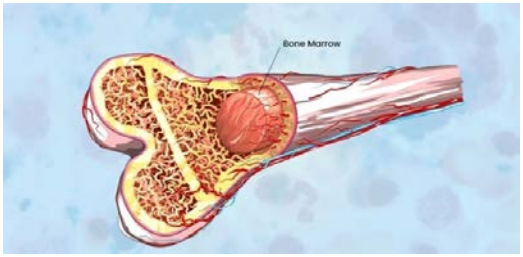
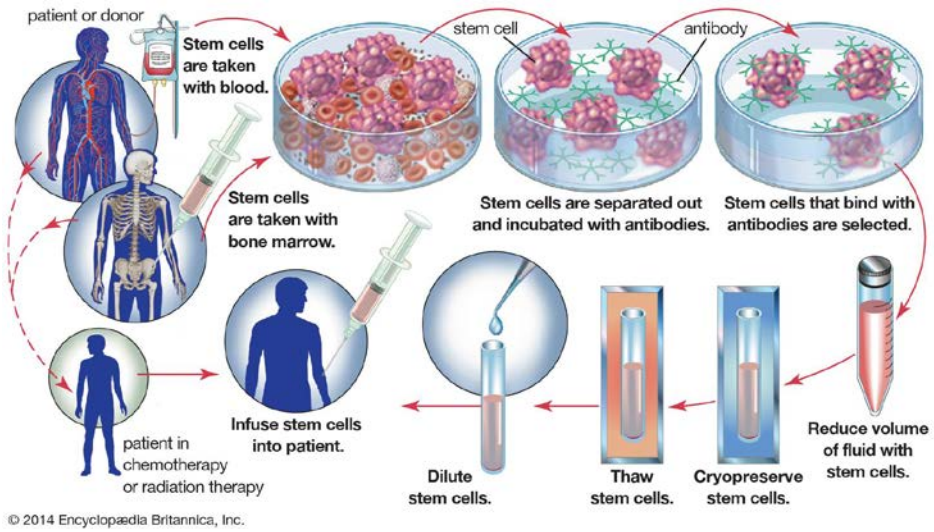
Bone Marrow Transplant

Context: In a groundbreaking first, Army Hospital (R&R) successfully performed a life-saving Bone Marrow Transplant for a 7-year-old with a rare immunodeficiency disorder.

- **Definition of Bone Marrow Transplant:**
  - A medical procedure that replaces bone marrow with healthy cells, either from the patient's own body or a donor.
  - Also known as a stem cell or hematopoietic stem cell transplant.
  - Primarily used to treat cancers such as leukemia, myeloma, and lymphoma, along with other blood and immune system disorders.
- **Stem Cells and Bone Marrow:**
  - Stem cells are specialized cells with the ability to replicate and transform into various types of cells required by the body.
  - Different types of stem cells are found in various parts of the body at different times.
  - Hematopoietic stem cells, crucial for blood cell production, are located in bone marrow and circulating in the bloodstream.



- **Significance of Hematopoietic Stem Cells:**
  - Cancer and its treatments can damage hematopoietic stem cells, impacting the production of red and white blood cells and platelets.
  - Red blood cells carry oxygen, white blood cells are part of the immune system, and platelets aid in clotting.
- **Bone Marrow/Stem Cell Transplant Procedure:**
  - The procedure aims to restore the body's ability to produce essential blood cells and combat infections.
  - Two main types of transplants: Autologous (using the patient's own cells) and Allogenic (using donor cells).



- **Types of Transplants:**
  - **Autologous Transplant:**
    - Involves using the patient's own stem cells, collected before intensive cancer treatment.
    - After treatment, the stem cells are returned to restore the immune system and blood cell production.
  - **Allogenic Transplant:**
    - Utilizes stem cells from a donor after the patient undergoes chemotherapy or radiation.
    - The success of the transplant often relies on finding a suitable donor match, including siblings, family, or unrelated volunteers.
  - **Other Options:**
    - **Umbilical cord blood transplant**: Uses stem cells from umbilical cord blood.
    - **Parent-child transplant and haplotype mismatched transplant**: Involve a 50% match from family members.

- **Graft-Versus-Cancer Effect**: Common in Allogenic Transplants, where the new stem cells recognize and eliminate remaining cancer cells.
- **Finding a Donor Match:**
  - Donor matching is based on human leukocyte antigens (HLA), crucial for reducing the risk of graft-versus-host disease (GVHD).
  - Siblings are often preferred donors, but unrelated donors or cord blood can also be suitable.
- **Procedure Steps**:
  - The initial placement of a catheter for administering treatments.
  - **For Autologous Transplants:**
    - Collection of stem cells.
    - Pre-transplant treatment with chemotherapy or radiation.
    - Infusion of stem cells.
    - Recovery with close monitoring.
  - **For Allogenic Transplants:**
    - Identification of a compatible donor and HLA typing.
    - Collection of stem cells from the donor.
    - Pre-transplant treatment with chemotherapy.
    - Infusion of donor cells.
    - Recovery with antibiotic treatment and GVHD prevention.
- **Recovery and Monitoring:**
  - Rigorous monitoring of cell recovery, growth, and potential side effects.
  - Administration of antibiotics to reduce the risk of infection.
  - Ongoing care to address and manage side effects and complications.
- **Complexity and Personalization:**
  - Transplants are complex medical procedures, and specific steps may be adjusted based on individual cases.
  - Patients may require hospital stays for various steps, and the duration can vary.
  - Regular communication with healthcare teams is essential for understanding and managing expectations.

Logistics Ease Across Different State (LEADS) 2023

Context: Sh. Piyush Goyal, the Union Minister of Commerce & Industry, Consumer Affairs, Food & Public Distribution, and Textiles, unveiled the "Logistics Ease Across Different State (LEADS) 2023" report.

- A comprehensive report guiding States and UTs for revolutionary reforms in the logistics sector.
- **Purpose and Importance:**
  - Aims to provide strategic insights for stakeholders in the logistics sector.
  - Encourages healthy competition among States/UTs to enhance logistics performance.
  - Aligns with the vision of Viksit Bharat.
- **Notable Initiatives and Vision:**
  - Stresses the significance of key initiatives like PM GatiShakti, granting 'industry' status to logistics, and promoting digital initiatives.
  - Emphasizes the role of logistics in India's growth vision, aiming for a tenfold increase from USD 3.5 trillion to USD 35 trillion by 2047.
- **Performance Highlights:**
  - Based on a pan-India primary survey conducted between May and July 2023.
  - Covers over 7,300 responses across 36 States/UTs.
  - Highlights achievements, fast movers, and aspirers in different groups (Coastal, Landlocked, North-East, Union Territories).
- **Evolution and Objectivity:**
  - Conceived in 2018, LEADS evolved to incorporate both perception and objectivity in its evaluation.
  - Differs from the Logistics Performance Index by considering a wider spectrum of state initiatives.
- **Positive Shift in States' Performance:**
  - LEADS 2023 signals a positive shift in States' performance across key pillars: Logistics Infrastructure, Logistics Services, and Operating and Regulatory Environment.
  - Provides region-specific insights for informed decision-making and comprehensive growth.
- **Performance Highlights from LEADS 2023:**
  - **Coastal Group:**
    - **Achievers**: Andhra Pradesh, Gujarat, Karnataka, Tamil Nadu.

    - **Fast Movers**: Kerala, Maharashtra.
    - **Aspirers**: Goa, Odisha, West Bengal.
  - **Landlocked Group:**
    - **Achievers**: Haryana, Punjab, Telangana, Uttar Pradesh.
    - **Fast Movers**: Madhya Pradesh, Rajasthan, Uttarakhand.
    - **Aspirers**: Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand.
  - **North-East Group**:
    - **Achievers**: Assam, Sikkim, Tripura.
    - **Fast Movers**: Arunachal Pradesh, Nagaland.
    - **Aspirers**: Manipur, Meghalaya, Mizoram.
  - **Union Territories**:
    - **Achievers**: Chandigarh, Delhi.
    - **Fast Movers**: Andaman & Nicobar, Lakshadweep, Puducherry.
    - **Aspirers**: Daman & Diu/Dadra & Nagar Haveli, Jammu & Kashmir, Ladakh.
- **Collaborative Development**:
  - Developed collaboratively, LEADS 2023 brings objectivity to the assessment of infrastructure development and process-related reforms.
  - 23 States/UTs aligned their State Logistics Policies with the National Logistics Policy.

Casgevy, Thalassemia and Genetic Editing

Context: CRISPR-based therapies for sickle-cell disease and β-thalassaemia have received regulatory approval in both the U.K. and the U.S., marking a significant milestone for these highly anticipated treatments.

- This development signifies a groundbreaking era with the potential to transform the lives of millions facing inherited blood disorders.
- **Prevalence of Thalassemia and Sickle-Cell Anaemia:**
  - Thalassemia affects over a million people globally, and approximately 100,000 individuals depend on regular blood transfusions.
  - An estimated 20 million people worldwide are suffering from sickle-cell anaemia.
- **CRISPR Discovery Timeline:**
  - The CRISPR system, discovered over almost three decades of academic pursuit, identified clustered regularly interspaced short palindromic repeats (CRISPR) in 1993.
  - CRISPR + Cas proteins were recognized as an antiviral defense system in 2005, leading to groundbreaking work by Emmanuelle Charpentier and Jennifer Doudna, who were awarded the 2020 Nobel Prize in chemistry.
- **Applications and Innovations:**
  - The CRISPR-Cas9 system serves as a programmable 'molecular scissor' for precise DNA editing.
  - Teams led by Feng Zhang and George Church demonstrated CRISPR-Cas9's use in editing eukaryotic organisms, spurring applications in genetic therapies and agricultural advancements.
- **CRISPR in Medicine - Casgevy Approval:**
  - The U.K.'s Medicines and Healthcare products Regulatory Agency (MHRA) approved the CRISPR-based method "exagamglogene autotemcel" (Casgevy).
  - The U.S. Food and Drug Administration (FDA) also approved Casgevy for treating sickle-cell disease, marking it as one of the first CRISPR-based therapeutics approved by major drug regulators.
  - Casgevy involves modifying a patient's blood stem cells to produce normal red blood cells.
- **Evolution of CRISPR Technologies:**
  - Ongoing advancements include base-editing, prime editing, and the modification of epigenetic effects.
  - First-generation CRISPR-based therapies pave the way for more efficacious and efficient technologies.
- **Thalassemia:**
  - Thalassemia is an inherited blood disorder characterized by insufficient hemoglobin production, a vital component of red blood cells.
  - Inadequate hemoglobin leads to impaired red blood cell function and a shortened lifespan, resulting in reduced oxygen delivery to body cells.

- **Impact on Health:**
  - The lack of healthy red blood cells in thalassemia can manifest as fatigue, weakness, and shortness of breath, collectively termed anemia.
  - Severe anemia poses the risk of organ damage and potential fatality.
- **Classification of Thalassemia:**
  - Thalassemia is classified into trait, minor, intermedia, and major categories based on its severity.
  - Thalassemia trait may exhibit mild or no symptoms, requiring no specific treatment.
  - Thalassemia major represents the most severe form, necessitating regular and comprehensive treatment.
- **Types of Thalassemia:**
  - **Alpha Thalassemia:**
    - Defects in alpha globin protein chains determine the type.
    - One defective gene results in asymptomatic alpha thalassemia minima.
    - Two defective genes may cause mild symptoms, known as alpha thalassemia minor.
    - Three defective genes lead to moderate to severe symptoms, termed Hemoglobin H disease.
    - Four defective genes often result in fatality or require lifelong blood transfusions, referred to as hydrops fetalis with Hemoglobin Barts.
  - **Beta Thalassemia:**
    - Defects in beta-globin genes dictate the type.
    - One defective gene results in mild symptoms, known as beta thalassemia minor.
    - Two defective genes cause moderate to severe symptoms, presenting as thalassemia intermedia or beta thalassemia major/Cooley's anemia.

NEWS IN BETWEEN THE LINES

Yogmaya Temple

Recently, the Yogmaya Temple in Mehrauli, once believed to date back to the Mahabharata era, has undergone a transformation from a Mughal-sponsored structure to a modern concrete building.

About Yogmata Temple:

- The Yogmaya Temple, also known as the Jogmaya temple is believed to have ancient roots tracing back to the **Mahabharata era**, monument in **Mehrauli**.
- It was built between **1806** and **1837** by **Lala Sidhu Mal**, a noble in the court of **Mughal Emperor Akbar II.**
- This temple held cultural significance, fostering **Hindu-Muslim unity** through traditions like **Phool Walon ki Sair**.
- Literary sources like the **Bhagawat** and historical texts allude to the temple's connection to the Mahabharata era, with tales of **Yudhishtir and Lord Krishna** associated with its creation.
- Accounts by historians like Thomas **Metcalfe in the 19th century** mention the construction of the Yogmaya shrine during Akbar II's reign, adding to its historical documentation.

Bodhicitta

Recently, the Tibetan spiritual leader the 14th Dalai Lama delivered a two-hour-long teaching to his devotees on Bodhicitta at Siliguri's Sed-Gyued Monastery.

About Bodhichitta:

- Bodhicitta is translated as "**awakening mind**" or "**thought of enlightenment**".
- It serves as a pivotal principle deeply interwoven into the **teachings of Mahayana Buddhism**, guiding practitioners on the compassionate path of altruism and selflessness.
- It is the commitment to embark on a path of awakening and be a bodhisattva, one dedicated to the liberation of all beings.
- There are two types of bodhicitta: **Conventional** and **Ultimate**.
- Conventional bodhicitta is a mind that wishes to **free beings from suffering** and bring them to the state of enlightenment.
- Ultimate bodhicitta is a mind that has **realized emptiness.**

Surat Diamond Bourse

Recently, the Prime Minister of India inaugurated Surat Diamond Bourse in Gujarat.

About Surat Diamond Bourse:

- The Surat Diamond Bourse (SDB) is a **large-scale project** in Surat, **Gujarat**, India.
- It is the **world's largest corporate office hub**, with over 67 lakh square feet of floor area.
- It is also a global center for trading rough and polished **diamonds** and **jewelry**.
- It is spread across **35.54 acres** and has **4,500 offices** for national and international traders.
- It also includes a customs clearance house for import and export, a jewelry mall and facilities for international banking and safe vaults.
- It was built to expand and consolidate the **diamond trading business from Mumbai to Surat.**
- The overall structure of the complex was completed in May 2022, and the overall construction was finished on **July 26, 2023.**
- On **August 22, 2023, Guinness World Records** officially declared it the world's largest office building, surpassing The Pentagon.
- It received the prestigious **platinum rating** from the **Indian Green Building Council (IGBC)** for its environmentally sustainable practices and design.

Place in News

Bhutan

Recenlty, Bhutan plans to build a massive "international city" in an area of over 1,000sq. km on its border with Assam.

Bhutan (Capital: Thimphu)

Location: Bhutan, a landlocked country of south-central Asia, located on the eastern ridges of the Himalayas.

Political Boundaries: Bhutan shares its border with **China** to the north and **India** to the south, east and west.

Physical Features:

- **Mount Jomolhari** and **Gangkhar Puensum** are prominent peaks in Bhutan.
- **Lush valleys** carved by rivers like the **Paro** and **Punakha** Valleys.
- Rivers like the **Drangme Chhu**, **Sankosh**, and **Manas** River flow through Bhutan.

Personality in News

Guru Teg Bahadur

Recently, Prime Minister of India paid homage to Sikh Guru Teg Bahadur, commemorating his martyrdom.

Guru Teg Bahadur (1621-1675)

- Guru Tegh Bahadur was **the ninth of ten Sikh Gurus**.
- He was a great **teacher**, and a **renowned fighter**, thinker and poet.
- His birth name was **Tyag Mal,** which means "**master of renunciation**".
- He stood against the forced conversions of **Kashmiri Pandits** and **non-Muslims to Islam**, displaying resistance against religious oppression.
- His writings, consisting of about **116 poetic hymns**, are preserved in the sacred text **'Guru Granth Sahib**.'
- He founded the town of **Chak-Nanki in Punjab** during one of his missions, later becoming part of **Anandpur Sahib.**
- He publicly beheaded in **1675 by emperor Aurangzeb** in Delhi for refusing to convert to Islam.
- He earned the name "**Teg Bahadur" (Mighty of The Sword**) from **Guru Hargobind** due to his valor in battling the Mughals.
- Gurudwara **Sis Ganj Sahib** marks the site of his execution.
- Gurdwara **Rakab Ganj Sahib** commemorates the places where his body was cremated.

POINTS TO PONDER

- What is the name given to the apex predator mosasaur fossil discovered in Japan's Wakayama Prefecture? **- Wakayama Soryu**
- Where did Prime Minister Narendra Modi inaugurated the largest office space in the world? **- Surat Diamond Bourse, Gujarat**
- Who was the most recent recipient of the esteemed Nyholm Prize for Education from the Royal Society of Chemistry? **- Savita Ladage**
- In which country is the Duqm Port located? **– Oman**
- What is the IUCN status of Indian Tent Turtle? **– Least Concern**