Hot Springs & Origin of Life

Source: DST

Scientists in **Puga Valley hot springs**, Ladakh, discovered **travertine (calcium carbonate)** deposits capable of **trapping organic molecules** like amino acids, fatty acids, and formamide.

- This supports theories that **life may have originated in geothermal environments**, similar to early Earth or Mars.
- The study used techniques like **GC-MS-MS, Raman Spectroscopy, X-ray Diffraction (XRD), Infrared Spectroscopy (IR), Stable Isotope Geochemistry and microscopy.**
- It challenges earlier **silica-based origin** theories by showing **calcium carbonate can preserve biosignatures**, acting as a **prebiotic reactor**.
- Findings may aid **ISRO's astrobiological missions** by guiding biosignature detection on **Mars-like terrains**.

Hot Springs & Geysers

- **Hot springs** are geothermal features where **heated groundwater surfaces in tectonically active areas.** Eg: Manikaran (Himachal Pradesh).
  - **Puga Valley**, in southeastern Ladakh, is known for geothermal activity, **sulphur springs**, and **energy potential**.
- **Geysers** are volcanic geothermal features that erupt **hot water and steam** when **groundwater is superheated by magma** in underground cavities. **Eg: Yellowstone National Park** (USA).

Hot Springs	Geysers
▪ In a **hot spring** the heated water flows out continuously without any eruptive activity. ▪ Such hot springs are common in **Yellowstone Park US**; **Badrinath and Manikaran in India**. ▪ These hot springs are very healthy for bathing.	▪ In a **geyser**, hot water and steam are thrown out at intervals in the form of a fountain. ▪ There is an **Old Faithful geyser which erupts out exactly in one hour** intervals; these are about 100 geysers.

Read More: Geothermal Power in Ladakh