Human Evolution and Migration

Source: TH

Why in News?

Scientists have established that **Homo sapiens** **evolved in Africa** and **later migrated to various parts of the world**. The routes and timing of these migrations are still debatable among the scientists.

- The **coastal dispersion theory** suggests migration along coastlines, though it lacks strong archaeological evidence.

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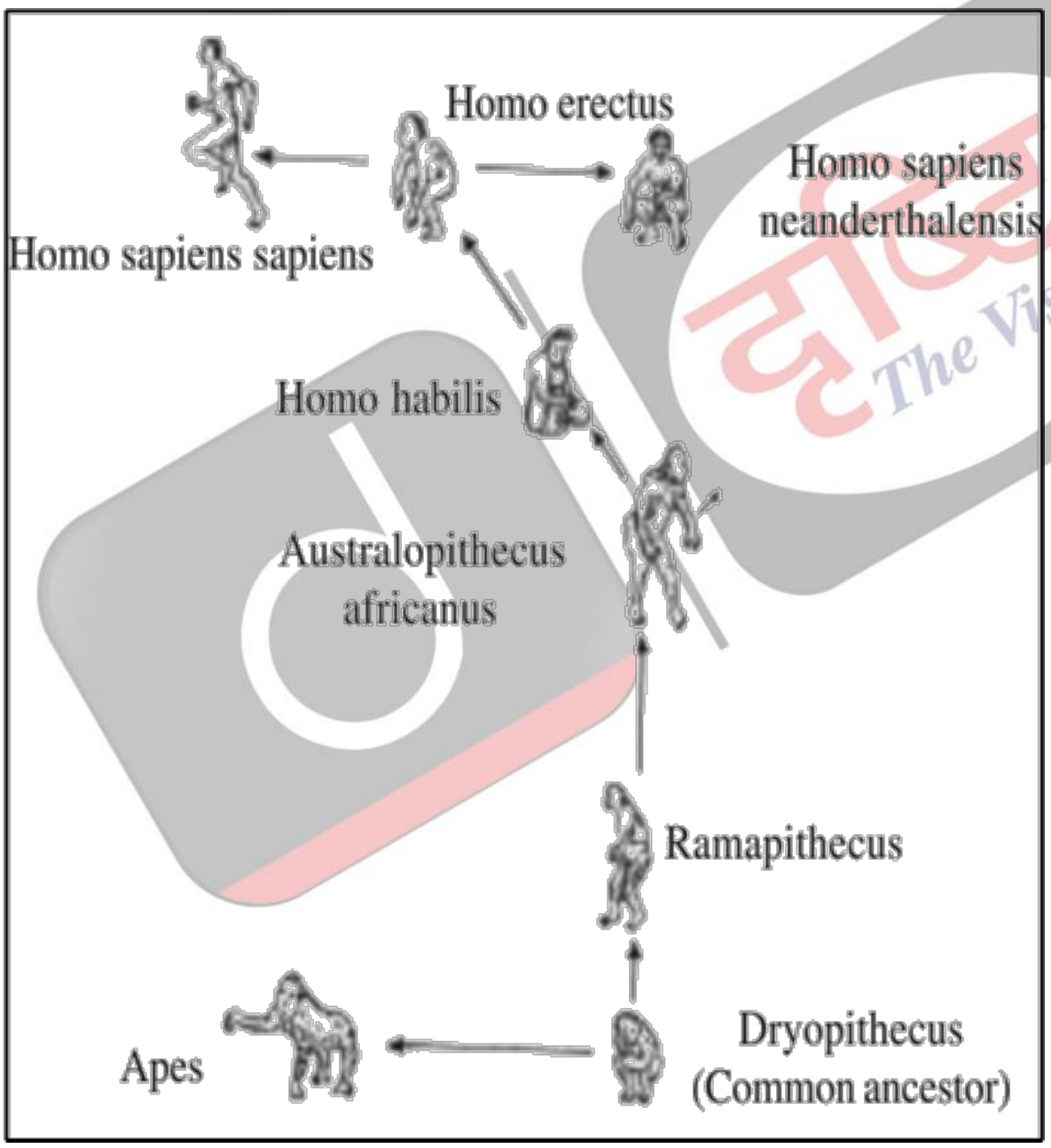
Human Evolution

- Human evolution is the **evolutionary process that led to the emergence of anatomically modern humans,** beginning with the evolutionary history of primates—in particular **genus Homo**—and leading to the **emergence of Homo sapiens** as a distinct species of the **hominid family, the great apes.**
- **Stages of Evolution of Human:**
    - Dryopithecus
    - Ramapithecus
    - Australopithecus
    - Homo
        - Homo habilis
        - Homo erectus
        - Homo sapiens
            - Homo sapiens neanderthalensis
            - Homo sapiens sapiens



What is the Route of Human Migration?

- **Background:**
  - **Genetic studies** have provided **insights into human evolution and migration patterns**. By analyzing **mitochondrial DNA mutations**, scientists confirmed that Homo sapiens evolved in Africa over millennia before migrating globally.
    - While scientists widely accept the **out-of-Africa theory**, they differ on the timing and routes of migration.
- **Two Theories of Dispersion:**
  - **Coastal Dispersion Theory:** Studies suggest **humans migrated along coasts**, benefiting from **warm climates, abundant food, and tropical conditions.**
    - **Research in 2005** using mitochondrial DNA of **260 Orang Asli individuals (Tribe of Malaysia)** indicated **rapid coastal migration around 65,000 years ago, reaching Australia** via the **Indian Ocean.**
    - A **2020 study on 2,700-year-old DNA in Japan** linked coastal migration to genetic affinities with **Taiwanese tribes.**
      - **Andaman Islands' settlements** also correlate with coastal journeys.
    - **Challenges to the Theory:**
      - Archeological **evidence in India contradicts** this model. **Inland Palaeolithic sites** dominate, with **no archeological traces along the Indian Ocean coastline** to support coastal dispersion.
- **Inland Dispersion Model:** The inland dispersal model suggests that **early humans migrated through interior terrestrial routes** rather than coastal ones.
  - **Saurashtra Peninsula Study:**
    - Recent research analysed **Middle Palaeolithic tools** in the **Bhadar and Aji river basins of Gujarat.**
    - Using relative dating methods, the **tools** were found to be **56,000–48,000 years old, indicating inland migration.**
    - Middle Palaeolithic tools revealed advanced flaking techniques, contrasting with sharper blade tools of the **Late Palaeolithic.**
    - Studies suggest Saurashtra was connected to **Kutch, Makran, and the Western Ghats during the Middle Palaeolithic**, indicating the region was farther from the coast.
    - **No evidence of marine resource dependence** (e.g., fish, shellfish) was found, further supporting inland migration.

Conclusion

- The **study offers new data but** emphasizes the need for precise dating. Evidence challenges purely coastal migration theories but r**equires careful interpretation due to submerged sites and undated regions.**
- The study also highlights broader dispersal in Saurashtra, covering coastal, hinterland, and inland areas, **suggesting a multifaceted migration pattern**.
- This detailed analysis of inland vs. coastal migration patterns continues to evolve, emphasizing the need for integrating genetic and archeological findings.

UPSC Civil Services Examination Previous Year Question (PYQ)

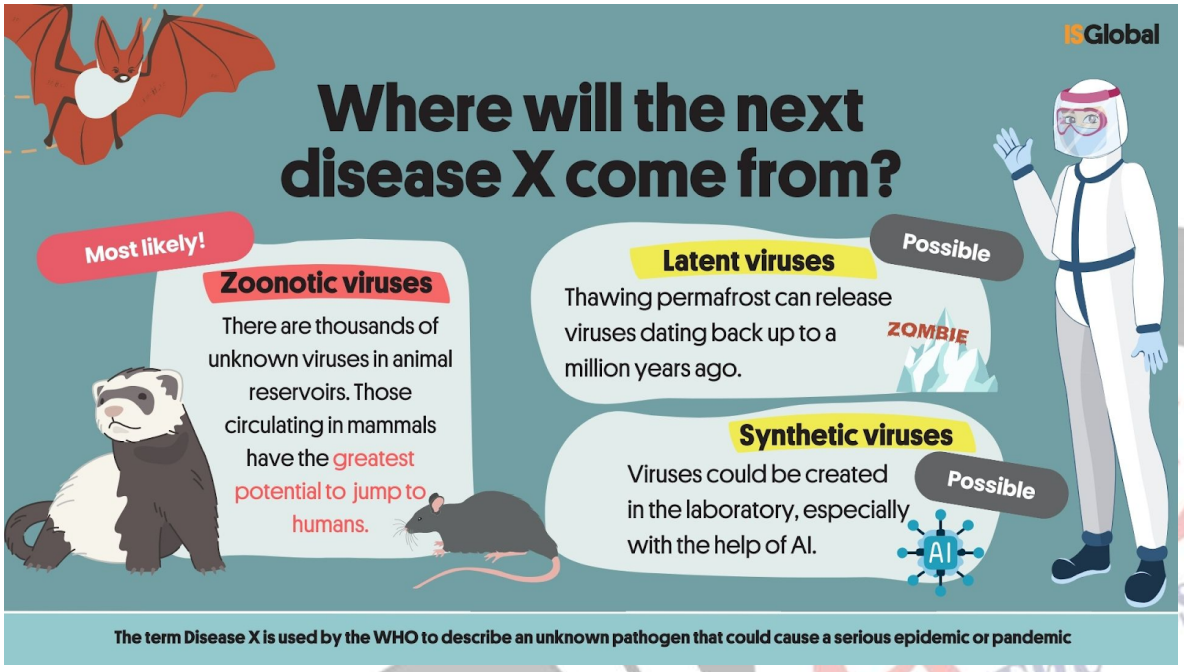
Q. The word 'Denisovan' is sometimes mentioned in media in reference to (2019)

A. fossils of a kind of dinosaurs
B. an early human species
C. a cave system found in North-East India
D. a geological period in the history of Indian subcontinent

Ans: (b)

Disease X

Source: TH



A December 2024 outbreak in the **Democratic Republic of Congo (DRC)**, causing over 400 deaths, raises concerns about **Disease X**.

About Disease X:

- **Definition**: A **hypothetical term by WHO** in **2018** for an **unknown pathogen** capable of **triggering a global pandemic**, highlighting the **need for preparedness** against emerging diseases.
- **Origins**: Emerged after the **2014–2016 West African Ebola epidemic.**
- **Sources:** Can originate from **viruses, bacteria, parasites, fungi, or prions**. Over 300 emerging diseases since 1940, 70% **zoonotic.**
- **Risk Factors:** High biodiversity regions, weak healthcare (e.g., Congo Basin), global connectivity, zoonotic spillovers, deforestation, agriculture, antimicrobial resistance, bioterrorism, lab accidents, and **climate change** complicate predictions.

Mitigation:

- Strengthened surveillance, healthcare systems, and platforms like **CEPI** are vital for rapid detection and response.
- Global cooperation, equitable access to resources, and frameworks like **WHO's pathogen list, Pandemic Treaty,** and **Nagoya Protocol** are essential for preparedness.

DRC:

- The DRC is the **2nd largest country in Africa** and the **11th largest in the world**.

Read More: [Future Pandemic Preparedness And Emergency Response]

2024 Arctic Report Card

[Source: DTE]

Why in News?

- A recent report titled the **2024** [Arctic Report Card] by the [National Oceanic and Atmospheric Administration (NOAA)] reveals that the Arctic, once a **major** [carbon sink], is now becoming a [carbon source] due to ongoing [climate-induced warming.]

Note: NOAA, a federal agency of the US, aims to understand and predict environmental changes, manage coastal and marine resources, and support informed decision-making.

The Arctic Report Card, issued annually since 2006, provides reliable, and concise environmental information on the Arctic's current state compared to historical records.

What are the Key Findings of the Report?

- **Accelerated Arctic Warming:** The Arctic is warming at an unprecedented rate, with **2024 marking the second-warmest year since records began in 1900**.
    - The **Arctic's summer of 2024** was the **third warmest on record**, with regions like **Alaska** and Canada experiencing extreme heat waves.

- **Arctic Tundra a Carbon Source:** Permafrost thaw is causing the Arctic tundra to switch from a **carbon sink to a carbon source**.
    - Decomposing permafrost releases **carbon dioxide** and **methane**, accelerating global warming.
    - **Wildfires** are increasing in frequency and intensity, releasing more carbon and extending the wildfire season.
- **Decline in Sea Ice:** The **extent and thickness of sea ice** have reduced significantly over the past decades. The shorter sea ice season exposes more dark ocean surfaces, which absorb more heat and further contribute to warming.
    - Arctic glaciers and the **Greenland Ice Sheet** continue to contribute meltwater to oceans, exacerbating **global sea-level rise**.
- **Implications:** Changes in the Arctic contribute to **global challenges** like **coastal flooding, extreme weather events, and wildfires.**
    - The Arctic's diminishing ability **to store carbon** underscores the need to **urgently reduce Greenhouse Gas emissions** to mitigate further risks.
    - **The reindeer or caribou** are in decline due to climate change affecting Indigenous communities reliant on them for food and cultural practices.

What is the Arctic?

- **About:** The Arctic is the northernmost polar region of Earth. It includes the Arctic Ocean, adjacent seas, and parts of Alaska (US), Canada, Finland, Greenland, Iceland, Norway, Russia, and Sweden.
    - The Arctic is characterized by its cold climate, with temperatures often dropping below freezing.
- **Geopolitical Importance:** The Arctic is rich in natural resources, including oil, natural gas, and minerals, attracting significant international interest and competition for control over these resources.
- **India's Interest in Arctic Region:** India engaged with the Arctic by signing the **Svalbard Treaty in 1920.**
    - India began its **Arctic research program in 2007,** and launched its first scientific expedition to the Arctic Ocean and established the **Himadri research base** in the Svalbard archipelago, Norway in 2008.
    - India has held observer status in the **Arctic Council** since 2013.
    - In 2022, the Indian government announced an **Arctic policy** aimed at engaging in climate research. The **National Centre for Polar and Ocean Research** will be the nodal agency for its implementation.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. Which of the following statements is/are correct about the deposits of 'methane hydrate'? (2019)

1. Global warming might trigger the release of methane gas from these deposits.
2. Large deposits of 'methane hydrate' are found in Arctic Tundra and under the sea floor.
3. Methane in atmosphere oxidizes to carbon dioxide after a decade or two.

Select the correct answer using the code given below.

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (d)

Exp:

- Methane hydrate is a crystalline solid that consists of a methane molecule surrounded by a cage of interlocking water molecules. It is an “ice” that only occurs naturally in subsurface deposits where temperature and pressure conditions are favourable for its formation.
- Regions with suitable temperature and pressure conditions for the formation and stability of methane hydrate– sediment and sedimentary rock units below the Arctic permafrost; sedimentary deposits along continental margins; deep-water sediments of inland lakes and seas; and, under Antarctic ice. Hence, statement 2 is correct.
- Methane hydrates, the sensitive sediments, can rapidly dissociate with an increase in temperature or a decrease in pressure. The dissociation produces free methane and water, which can be triggered by global warming. Hence, statement 1 is correct.
- Methane is removed from the atmosphere in about 9 to 12-year period by oxidation reaction where it is converted into Carbon Dioxide. Hence, statement 3 is correct.
- Therefore, option (d) is the correct answer.

Manganese Contamination Causing Cancer

Source: DTE

A recent study links **manganese (Mn) contamination** in **groundwater** to rising **cancer** cases in Bihar’s **Gangetic plains**. Elevated Mn levels were observed in blood samples (average: 199 µg/L; highest: 6,022 µg/L in a liver cancer patient) and household hand pump water.

- The study examined 1,146 cancer patients from Bihar, with **carcinoma** being most common (84.8%).
    - Household water samples were tested for manganese contamination using **Atomic Absorption Spectrophotometer.**

Manganese:

- It is the **fifth-most abundant metal** on Earth**,** exists naturally in **oxides, carbonates, and silicates**.
- It is **vital in trace amounts** for maintaining body **homeostasis,** but toxic in excess.
- **WHO-recommended limit for manganese** in drinking water is **400 µg/L.**

Sources of Contamination:

- Major sources include **geogenic deposits** (from **sedimentary/igneous rocks)** and anthropogenic factors like **industrial pollution**. **Groundwater** is a primary medium of exposure.

Health Impact:

- Chronic exposure to high levels of manganese leads to **toxicity,** causing symptoms like **weakness, clumsiness, emotional instability**, impaired movement and cancer in advanced stages.

Regions Affected:

- **India:** Bihar’s Gangetic plains, West Bengal (Murshidabad, 24 Parganas), Karnataka (Tumkur).
- **Global:** Reported in **Nigeria, Bangladesh, China, Japan, and Greece**.

Read More: **Groundwater Contamination in India**

Enhancing Parliamentary Productivity

For Prelims: **Vice President,** **President**, **Productivity of parliament**, Parliamentary Debates, Adjournment, **Motions in the Parliament.**

For Mains: Issues Related to Functioning of Parliament

Source: IE

Why in News?

Recently, the former **Vice President of India** highlighted increasing **disruptions in Parliament,** emphasising the need for a transition from confrontational politics to constructive debates.

- He urged political parties to restore parliamentary decorum, foster consensus, and prioritise meaningful dialogue to strengthen democracy and rebuild public trust.

What are the Challenges to the Functioning of Parliament in India?

- **Frequent Disruptions of House:**
  - Frequent disruptions, often driven by opposition protests, waste valuable time and resources, undermining Parliament's legislative and representative functions.
    - These led to **key bills being passed without sufficient discussion,** weakening the quality of legislative debate and the effectiveness of parliamentary proceedings .
    - For instance, the **2023 Winter Session of Parliament** faced significant disruptions, including the **suspension of 141 opposition MPs** over protests related to issues such as breaches in parliamentary security.
- **Political Polarization and Adversarial Politics:**
  - **Intensified polarization** between the government and opposition has fostered adversarial politics, stalling legislative progress.
    - This divisive approach undermines consensus-building essential for effective governance.
- **Lack of Participation in Sessions:**
  - During the **17th Lok Sabha (2019–2024)**, the average attendance across sessions was 79%, but participation in debates was limited, with MPs engaging in an average of 45 debates each.
  - Certain sessions saw lower attendance, such as the Budget Session of 2021, which recorded a significant drop to 69%, primarily due to the pandemic's impact
- **Poor Quality of Legislation:**
  - Legislative quality often suffers due to insufficient debate and scrutiny, with bills sometimes passed hastily which undermines clarity and effective implementation.
    - The **Right to Information (Amendment) Bill, 2019**, faced criticism for diluting the autonomy of the Information Commission, reflecting inadequate stakeholder consultation.
- **Lack of Gender Equality:**
  - In the **18th Lok Sabha**, 74 women were elected, constituting **13.6%** of its members.
    - This marks a slight decline from the 17th Lok Sabha, where women represented **14.4%** of the members.
  - Additionally, women account for **14.05% of the Rajya Sabha.**
    - As of April 2024, women make up **26.9%** of lawmakers worldwide.

What Steps Have Been Taken to Ensure Proper Functioning of Parliament?

- **Code of Conduct:** A code of conduct has been established to guide the behavior of Members of Parliament (MPs) and to promote decorum, discourage disruptions, and encourage active participation.
- **Technology Adoption:** The Parliament has embraced technology to enhance its efficiency.
    - **Live streaming of parliamentary proceedings** in India has fostered greater **accountability and decorum** among MPs, as real-time broadcasts increase public scrutiny.
        - This has led to **more disciplined behavior,** with MPs conscious of being observed.
    - Also, online platforms and apps have been developed for **better communication among MPs.**
- **Committee System:** To improve the quality of legislative processes, Parliament utilizes a robust **committee system** to scrutinize bills, policies, and government initiatives before they reach the main House.
    - This ensures that expert opinions are integrated, improving the depth and quality of the legislative output.
- **Disciplinary Actions:**
    - Disruptive behavior by MPs is addressed through disciplinary actions. MPs who engage in unruly conduct can face suspension or expulsion from the House.
        - This measure **ensures accountability and discourages behavior that undermines** the parliamentary process.

How can the Productivity of Parliamentary Functioning in India be Enhanced?

- **Commitment to Constructive Debate**:
    - Political parties should **focus on fostering constructive dialogue** and **move away from obstructionist strategies**.
        - Promoting **consensus-building** is essential, with the government **addressing opposition concerns** and the opposition **offering feasible alternatives**.
        - This approach ensures **more productive discussions**, contributing to the overall effectiveness of parliamentary proceedings.
- **Strengthening the Role of the Presiding Officer**:
    - To improve parliamentary efficiency, the **Speaker/Chairman of the House** should be granted **enhanced powers** to swiftly address disruptions and ensure adherence to parliamentary rules.
    - This would **help maintain decorum** and allow the legislative process to proceed smoothly without unnecessary interruptions.
- **Promoting a Culture of Accountability**:
    - To promote accountability in Parliament, political parties must ensure **MPs actively engage in the legislative process** by monitoring their **attendance,** participation in debates, and **voting records.**
    - **Peer pressure, party discipline**, and **following the examples of exemplary parliamentarians** can further encourage integrity and constructive dialogue, strengthening democratic values.
    - Additionally, the **Right to Information (RTI) Act** can be leveraged to ensure **MPs' actions and records** are accessible to the public, fostering greater accountability.
- **Public Engagement and Transparency**: Increasing **public awareness** about the functioning of Parliament can build trust in the institution.
    - **Enhanced media coverage** and transparency in decision-making will ensure greater accountability.
- **Youth Engagement in Politics**: Encouraging **young leaders** to focus on values such as integrity, transparency, and accountability can bring fresh perspectives to parliamentary proceedings, **promoting ethical conduct** and effective governance.

Conclusion

The Indian Parliament faces challenges like frequent disruptions, low participation, and ineffective legislation. However, reforms such as implementing a code of conduct, leveraging technology, strengthening committee systems, and enforcing disciplinary measures are crucial to addressing these issues. To enhance its democratic function, Parliament must focus on increasing transparency, accountability, and inclusivity. This will ensure it effectively represents the people and produces impactful, meaningful legislation.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q.Which of the following is/are the exclusive power(s) of Lok Sabha? (2022)

1. To ratify the declaration of Emergency.
2. To pass a motion of no-confidence against the Council of Ministers.
3. To impeach the President of India.

Select the correct answer using the code given below:

(a) 1 and 2
(b) 2 only
(c) 1 and 3
(d) 3 only

Ans: B

Mains

Q. To what extent, in your view, the Parliament is able to ensure accountability of the executive in India? **(2021)**
