



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.

THEORIES OF EVOLUTION

The modification of living organisms during their descent, generation by generation from common ancestors.

Oparin-Haldane Theory of Origin of Life

- ↳ Also known as Materialistic theory
- ↳ Describes process of origin of life on early Earth as:
Physio-chemical processes of atoms → Organic compounds → Macromolecules → First living system or cells

Theory of Natural Selection (Darwinism)

- ↳ Foundation of evolutionary biology
- ↳ **Elements:**
 - ↳ Universal occurrence of variation
 - ↳ Rapid multiplication
 - ↳ **The struggle for existence** - Intraspecific and interspecific
 - ↳ **Survival of the fittest (Natural Selection)**
 - ↳ Inheritance of useful variations; Elimination of non-useful variations
- ↳ **E.g.;** Survival of more dark-winged moths than white-winged ones in post-industrialisation period

Theory of Inheritance of Acquired Character (Lamarckism)

- ↳ First theory of organic evolution
- ↳ **Evolutionary ideas:**
 - ↳ Internal forces of life increase the size of organism
 - ↳ New structures appear because of an 'inner want'
 - ↳ Direct environmental effect over living organisms
 - ↳ Inheritance of acquired character
- ↳ **E.g.;** Long neck of giraffe due to gradual lack of surface vegetation

Mutation Theory (Hugo de Vries)

- ↳ Describes evolution as a jerky process where new varieties of species are formed by mutations (discontinuous variations)
- ↳ **Salient features:**
 - ↳ Mutation appears all of a sudden and becomes operational immediately
 - ↳ Same type of mutation in several individuals of a species
 - ↳ All mutations are inheritable
 - ↳ Useful mutations are selected and lethal ones are eliminated by nature

Neo-Darwinism

Integration of Darwin's theory of evolution with Gregor Mendel's theory of genetics

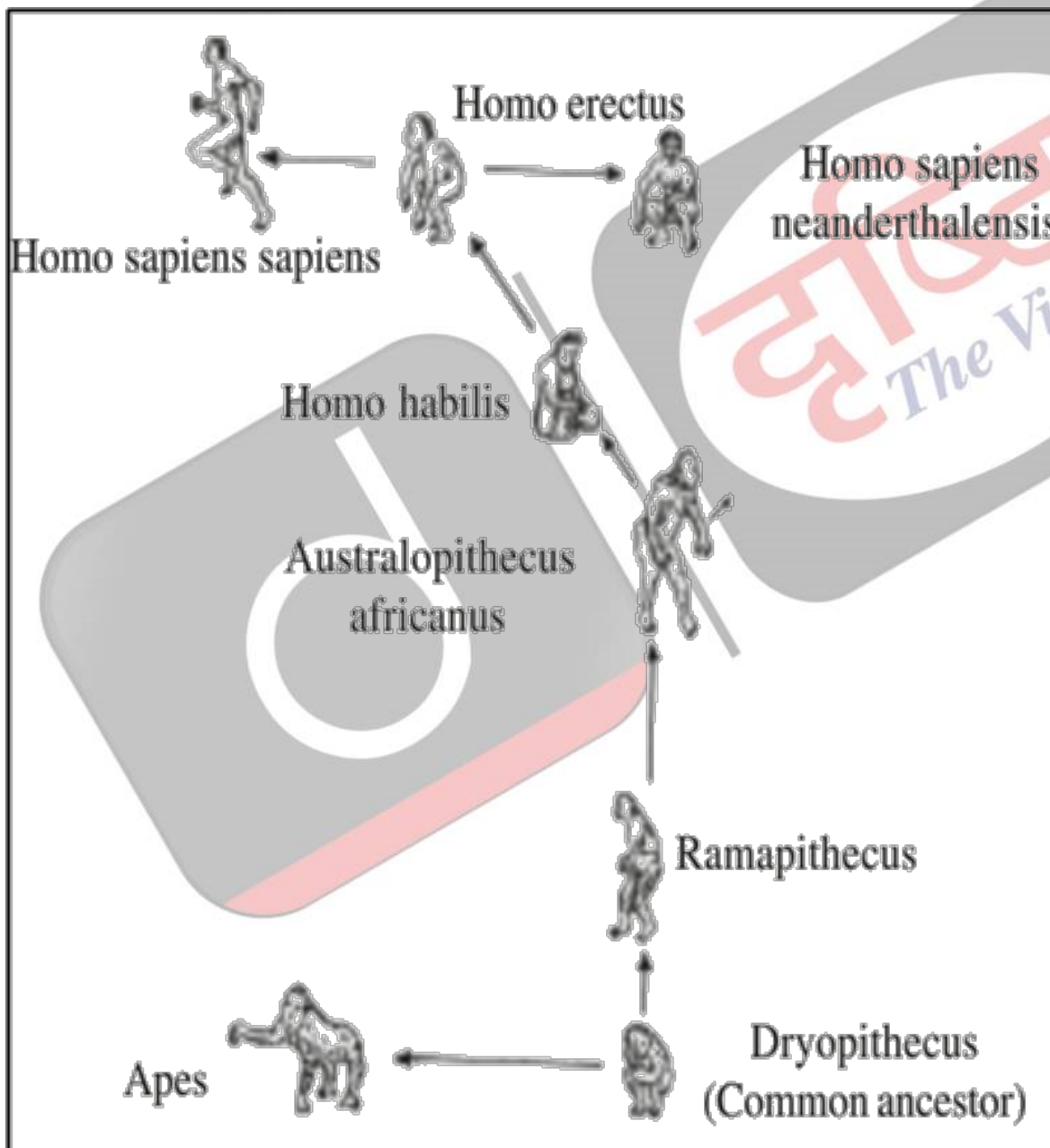
Modern Synthetic Theory

- One of the proven theories of organic evolution
- Includes factors such as – Mutation, Variation /Recombination, Heredity, Natural Selection and Isolation

 
Drishti IAS

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 **requires 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)

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