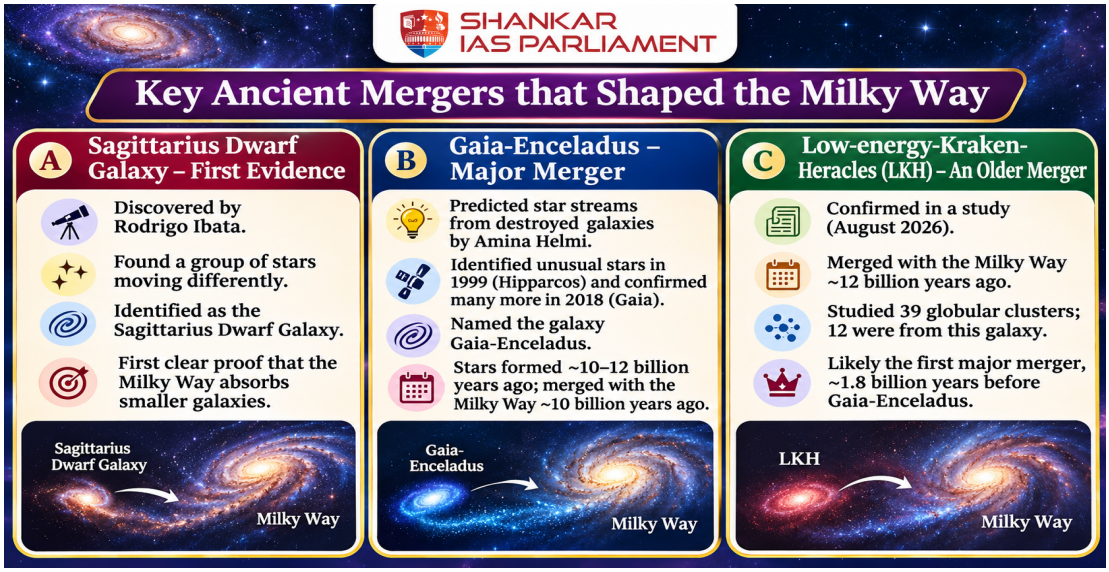
Growth of Milky Way by Devouring Galaxies

Prelims: *Current events of national and international importance | Science & Technology*

Why in news?

The Milky Way has grown into the massive spiral we see today, leaving a trail of ghost stars.

- **Galactic Cannibalism (Galactic Merger)** – The Milky Way did not form all at once. It gradually grew by absorbing smaller galaxies over billions of years.
- **Galactic growth through cosmic collisions** – Astronomers now believe that the Milky Way did not form in isolation. Instead, it grew over billions of years by colliding with and absorbing smaller galaxies.
- This process, often described as a "*snowball effect*", allowed the Milky Way to become larger and more massive over time.
- **Ghost Stars** – As galaxies fall into one another, the smaller ones are ripped apart by the tidal forces of the larger, leaving behind streams and clusters of stars that do not disappear; they survive as scattered streams and clusters moving through the Milky Way.
- These stellar remnants, which retain distinct motions and chemical signatures from their original galaxies, are often referred to as "ghost stars."
- **Galactic Archaeology** – It is the study of the Milky Way's formation and evolution by examining its stars.
    - **3 characteristics** – Age, chemistry, and motion tell astronomers different things about stars.
- Galactic archaeologists use precise measures and larger sample sizes afforded by new missions to tease apart minute differences between groups of stars, revealing the history of the Milky Way going back almost 12 billion years.



Role of modern astronomical missions and technologies

- **Hipparcos (1999) (ESA)** – It measured the positions and movements of nearby stars.
- **Gaia (ESA)** – It maps stars across the Milky Way and measures their positions, distances and movements with high precision.
- **4MOST (Chile)** – A multi-object spectroscopic survey instrument that studies the chemical composition and movement of large numbers of stars, including in the Southern Sky.
- **MOONS Telescope** – It uses infrared observations to study stars hidden in the Milky Way's central bulge.
- **APOGEE** – Provides spectroscopic data to understand the chemical composition of stars.

Reference

The Hindu | The Milky Way grew by devouring galaxies, leaving a trail of ghost stars

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