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News Analysis (04 Dec, 2018)

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OSIRIS-REx Spacecraft Arrives at Asteroid Bennu

OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer) mission has arrived at asteroid Bennu after a two-year journey.

- OSIRIS-REx was launched from Cape Canaveral, Florida on September 8, 2016.
- The OSIRIS-REx mission is not the first to ever visit an asteroid and attempt a sample return — **Japan has done (Hayabusa Mission) it before and Europe (Rosetta Mission) has managed to land on a comet.**

Mission

- The Mission aims to study asteroid Bennu, **collect a sample and return it to Earth in 2023.**
- The mission will spend 2.5 years, mapping its surface and studying its composition.
- In mid-2020, scientists will direct Osiris-Rex to drop down to the asteroid and grab at least 60g of regolith, or "topsoil".
- This will be packed away in a sterile capsule to be returned home in 2023.

Mission Objective

The OSIRIS-REx name is an acronym of the mission objectives, which are:

- **Origins:** Return and analyze a pristine carbon-rich asteroid sample
- **Spectral Interpretation:** Provide ground truth or direct observations for telescopic data of the entire asteroid population
- **Resource Identification:** Map the chemistry and mineralogy of a primitive carbon-rich asteroid
- **Security:** Measure the effect of sunlight on the orbit of a small asteroid, known as the Yarkovsky effect—the slight push created when the asteroid absorbs sunlight and re-emits that energy as heat
- **Regolith Explorer:** Document the regolith (layer of loose, outer material) at the sampling site at scales down to the sub-centimeter

Significance of Mission

- **Origins of the Solar System**

- In order to understand the origin and evolution of the solar system.
- Bennu may have molecules of carbon and water, both of which are necessary for life.
- As Earth formed, and afterward, objects like Bennu delivered these materials to our planet. By studying Bennu, we can better understand how life originated on earth.

- **Protecting Earth**

- Bennu is one of the most potentially hazardous asteroids currently known to Earth. Bennu has a 1-in-2,700 chance of impacting earth during one of its close approaches to Earth in the late 22nd century.
- Close observations by OSIRIS-REx will help get more information about Bennu's journey and help scientists working on safeguarding our planet against hazardous asteroids.

- **Mining, LaunchPad, and Future Explorations**

- The mission will help to explore the possibility of using asteroids as refueling stations for spacecraft on the way to farther-flung destinations.
- Asteroids might also help astronauts restock their supplies. For example, Bennu likely has water bound in clay minerals, which could perhaps one day be harvested for providing water to astronauts.
- Asteroids contain a range of valuable minerals, there is a possibility of mining asteroids in the future.

About Bennu

- The asteroid was discovered by the **Lincoln Near-Earth Asteroid Research (LINEAR)** survey on September 11, 1999.
- It was originally named as **1999 RQ36**.

- The name Bennu comes from an Egyptian deity related to the Sun, often depicted as a gray heron.
- Bennu is a 500-meter wide asteroid in an elliptical orbit around the sun. It is a **carbonaceous asteroid** composition including a large amount of carbon.

Why Bennu?

- **It's close to Earth**
 - Bennu's orbit is close in proximity to Earth's, even crossing it. The asteroid makes its closest approach to Earth every 6 years.
 - It also circles the Sun nearly in the same plane as Earth, which makes it simple to launch the spacecraft out of Earth's plane and into Bennu's plane.
 - **It's the right size**
 - Small asteroids, with diameters of 200 meters or less, spin very fast. This rapid spinning makes it difficult for a spacecraft to match an asteroid's velocity and collect samples.
 - Bennu's size makes it approachable and makes landing possible.
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Qatar Quits OPEC

Qatar has decided to withdraw its membership from Organization of Petroleum Exporting Countries (OPEC) effective from January 2019 to focus on Liquefied Natural Gas (gas isn't part of OPEC's mandate) production.

- Qatar is a small oil producer which accounts for less than 2 percent of total oil output, so its departure may not have a significant impact on the oil market.
- OPEC's policy has become more concentrated in the hands of Saudi Arabia and non-OPEC member Russia.
- It is notable that some of the world's largest oil producers, including **Russia, China** and the **United States**, are **not members of OPEC** and pursue their own objectives.

Saudi -Qatar Conflict

- Saudi Arabia has been leading a **regional blockade** on Qatar that has seen trade and travel links severed over its **alleged support for terrorism**.
- OPEC members, Saudi Arabia and the United Arab Emirates, and fellow Arab states Bahrain and Egypt have imposed a **political and economic boycott** leading to the regional blockade on Qatar since June 2017.
- However, according to Qatar, Saudi led blockade is **aimed to impinge on its sovereignty**.

Impact Analysis

- Qatar will continue to produce oil and seek deals in countries including Latin America's top oil producer Brazil.
- It could signal that smaller producers are dissatisfied with the cartel's dominance by Saudi Arabia and Russia. So a group of small producers exiting the cartel will decrease OPEC's influence in the oil market.

OPEC

- The Organization of the Petroleum Exporting Countries (OPEC) is a permanent, **intergovernmental Organization**, created at the **Baghdad Conference in 1960**, by **Iran, Iraq, Kuwait, Saudi Arabia and Venezuela**.
- OPEC is a **cartel** that aims to manage the supply of oil in an effort to set the price of oil on the world market, in order to avoid fluctuations that might affect the economies of both producing and purchasing countries.
- According to its statutes, OPEC **membership is open to any country that is a substantial exporter of oil** and that shares the ideals of the organization.
- These countries were later joined by Qatar (1961), Indonesia (1962), Libya (1962), the United Arab Emirates (1967), Algeria (1969), Nigeria (1971), Ecuador (1973), Gabon (1975), Angola (2007), Equatorial Guinea (2017) and Congo (2018).
- Ecuador suspended its membership in December 1992 but rejoined OPEC in October 2007.
- Indonesia suspended its membership in January 2009, reactivated it again in January 2016, but decided to suspend its membership once more in November 2016.
- Gabon terminated its membership in January 1995. However, it rejoined the Organization in July 2016.
- OPEC has its **headquarter** in **Vienna, Austria**.

Warmer Winters Ahead as El Niño Conditions Develop

According to the India Meteorological Department (IMD), India is likely to experience a warmer winter for a second consecutive year due to the influence of a brewing El Niño over the Pacific Ocean.

- It is likely that a **weak and short duration El Niño** will develop towards February 2019, i.e by the end of winters.
- This was stated in **IMD's 'Seasonal Outlook for Temperatures'** which it has been issuing since 2016, for both hot and cold weather seasons. These forecasts are based on predictions from the Monsoon Mission Coupled Forecasting System (MMCFs).

India Meteorological Department (IMD)

- IMD was established in **1875**.
- It is an agency of the **Ministry of Earth Sciences of the Government of India**.
- It is the principal agency responsible for **meteorological observations, weather forecasting and seismology**.

El Nino

- El Nino refers to the **unusual warming of the central and east-central equatorial Pacific Ocean** which affects global weather. The warmer waters of the Pacific Ocean cause the winds in various regions to reverse, like the trade winds that come towards India.
- This change of wind direction leads to warmer winters and summers and a decrease in rainfall during the monsoon. Most of the time, it also leads to drought.
- There is also an **opposite of an El Niño, called La Niña means The Little Girl in Spanish**. This refers to times when waters of the tropical eastern Pacific are colder than normal and trade winds blow more strongly than usual.
- **Collectively, El Niño and La Niña are parts of an oscillation in the ocean-atmosphere system called the El Niño-Southern Oscillation, or ENSO cycle.**

What Happens Normally?

- Normally, the warmest part of the Pacific Ocean is the region near the equator. Due to the spinning of the earth, the prevailing winds flow from east to west. This **pushes the warm waters westwards, say towards Indonesia**.

During an El Nino event, the prevailing winds across the Pacific weaken, and sometimes they can even reverse and blow the other way. This allows some of the **warmer waters to move eastwards, away from Indonesia and towards South America**.

- In the east, around the coast of South America, **cool waters normally well up**. These waters are **rich in nutrients and fish, and provide plenty of food for the Peruvian Fisherman**.

It is interesting to note that the **El Nino was discovered by Peruvian Fisherman** when they noticed that every three to seven years, in the months of December and January, there would be **virtually no fish in the seas**, because of **unusual presence of warm waters**. As it was noticed around **Christmas time**, they named this phenomenon **El Nino (Spanish for 'the baby boy')**.

Effects of El Nino

- El Nino affects global weather. It **favours eastern Pacific hurricanes and tropical storms**. Recorded unusual rainfall in Peru, Chile and Ecuador are linked to the climate pattern.

- El Nino reduces upwelling of cold water, **decreasing the uplift of nutrients from the bottom of the ocean**. This affects marine life and sea birds. The fishing industry is also affected.
 - **Drought** caused by El Nino can be widespread, **affecting southern Africa, India, Southeast Asia, Australia, and the Pacific Islands**. Countries dependent on agriculture are affected.
 - WHO report on the health consequences of El Nino forecasts a **rise in vector-borne diseases**, including those spread by mosquitoes, in Central and South America. Cycles of malaria in India are also linked to El Nino.
 - Over India, the El Nino has usually been the harbinger of drought and the La Nina of rain.
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Important Facts for Prelims (4th December 2018)

SHINYUU Maitri-2018

- The bilateral air exercise between the **Japanese Air Self Defence Force (JASDF)** and **Indian Air Force** is being held in Agra, India.
- The theme of the exercise is joint Mobility/Humanitarian Assistance & Disaster Relief (HADR) on Transport aircraft.
- Recently, the **joint military exercise** between Indian Army and Japan Ground Self Defence Force, named **Dharma Guardian** 2018 was held in Mizoram, India.
- Japan-India **Maritime Exercise** known as **JIMEX** was also held in Visakhapatnam, Andhra Pradesh.

“Chemputer” to Manufacture Drugs

- Scientists at University of Glasgow, UK have developed a new method to produce drug molecules, which uses downloadable blueprints to easily and reliably synthesise organic chemicals via a programmable ‘chemputer’.
- This is the first time synthesis of important drug molecules was achieved in an affordable and modular chemical-robot system called a chemputer.
- The chemputer is underpinned by a **new universal and interoperable standard for writing and sharing chemical recipes**.
- Those chemical recipes, run on a computer programme the team calls the ‘chempiler’, instruct the chemputer how to produce molecules on-demand, more affordably and safely than ever possible before.

- This is a **key step in the digitisation of chemistry** and will allow the universal assembly of complex molecules on demand, democratising the ability to discover and make new molecules using a simple software app and a modular chemputer.
- Chemputer system, could allow medical professionals in remote parts of the world to create life-saving drugs as and when required.

International Conference on Bears

- International conference on bears has been organised in **Agra (Uttar Pradesh)**.
- The conference is hosted by **Wildlife SOS (a conservation non-profit organisation)** in collaboration with **Bear Care Group from the US and Canada**.
- The conference is focused on **bear care, wildlife conservation** and **human-wildlife conflict mitigation**.

Acute Flaccid Myelitis

- Acute Flaccid Myelitis (AFM), a polio-like disease affecting children has come into public focus.
 - **Enteroviruses** (a group of viruses such as poliovirus and enterovirus A71, and West Nile virus.) are the main cause of the disease in children.
 - The concerns emanate from the US, more than 100 cases of AFM have been confirmed in 2018.
 - AFM is characterised by muscle weakness — weak limbs, pain, absent reflexes.
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