



# Woolly Mammoths

## Why in News

The United States' startup Colossal Biosciences has announced its **plan to bring woolly mammoths**, or animals like them, **back from extinction** and into the frosty landscape of the Siberian tundra (treeless polar desert).

### A MAMMOTH UNDERTAKING

- Harvard geneticists now seek to resurrect the long-gone **woolly mammoth** – the **shaggy Ice Age herbivore**, which lived on northern continents in climates of extreme cold, **went extinct about 4,000 years ago**, but genetics can return these
- Genetic tools enable scientists to **sequence the mammoth's genes found in fossils**, recreate and place these in the closely-related Asian elephant, for **the elephant** to then give birth to a woolly mammoth

- Reviving the woolly mammoth can help our ecological well-being – the **Siberian steppes** are composed of **permafrost** which contains vast amounts of **carbon**. With global warming, permafrost is melting, which could release more harmful carbon. But **permafrost temperature can be significantly lowered by reintroducing large animals like mammoths and bison**, which help the growth of steppe grasses that reflect sunlight back into the atmosphere, lowering heat absorption – and **reducing permafrost melt**

the Vision



## Key Points

## ▪ About:

- Mammoth, (*genus Mammuthus*), **any member of an extinct group of elephants found as fossils in Pleistocene deposits over every continent except Australia and South America and in early Holocene deposits of North America.**
  - The **Pleistocene Epoch** began 2.6 million years ago and ended 11,700 years ago.
  - The **Holocene Epoch** began 11,700 years ago and continues through the present.)
- **Woolly Mammoths:** The woolly, Northern, or Siberian mammoth (***Mammuthus primigenius***) is by far the best-known of all mammoths.
  - The relative abundance and, at times, excellent preservation of this species's carcasses found in the permanently frozen ground of Siberia has provided much information about mammoths' structure and habits.
- **Cause of Extinction:**
  - It is believed that mammoths disappeared because of a [change in climate](#), disease, hunting by humans, or perhaps some combination of these.

## ▪ De-extinction of Woolly Mammoths:

### ◦ Need:

- **Restoration of Ecosystem:** When mammoths disappeared from the Arctic some 4,000 years ago, shrubs overtook what was previously grassland.
  - Mammoth-like creatures **could help restore this ecosystem** by compressing shrubs, knocking over trees, and fertilising grasses with their faeces.
- **Reduce Climate Change:**
  - If the current Siberian [permafrost](#) melts, it will release potent greenhouse gases.
  - De-extinction will prevent the permafrost from melting. Compared to tundra, grassland might reflect more light and keep the ground cooler.
- **Technology Used:** The [CRISPR gene editing technology](#) will be used to modify [Asian elephant embryos](#).
  - Asian elephants are the mammoth's closest living relative so their genomes resemble those of woolly mammoths.

## ▪ Concerns Raised:

- **Disturb the Ecosystem:** Bringing back extinct species, whose ecological niches may no longer exist, will upset existing ecosystems.
- **Opportunity Cost:**
  - The de-extinction could **distract from more cost-effective efforts to protect biodiversity or mitigate climate change.**
  - The **possible moral hazards** that may arise if people start believing extinction is not forever.
  - Even if de-extinction programs are successful, they will likely **cost more than saving existing species** from extinction.
    - Once de-extinction becomes possible, the need to protect species from extinction will seem less urgent.
- **No Guarantee of Behaviour Adoption:** Even if newly engineered mammoth-like animals contain mammoth DNA, there is **no guarantee these hybrids will adopt the behaviours of ancient mammoths.**
  - For instance, we inherit more than just DNA sequences from our parents. We inherit

**epigenetic changes**, wherein the environment around us can affect how those genes are regulated.

- We also inherit our parents' microbiome (colonies of gut bacteria), which plays an important role in our behaviours.
- The behaviours animals learn from observing other members of their species. The first mammoth will have no such counterparts to learn from.

## Tundra

- The tundra climate region **occurs between 60° and 75° of latitude, mostly along the Arctic coast** of North America and Eurasia and on the coastal margins of Greenland.
- Tundra winters are long, dark, and cold, with mean temperatures below 0°C for 6 to 10 months of the year. There is a layer of permanently frozen ground below the surface, called **permafrost**.
- Structurally, the Tundra is a **treeless expanse** that supports communities of sedges and heaths as well as dwarf shrubs.

[Source: DTE](#)

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