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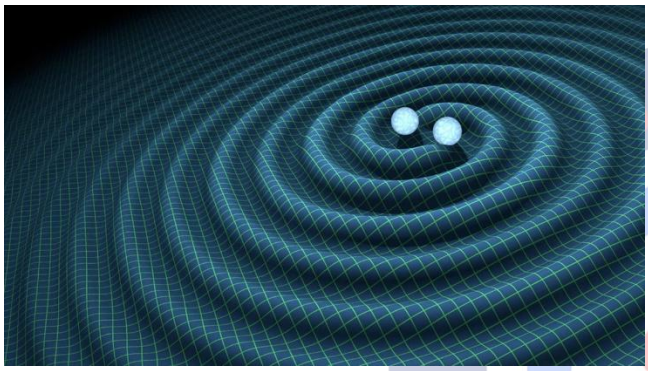
PRELIMS EDGE 2025 **19-07-2025**

TERMS IN NEWS

Gravitational waves



- Gravitational waves are **'ripples' in space-time caused by some of the most violent and energetic processes in the Universe.**
- **Albert Einstein** predicted the existence of gravitational waves in 1916 in his general theory of relativity.
- Einstein's mathematics showed that massive accelerating objects (things like neutron stars or black holes orbiting each other) would disrupt space-time in such a way that 'waves' of undulating space-time would propagate in all directions away from the source.
- These cosmic ripples would travel at the speed of light, carrying with them information about their origins, as well as clues to the nature of gravity itself.
- These waves squeeze and stretch anything in their path as they pass by.
- **The frequency of the wave will depend on the masses of the objects, and the strength will depend on how far away the event occurs.**
- The strongest gravitational waves are produced by cataclysmic events such as colliding black holes, supernovae (massive stars exploding at the end of their lifetimes), and colliding neutron stars.
- Other gravitational waves are predicted to be caused by the rotation of neutron stars that are not perfect spheres, and possibly even the remnants of gravitational radiation created by the Big Bang.

Existence of Gravitational waves

- In 2015, scientists detected gravitational waves for the very first time.
- They used a very sensitive instrument called LIGO (Laser Interferometer Gravitational-Wave Observatory).
- These first gravitational waves happened when two black holes crashed into one another.
- The collision happened 1.3 billion years ago. But the ripples didn't make it to Earth until 2015.

Three-Person In Vitro Fertilization Technique

In Vitro Fertilization

- It is a **medical procedure used to assist individuals or couples who are facing**

fertility challenges in achieving pregnancy.

- IVF is the most common and effective type of assisted reproductive technology (ART).

Process:

- IVF is a complex process that involves retrieving eggs from ovaries and manually combining them with sperm in a lab for fertilization.
- Several days after fertilization, the fertilized egg (now called an embryo) is placed inside a uterus.
- Pregnancy occurs when this embryo implants itself into the uterine wall.
- The procedure can be done using a couple's own eggs and sperm. Or IVF may involve eggs, sperm or embryos from a known or anonymous donor.
- The success rate of IVF depends on a number of factors, including reproductive history, maternal age, the cause of infertility, and lifestyle factors.

Three-Person In Vitro Fertilization

- Most DNA is found in the nucleus of our cells, and it's that genetic material—some inherited from mom, some from dad — that makes us who we are.
- But there's also some DNA outside of the cell's nucleus, in structures called **mitochondria.**
- Dangerous mutations there can cause a range of diseases in children that can lead to muscle weakness, seizures, developmental delays, major organ failure and death.
- These disorders are inherited exclusively through the mother, as mitochondrial DNA is passed down maternally.
- While men can suffer from mitochondrial disease, they do not transmit it to their children.
- Currently, there is no cure for mitochondrial DNA disorders.
- The three-person IVF technique offers a promising solution to this.
- It involves a procedure in which the nucleus from the mother's fertilized egg, along with the father's sperm, is transferred into a healthy donor egg that has had its own nucleus removed.
- This process allows the child to inherit nuclear DNA from the biological parents and healthy mitochondrial DNA from the donor.
- The procedure essentially replaces the faulty mitochondrial material in the mother's egg with healthy mitochondria from the donor.
- Therefore, the mother with the mitochondrial condition is still the biological mother of her child.
- In fact, the egg donor's DNA only accounts for about .2% of the baby's genetics.

PLACES IN NEWS

Syria

- **Location**: Western Asia, eastern Mediterranean
- **Borders:** It is bordered by Turkey, Iraq, Jordan, Israel, Lebanon, and the Mediterranean Sea.
- **Highest Point:** Mount Hermon.
- **Terrain**: Coastal plains, northwest mountains (Anti-Lebanon, Jabal al-Druze), central/eastern plateau and desert, and fertile Euphrates valley.
- Its area includes territory in the **Golan Heights** that has been occupied by Israel since 1967
- **Rivers & Reservoirs**: The Major rivers are the Euphrates, the Orontes and the Tigris. Lake Assad is the largest reservoir.
- **Climate**: Mediterranean coast; semi-arid steppe inland; arid desert in east.
- It got independence on 17 Apr 1946.
- **Ethnic Groups**: Arabs, Kurds, plus Turkmen, Assyrians, Circassians, Armenians, Druze, etc.

SPECIES IN NEWS

Dugong

- Dugongs (Dugong dugon) are the **only herbivorous mammals found in India's marine ecosystems**.
- **Appearance:** It is known as the sea cow, but resembles a cross between a seal and a whale, and is distributed through the Indo-Pacific region.
- **Distribution:** They are found along the Indian coastline, primarily inhabiting warm waters around the Andaman and Nicobar Islands, the Gulf of Mannar, Palk Bay, and the Gulf of Kutch.
- The dugong is a long-lived species, able to live up to 70 years.
- **Habitat:** Due to their dependence on seagrass beds for habitat and food, dugongs are restricted to shallow waters, where they spend the day feeding on seagrasses of the genera Cymodocea, Halophila, Thalassia, and Halodule.
- Individuals reach reproductive maturity after only nine or ten years and can give birth at intervals of around three to five years.

- Due to its **slow reproductive cycle,** extended time to maturity, and infrequent calving, a dugong population's maximum potential growth rate is estimated to be just about 5% per year.

Conservation status

- IUCN: Vulnerable
- CITES: Appendix I
- Wildlife Protection Act 1972: Schedule I
- **Threats:** The threats they face worldwide include rapidly declining populations and the ongoing degradation of their seagrass habitats.

Indian Gaur

- The Indian Bison of Gaur is the **largest and tallest in the family of wild cattle.**
- Scientific Name: Bos gaurus
- Distribution: Gaurs are indigenous to the South and Southeast parts of Asia.

Habitat:

- Gaurs are primarily the denizens of evergreen and semi-evergreen forests along with moist deciduous forests with open grasslands.
- They prefer **hilly-terrains below an altitude of 1,500-1,800 m with large and undisturbed forest tracts and abundant water.**

Features:

- The Indian Bison is about 240 cm to 340 cm in length, with a sole tail length of about 70 cm to 105 cm. Their height is about 170 cm to 230 cm.
- The adult male weighs around 600 kg to 1500 kg. and the adult female weighs about 400 kg to 1000 kg.
- They have a convex shape on the forehead.
- The limbs are very strong and sturdy.
- Both males and females possess horns. The horns are pale green or yellowish brown in color and are not pointed upward but possess a slightly inward curvature.
- They have a typically short tail.
- The Gaur is a **social animal**. They generally live in group size of about 30 to 40.

Conservation Status:

- IUCN Red List: Vulnerable
- Wild Life Protection Act, 1972: Schedule I
- It is listed in CITES Appendix I

PRACTICE QUESTIONS

Q1: They are the only herbivorous mammals found in India's marine ecosystems. They are known as the sea cow, but resembles a cross between a seal and a whale, and is distributed through the Indo-Pacific region. They are found along the Indian coastline, primarily inhabiting warm waters around the Andaman and Nicobar Islands, the Gulf of Mannar, Palk Bay, and the Gulf of Kutch.

Identify the species from the given description

A. Dugong
B. Indus River Dolphine

C. Gharials
D. Blue Finned Mahasheer

Q2 : They are the is the largest and tallest in the family of wild cattle. They are indigenous to the South and Southeast parts of Asia. They are primarily the denizens of evergreen and semi-evergreen forests along with moist deciduous forests with open grasslands. They are social animals that generally live in group size of about 30 to 40.

Identify the species from the given description

A. Water Buffalo
B. Mithun
C. Indian Gaur
D. Nilgai

Q3 : Which among the following do not share borders with Syria?

A. Jordan
B. Lebanon
C. Israel
D. Cyprus

Q4 : These are are 'ripples' in space-time caused by some of the most violent and energetic processes in the Universe. Albert Einstein predicted their existence in 1916 in his general theory of relativity. In 2015, scientists detected them for the very first time.

Identify the correct option from the following

A. Black Holes
B. Worm Holes
C. Gravitational Waves
D. Pulsars

Q5 : Consider the following statements regarding In Vitro Fertilization

1. It is a medical procedure used to assist individuals or couples who are facing fertility challenges in achieving pregnancy.
2. IVF is a complex process that involves retrieving eggs from ovaries and manually combining them with sperm in a lab for fertilization.
3. Currently these are successful models of three person IVFs in the world.

How many of the above statements are correct?

A. Only One
B. Only Two
C. All of the Above
D. None of the Above

Answers

1. A
2. C
3. D
4. C
5. C