



Blue Straggler Stars

Why in News

Recently, in the **first-ever comprehensive analysis of blue stragglers**, Indian researchers have proposed a **hypothesis for evolution of blue straggler stars**.

- Blue stragglers is a class of stars on open or globular clusters that **stand out as they are bigger and bluer than the rest of the stars**.

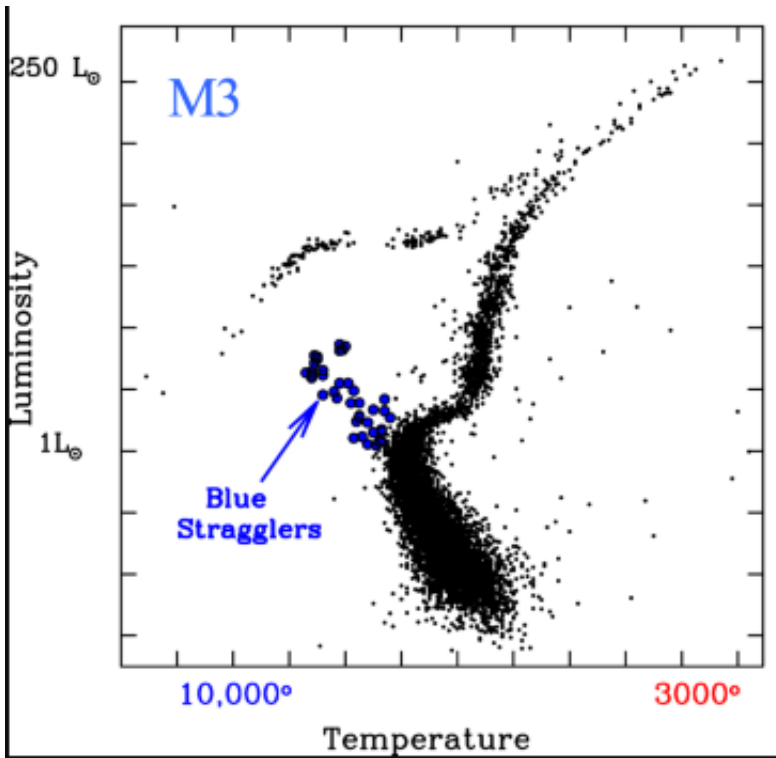
Key Points

▪ About Blue Straggler Stars:

- These are **unusually hot and bright stars found** in the cores of ancient star clusters known as **globulars**.
- A clue to their origin is that they are only found in dense stellar systems, where distances between stars are extremely small (a fraction of a light year).
- **Allan Sandage** (an astronomer with Carnegie Observatories in Pasadena, California) **discovered blue stragglers** in the **globular cluster M3** in 1952-53.
- Most are located at least several thousand light-years away from the sun, and most are around 12 billion years old or more.
- The **Milky Way's largest and brightest globular** is **Omega Centauri**.

▪ Peculiarity about Blue Stragglers:

- Blue straggler stars **appear to violate standard theories of stellar evolution**.
 - A bunch of stars born at the same time from the same cloud form a star cluster. Star formation happens in interstellar molecular clouds: opaque clumps of very cold gas and dust.
 - Under standard stellar evolution, as time passes, **each star evolves differently depending on its mass**, in which **all stars born at the same time should lie on a clearly defined curve in the Hertzsprung-Russell diagram**.
 - Hertzsprung-Russell diagram **plots the temperature of stars against their luminosity** or the colour of stars against their absolute magnitude. It **shows a group of stars in various stages of their evolution**.
 - By far the **most prominent feature is the main sequence**, which runs from the upper left (hot, luminous stars) to the bottom right (cool, faint stars) of the diagram.
- In **case of blue straggler**, they evolve and move off the main sequence creating a bend in their track, **known as the turnoff**.
 - Since blue stragglers often lie well off this curve, they **may undergo abnormal stellar evolution**.
 - They **appear to be lagging behind most of the other stars in the cluster in its evolution toward a cooler, reddish state**.



▪ **About the Hypothesis:**

- Indian researchers have found that:
 - Half of the blue stragglers are formed through mass transfer from a close binary companion star.
 - One third are likely formed through collisions of two stars.
 - Remains are formed through interactions of more than two stars.
- For this Hypothesis, the researchers utilised the [Gaia telescope of the European Space Agency](#).
- For further study, Ultraviolet Imaging Telescope on [AstroSat](#), India's first dedicated space observatory, as well as the **3.6 m Devasthal Optical Telescope in Nainital** will be used.
- The study **will help improve understanding of these stellar systems** to uncover exciting results in studies of large stellar populations, including galaxies.

[Source: PIB](#)