Stars and Lithium Production

Part of: GS-III- S&T (PT-MAINS-PERSONALITY TEST)

Recently, scientists from the Indian Institute of Astrophysics (IIA) have provided evidence for the first time that Lithium (Li) production is common among low mass Sun-like stars during their Helium (He) core burning phase.

IIA is an autonomous institute of the Department of Science and Technology (DST), Government of India.

Findings of the Study:

Scientists performed a large-scale systematic investigation of the ‘He-flash’ (onset of He-ignition at the star’s core via violent eruption), at the end of the star’s core hydrogen-burning phase

Hydrogen burning is the fusion of hydrogen nuclei into a helium nucleus. This He-flash has been identified as the source of Li production suggesting that all low-mass stars undergo Li production.

Our Sun will reach this phase in about 6-7 billion years and will manufacture Li. The study challenges the long-held idea that stars only destroy lithium and indicates that there is some physical process missing in stellar theory.

Earlier, it was believed that a vast majority of stars with a mass similar to that of the Sun destroy Li gradually over the course of their lives, via low-temperature nuclear burning.

The study also suggests new limits (A(Li) > -0.9~dex) for classifying stars as Li-rich, which is 250 times below the threshold (A(Li) > 1.5~dex) used till now.

Origin of Lithium:

- The origin of much of the Li can be traced to the Big-Bang that happened about 13.7 billion years ago.
- Over the course of time, Li content in the physical universe has increased by about a factor of four, which is meagre compared to the rest of the elements which grew about a million times.
- Stars are primary contributors to the significant enhancement of heavier elements through mass ejections and stellar explosions. Li, however, was thought to be an exception till now.
Usage of Lithium: (PT SHOT)

- Lithium is a light inflammable metal which is mainly used in lithium-ion (Li-ion) batteries and has brought a transformation in modern communication devices and transportation.
- It is used in the manufacturing of aircrafts.
- It is also used in mental health. Lithium carbonate is a common treatment of bipolar disorder, helping to stabilize wild mood swings caused by the illness.