Hot Spring Bacteria Shows Antibacterial Activity

Prelims: Current events of national and international importance

Why in News?

Recently, researchers from Vellore Institute of Technology (VIT) studied the Rajgir hot spring in Nalanda, Bihar and discovered thermophilic Actinobacteria that produce antibiotic compounds effective against several disease-causing pathogens.

- **Hot spring** – A hot spring is a **naturally occurring spring** of water that is heated geothermally as it gets its heat from the Earth's interior.
- Hot springs provide a mineral-rich, low-competition environment, for thermophiles bacteria.
- **Findings of the study –** At Rajgir hot spring, 40–43% of bacteria found were thermophilic Actinobacteria.

Thermophilic bacteria are heat-loving bacteria that thrive in 45°C to 70°C.

Actinobacteria are a group of Gram-positive bacteria and are renowned for producing antibiotics like streptomycin and tetracycline.

- Some Actinobacteria are thermophilic as they survive in hot environments like hot springs.
- **Discovery of Antibiotic-Producing Bacteria** – Researchers tested Actinobacteria strains against harmful pathogens (e.g., E. *coli*, *S. aureus*).
- It is found that 7 ***strains from the Actinobacteria*** showed strong antibacterial activity.
- And a compound called **diethyl phthalate** was isolated from one such strain which is effective against **Listeria monocytogenes**, which causes listeriosis.

Listeriosis is a serious foodborne infection caused by bacterium Listeria monocytogenes. It can be life-threatening, for pregnant women, infants, elderly, and individuals with weakened immune systems.

Importance of this findings

- **Effective against Antimicrobial Resistance –** Some isolated bacteria produced compounds that is effective against drug-resistant pathogens.

- This supports global efforts to find new antibiotics as existing ones become ineffective.
- **Agricultural benefits –** Hot spring microbes can help promote plant growth or develop heat-tolerant enzymes.
- **Industrial benefits –** Thermophiles from hot springs can be used in enzyme industries for the production of detergents, food processing, etc
- **Bio-prospecting** – This study opens the door to **bio-prospecting** of India's geothermal ecosystems for useful microbes.

  Bioprospecting is the systematic exploration of natural resources, including plants, microorganisms, and animals, for potential commercial applications

- Actinobacteria made up 40–43% of the Rajgir microbial population — unusually high.
- This suggests that hot springs could be a rich, untapped source of antibiotic-producing microbes.

Reference

[The Hindu| Bacteria at Rajgir hot spring shows antibacterial activity]