperature difference. Perfusion Index is also used as an early warning of anesthetic failure. Studies have shown that an increase in PI is an early indicator that general or epidural anesthesia has initiated peripheral blood vessel dilation, which typically occurs before the onset of anesthesia. Lacking the spike would indicate the lack of anesthetic effect.

KNOW THE ENTERING SPACE GALLERY'S EXHIBIT

Inhabitable Planet

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

This exhibit showcases the environmental condition such as temperature, surface pressure, length of the day and length of a year of 7 planets of the solar system i.e., Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. It also showcases percentage presence of Nitrogen, Oxygen, Carbon dioxide, Sodium, Hydrogen, Argon, Helium, Methane and other gases in the planet's atmosphere.

Earth is the only planet in our solar system that can sustain life. The temperatures, pressure, gases in the atmosphere are favourable to support life in different form. This is not so in case of other planets. Extreme temperature, pressure or gases other than oxygen make them hostile to withstand life.



SCIENCE PROJECT

Surat Municipal Corporation had organized 'Science Fair' at Art Gallery, Science Centre, Surat On 30st and 31st August 2019. Student of 'J. H. Ambani saraswati Vidhyamandir' presented their project on 'To make 3-D objects using 2-D figures/shapes'.

The aim of the project is to make people aware about unique 3D objects which can make our difficult task easier and simple. It is environment friendly so does not harm animals and plants.

Oloid: An oloid is a 3D object formed by joining two congruent circles perpendicular to each other.

Applications: It is used in water treatment, to create waves in large water surface and in biotechnology as stirrer.

Sphericon: Sphericon is a 3D object formed by bicones in which axis are perpendicular to each other.

Applications: It is used in toy industry and in mechanical engineering.

Wobbler: It is special kind of oloid.



Quiz

1. What is the image formed in a compound microscope?
a) erect
b) inverted
c) sometimes erect, sometime inverted
d) None
2. Which lens is used in a simple microscope?
a) concave
b) convex
c) cylindrical
d) None
3. What is the S.I unit of refractive index?
a) meter
b) cm
c) watt
d) no unit
4. Which colour of light is deviated least?
a) Red
b) Blue
c) Violet
d) Green
5. Which blood cells are called 'Soldiers' of the body?
a) WBC
b) Platelets
c) RBC
d) all of above
6. What is the product of force and velocity?
a) work
b) power
c) energy
d) momentum
7. Who is the father of Botony?
a) Adam Smith
b) Greco-Roman
c) Theophrastus
d) Carl Linnaeur