

# How do hurricanes form? Know from NASA scientists

Washington, Sep 11: Even as Hurricane Harvey left Texas bruised and Hurricane Irma began lashing Florida, NASA scientists have explained in a blog how hurricanes form and what steps the US space agency has taken to study the most violent storms on Earth. People call these storms by other names, such as typhoons or cyclones, depending on where they occur, but the scientific term for all of these storms is "tropical cyclone", the scientists explained in a Tumblr blog this week.



Only tropical cyclones that form over the Atlantic Ocean or eastern and central Pacific Ocean are called "hurricanes."

Whatever they are called, tropical cyclones all form the same way. They are like giant engines that use warm, moist air as fuel. "That is why they form only over warm ocean waters near the equator. This warm, moist air rises and condenses to form clouds and storms," the blog said.

As this warmer, moister air rises, there is less air left near the Earth's surface. Essentially, as this warm air rises, this causes an area of lower air pressure below.

This starts the 'engine' of the storm. To fill in the low pressure area, air from surrounding areas with higher air pressure pushes in.

That "new" air near the Earth's surface also gets heated by the warm ocean water so it also gets warmer and moister and then it rises.

As the warm air continues to rise, the surrounding air swirls in to take its place. The whole system of clouds and wind spins and grows, fed by the ocean's heat and water evaporating from the surface.

As the storm system rotates faster and faster,

an eye forms in the centre.

Tropical cyclones usually weaken when they hit land, because they are no longer being "fed" by the energy from the warm ocean waters, the scientists explained.

However, when they move inland, they can drop many inches of rain, causing flooding as well as wind damage before they die out completely.

There are five types, or categories, of hurricanes. The scale of categories is called the Saffir-Simpson Hurricane Scale and they are based on wind speed.

To study hurricanes,

NASA satellites gather information from space that are made into pictures.

Some satellite instruments measure cloud and ocean temperatures. Others measure the height of clouds and how fast rain is falling. Still others measure the speed and direction of winds.

NASA also flies airplanes into and above hurricanes. The instruments aboard planes gather details about the storm.

To study those parts which are too dangerous for people to fly into, NASA uses airplanes that operate without people, the blog said.

# After revealing Saturn, Cassini set for final dive on September 15

New York, Sep 11: Nasa's robotic spacecraft Cassini that has been orbiting Saturn for 13 years is set for a final dive towards the planet and burn up in its atmosphere in a "grand finale" after it flies past TitanBSE 0.13 %, Saturn's largest moon, on September 15.

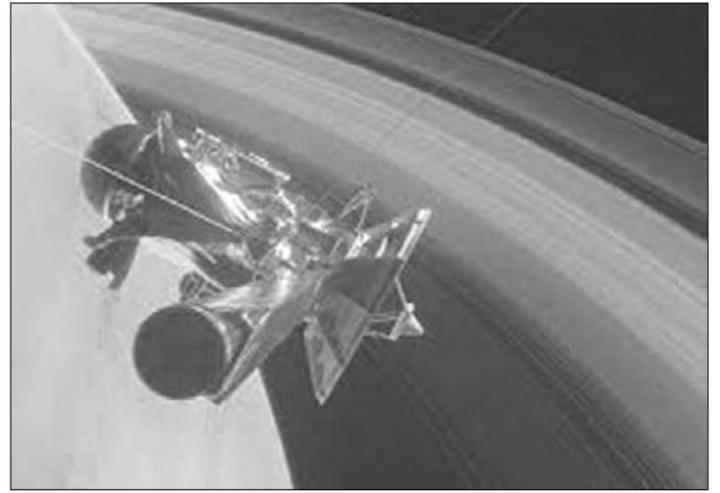
Cassini's imaging cameras will take their last look around the Saturn system, sending back pictures of moons Titan and Enceladus, the hexagon-shaped jet stream around the planet's north pole and features in the rings.

With its antenna pointed at Earth, the spacecraft will send back its final images and other data collected along the way.

Soon after, Cassini will burn up and disintegrate like a meteor, NASA said in a statement.

Cassini, a collaboration between Nasa, ESA and the Italian space agency, Agenzia Spaziale Italiana, was launched for the first time on October 15, 1997.

The spacecraft entered orbit around Saturn on June 30, 2004, carrying the European Huygens probe. After its four-year prime mission,



Cassini's tour was extended twice. Its key discoveries have included the global ocean with indications of hydrothermal activity within Enceladus -- a potential target for scientists that can harbour life -- and liquid methane seas on Titan.

As Cassini plunges past Saturn, in its final run, the spacecraft will collect some incredibly rich and valuable information that was too risky to obtain earlier in the mission.

The spacecraft will make detailed maps of Saturn's gravity and magnetic fields, revealing how the

planet is arranged internally, and possibly helping to solve the irksome mystery of just how fast Saturn is rotating.

The final dives will vastly improve our knowledge of how much material is in the rings, bringing us closer to understanding their origins.

Cassini's particle detectors will sample icy ring particles being funneled into the atmosphere by Saturn's magnetic field.

Its cameras will take amazing, ultra-close images of Saturn's rings and clouds.

In 2017, Cassini completed 13 years in

orbit around Saturn, following a seven-year journey from Earth.

The spacecraft is running low on the rocket fuel used for adjusting its course. If left unchecked, this situation would eventually prevent mission operators from controlling the course of the spacecraft, NASA said.

NASA chose to safely dispose of the spacecraft in the atmosphere of Saturn, in order to avoid the unlikely possibility of Cassini someday colliding with one of Saturn's moons, the statement said.

# Scratching helps boost social bonding in monkeys



London, Sep 11: Scratching can be a sign of stress in many primates, including humans, and may have evolved as a communication tool to help social cohesion in monkeys, a study has found.

The findings showed that scratching in the monkeys is more than an itch and was more likely to occur in times of heightened stress, such as being close to high-ranking individuals or to non-friends.

During such stressful experiences scratching appeared to reduce aggression from others and lessen the chance of conflict, suggesting that it might have evolved as a communication tool to help social cohesion.

"Observable stress behaviours could have evolved as a way of reducing aggression in

socially complex species of primates. Showing others you are stressed could benefit both the scratcher and those watching, because both parties can then avoid conflict," said Jamie Whitehouse from Britain's University of Portsmouth.

The research also raises the question whether human scratching and similar self-directed stress behaviours serve a similar function.

Further, stress scratching significantly lowered the likelihood of a scratching monkey being attacked.

The likelihood of aggression when a high ranking monkey approached a lower ranking monkey was 75 per cent if no scratching took place, and only 50 per cent when the lower ranking monkey

scratched. Scratching also reduced the chance of aggression between individuals who did not have a strong social bond.

"By revealing stress to others, we are helping them predict what we might do, so the situation becomes more transparent. Transparency ultimately reduces the need for conflict, which benefits everyone and promotes a more socially cohesive group," Jamie added.

For the study, published in Scientific Reports, the team conducted behavioural observations of 45 rhesus macaques from a group of 200. The team monitored the naturally occurring social interactions between these animals over a period of eight months.

# Researchers identify 27 states of emotion

San Francisco, Sep 11: A new study challenges a long-held assumption in psychology that most human emotions fall within the universal categories of happiness, sadness, anger, surprise, fear and disgust.

Using statistical models to analyse the responses of 853 men and women, who are demographically diverse, to 2,185 emotionally evocative video clips, University of California, Berkeley, researchers have identified 27 distinct categories of emotion and created a multidimensional map to show how they are connected.

According to the study published in journal Proceedings of the National Academy of Sciences journal, there are smooth gradients of emotion between, for instance, awe and peacefulness, horror and sadness, and amusement and adoration.

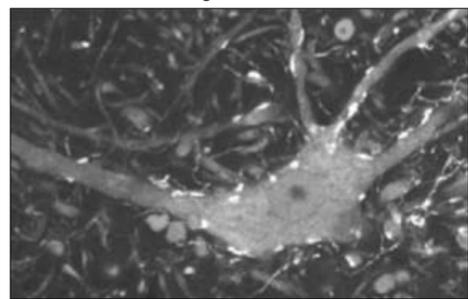
"We don't get finite clusters of emotions in the map because everything is interconnected," Xinhua quoted lead author Alan Cowen as saying.

The results showed that study participants generally shared the same or similar emotional responses to the videos shown to them, providing a wealth of data that allowed the researchers to identify 27 distinct categories of emotion.

Through statistical modelling and visualisation techniques, the researchers organised the emotional responses to each video into a semantic atlas of human emotions.

"We found that 27 distinct dimensions, not six, were necessary to account for the way hundreds of people reliably reported feeling in response to each video," said study senior author Dacher Keltner.

# Scientists turn human skin cells directly into motor neurons



Washington, Sep 11: Scientists have found a way to convert skin cells from healthy adults directly into motor neurons without going through a stem cell state, thereby making it possible to study motor neurons of the human central nervous system in the laboratory.

Unlike commonly studied mouse motor neurons, human motor neurons growing in the lab would be a new tool since researchers cannot take samples of these neurons from living people but can easily take skin samples.

Motor neurons drive muscle contractions, and their damage underlies devastating diseases such as amyotrophic lateral sclerosis and spinal muscular atrophy, both of which ultimately lead to paralysis and early death.

The technique, described in the journal Cell Stem Cell, could help researchers better understand these diseases.

"In this study, we only used skin cells from healthy adults ranging in age from early 20s to late 60s," said senior author Andrew Yoo, Assistant

Professor at Washington University School of Medicine in St. Louis.

To convert skin cells into motor neurons, the researchers exposed the skin cells to molecular signals that are usually present at high levels in the brain.

"Our research revealed how small RNA molecules can work with other cell signals called transcription factors to generate specific types of neurons, in this case motor neurons," Yoo said.

"In the future, we would like to study skin cells from patients with disorders of motor neurons. Our conversion process should model late-onset aspects of the disease using neurons derived from patients with the condition," Yoo added.

Avoiding the stem cell phase eliminates ethical concerns raised when producing what are called pluripotent stem cells, which are similar to embryonic stem cells in their ability to become all adult cell types.

And importantly, avoiding a stem cell state allows the resulting motor neurons to retain the age of the original skin cells and, therefore, the age of the patient.

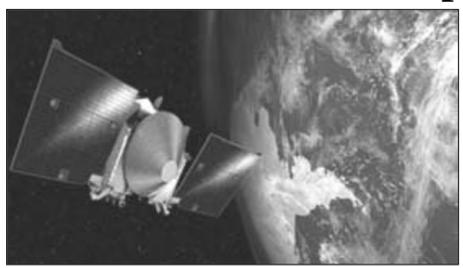
Maintaining the chronological age of these cells is vital when studying neurodegenerative diseases that develop in people at different ages and worsen over decades.

"Going back through a pluripotent stem cell phase is a bit like demolishing a house and building a new one from the ground up," Yoo said.

"What we're doing is more like renovation. We change the interior but leave the original structure, which retains the characteristics of the ageing adult neurons that we want to study," Yoo added.

The ability of scientists to convert human skin cells into other cell types, such as neurons, has the potential to enhance understanding of disease and lead to finding new ways to heal damaged tissues and organs, a field called regenerative medicine.

# NASA's asteroid-bound spacecraft imaged from Earth



Washington, Sep 11: As NASA's asteroid-bound spacecraft OSIRIS-REx approaches Earth for its September 22 gravity assist, a ground-based telescope has captured images of the spacecraft.

This is the first Earth-based view of OSIRIS-REx since its launch on September 8, 2016, NASA said on Friday.

The images were taken on September 2, by the Large Binocular Telescope Observatory located on Mount Graham in Arizona.

OSIRIS-REx was approximately 12 million kilometres away when the images were taken, NASA said.

The Large Binocular Telescope is a pair of 8.4-metre mirrors mounted side by side on the same mount, that can work together to provide resolution equivalent

to a 22.7-metre telescope.

The telescope typically conducts imaging of more distant objects but took this opportunity to look for OSIRIS-REx with a pair of wide-field cameras (one per mirror) as the spacecraft approaches Earth for its gravity assist.

This encounter will change the spacecraft's trajectory and set it on course to rendezvous with asteroid Benu, where it will collect a sample of surface material and return it to Earth for study in 2023.

The OSIRIS-REx mission team is collecting other images of the spacecraft taken by observatories and other ground-based telescopes around the world during this period -- approximately September 10-23, depending on location and local conditions.

## HAPPY RETURNS OF THE DAY

### BIRTHDAY GREETINGS

Name : .....

Date of birth : .....

Place : .....

PHOTO



Ayesha Julekha

Office address : HIMALAYAN MIRROR, Gairi Gaon, Tadong, Gangtok, PIN: 737102, Email :Himalayanmirrornews@gmail.com