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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

Eruption of Mount Etna

Prelims : Current events of national and international importance | Geography

Why in News?

Italy's Mount Etna, produced an explosive eruption recently, sending a huge cloud of ash, smoke and rock fragments several kilometres into the sky.

- **Background -** Mount Etna is an ***active volcano*** on the east coast of Sicily, the largest island in the ***Mediterranean Sea.***
- Etna's peak is the highest in Italy south of the Alps, and it is the largest of Europe's active volcanoes.
- Etna's summit has 5 craters, which are responsible for most of the volcano's eruptions.
- Flank eruptions also occurs with varying sizes along the slopes of the mountain.
- The volcano is in *near-constant activity.*
- Etna has been a ***World Heritage Site*** since 2013.
- **Kind of eruption** - Experts suggest that the eruption began with an increase in pressure inside the volcano due to expanding gases, which led to the collapse of the southeast crater, resulting in hot lava flows.
- According to Italy's National Institute of Geophysics and Volcanology (INGV) Etna Observatory, the volcano was witnessing a ***"Strombolian" eruption.***
- This type of eruption is usually characterized as discreet ***moderately explosive bursts*** which can *eject chunks of rock and cinders* that can travel hundreds of metres

into the air.
- It occurs due to the presence of gas in the magma chamber within the volcano.
- When the gas bubbles reach the surface, they can burst suddenly, throwing material skywards.
- However, some volcanologists believe that Mount Etna did not experience a Strombolian eruption but rather a *Plinian eruption*, in which hot gas, ash, and rock can explode high enough to reach the stratosphere.
- Given that the recent eruption produced by Mount Etna threw material several kilometres into the sky, this set of volcanologists say it was a Plinian eruption.
- **Consequences -** The eruption of Mount Etna released massive clouds of ash into the atmosphere and necessitated the evacuation of affected areas.
- The sudden volcanic activity has disrupted daily lives around the area, leading to emergency evacuations because of the hazardous conditions created by the thick ash fallout.

Reference

The Indian Express | Massive eruption of Italy's Mount Etna

Kumram Bheem Conservation Reserve

Prelims : Current events of national and international importance | Conservation

Why in News?

Telangana recently issued orders declaring the tiger corridor area connecting the Kawal Tiger Reserve in the State with the Tadoba-Andhari Tiger Reserve in Maharashtra as 'Kumram Bheem Conservation Reserve'.

- **Declared under** - Wildlife Protection Act (WPA), 1972.
- **Connecting areas -** The area is a critical part of the wildlife corridor connecting Kawal Tiger Reserve with
    - Tadoba, Kanhargaon, Tipeshwar, and Chaprala wildlife sanctuaries in Maharashtra and
    - Indravati Tiger Reserve in Chhattisgarh.
- **Tiger Population** - The presence of resident, breeding tigers in the area and several inter-State tiger dispersal events over the past decade indicate that it is a crucial link for maintaining tiger connectivity.
- **Significance for wildlife -** It is also home to leopard, wild dog, sloth bear, wolf, hyena, honey badger and jungle cat, and supports diverse prey such as gaur, sambar, nilgai, chital, four-horned antelope, muntjac, and Indian gazelle.
- More than 240 bird species have made it home, including the Malabar Pied Hornbills, and Long Billed Vulture for which it is the only nesting site.
- As per the Section 36(A) of the WPA, the ***State government*** may declare any areas owned by it, particularly in areas adjacent to the national parks and sanctuaries and those areas which link one protected area with another, as conservation reserve.

- **Advantages -** It offers significant advantages for wildlife conservation and biodiversity protection, especially regarding tiger connectivity in central India.
- It serves as a crucial corridor, facilitating the movement of tigers and other wildlife between reserves and sanctuaries across states.
- Enhanced genetic diversity, reduced inbreeding, and the long-term survival of tiger populations.

Reference

The Hindu | Kumram Bheem Conservation Reserve

Unified Waqf Management, Empowerment, Efficiency, and Development (UMEED) Portal

Prelims : Current events of national and international importance | Governance

Why in News?

Government to launch portal for registration of Waqf properties.

- It is a ***centralized digital platform*** designed for the registration of Waqf properties nationwide.
- It seeks to enhance management practices and improve transparency.
- The portal is being introduced in light of the recently passed Waqf (Amendment) Bill, 2025, which has received presidential approval.
- Registrations will be managed by the respective State Waqf Boards.
- **Key Features -** All Waqf properties are required to be registered on the portal ***within 6 months*** of its launch.
- Each registration must provide comprehensive details, including measurements (length and width) and geotagged locations.
- Properties registered in the names of women will *not qualify* as Waqf properties.
- Nonetheless, women, children, and individuals from economically disadvantaged backgrounds will remain primary beneficiaries of Waqf assets.
- Properties that are not registered within the designated timeframe due to technical issues or other significant factors may receive an extension of one to two months.
- However, properties that are still unregistered after the allowed period will be deemed disputed and referred to the Waqf Tribunal for resolution.

Reference

India Today | UMEED Portal

Aravalli Green Wall Project

Prelims : Current events of national and international importance | Environment

Why in News?

On World Environment Day (June 5) this year, the Union government is set to relaunch the Aravalli Green Wall Project.

- The original phase of the Aravalli Green Wall was launched in 2023, covering a 5-kilometre buffer zone around the range.
- The upcoming phase broadens the scope significantly, incorporating new initiatives and partnerships with local communities.
- This corridor will cover the 29 districts in the Aravalli range, including those in Gujarat, Rajasthan, Haryana, and Delhi.
- **Aim** - To create a continuous green belt from Delhi to Gujarat, acting as a natural barrier against desertification and aiding in groundwater recharge across the Indo-Gangetic plains.
- **Objectives** - The plan focuses on
    - Restoring degraded forest lands,
    - Improving water retention through soil and moisture conservation, and
    - Encouraging the planting of indigenous species.
- One thousand permanent nurseries will be set up to revive India's oldest mountain range.
- **Funding** - Through the already existing and functioning schemes of MNREGA, Compensatory Afforestation Fund Management and Planning Authority (CAMPA) and Green India Mission.
- **Tools** - Advanced tools like satellite mapping and remote sensing will be used to monitor progress and ensure transparency.
- **Significance -** The range is home to 22 wildlife sanctuaries and 4 tiger reserves - Ranthambore, Sariska, Ramgarh-Vishdhari, and Mukunda Hills.
- It also houses the bird sanctuary, Keoladeo National Park and nearly 50 historic forts.
- The terrain varies from rolling ridges to steep hillocks, with the highest elevation being Guru Shikhar in Mount Abu, Rajasthan,.
- Several rivers, including the Chambal and Luni, originate in these hills, which are also rich in minerals and diverse flora and fauna.
- **'Ek Ped Maa Ke Naam' campaign -** Integrated with existing program like 'Ek Ped Maa Ke Naam' campaign.
- It encourages people to plant a tree as a symbol of love, respect, and *honour for their mothers*, while also pledging to protect trees and the Earth.
- The initiative aims to combat land degradation and restore degraded land areas.
- **The need of the hour -** Aravalli range has faced severe environmental degradation in recent decades.

Reference

NDTV | 'Aravalli Green Wall' Project

One Liners 05-03-2025

History, Art and Culture

Gandhi's "Indian Opinion" Journal

On **June 4, 1903**, Mahatma Gandhi launched the weekly journal "**Indian Opinion**" at Phoenix Farm near Durban, South Africa.

• **Purpose -** This publication was a crucial instrument in Gandhi's fight against racial discrimination, uniting the Indian community and articulating their grievances.

• **Multilingual Reach -** It was published in **four languages**: English, Gujarati, Hindi, and Tamil, ensuring wide resonance within the diverse Indian diaspora.

• **Satyagraha's Voice -** Through its pages, Gandhi documented injustices, exposed colonial hypocrisy, and developed his philosophy of non-violent resistance, or Satyagraha.

• **Phoenix Farm's Role -** Produced at his self-sufficient Phoenix Farm, the journal embodied Gandhi's ideals of communal living and collective effort.

• **Lasting Impact -** "Indian Opinion" was vital for mobilization, raising international awareness, and laying the groundwork for Gandhi's future leadership in India's independence movement.

Geography

Phytoplankton: Microscopic Marine Plants

Recent, U.S. research indicates that human activities release iron, enhancing phytoplankton blooms and accelerating nutrient consumption, potentially leading to **harmful Algal Blooms (HABs),** causing harmful toxins.

• **Phytoplankton -** Or microalgae, are microscopic marine plants. They're the ocean's food web foundation, using sunlight and inorganic nutrients to produce essential compounds and oxygen.

• **2 primary classifications** - Are dinoflagellates and diatoms. Dinoflagellates possess whip-like flagella for movement and are covered in intricate shells. Diatoms, conversely, have rigid shells composed of interlocking parts and navigate primarily via ocean currents.

• **Ecological Significance -** Phytoplankton provide a crucial food source for a vast array of marine organisms, from shrimp and snails to jellyfish, underpinning the entire aquatic food chain.

• **Global Impact -** These tiny organisms are monumental in their global contribution, estimated to produce approximately 50% of Earth's oxygen. They also play a pivotal role in the global carbon cycle, absorbing carbon dioxide from the atmosphere.

• **Seasonal Growth Patterns -** Similar to terrestrial plants, phytoplankton exhibit seasonal growth variations, with their populations flourishing more in certain periods.

Polity & Governance

Unified Waqf Management, Empowerment, Efficiency, and Development (UMEED) Portal Launch

The Centre launches the **UMEED Portal** on June 6, 2025.

• Is a centralized digital platform for Waqf property registration and regulation?

• **Nodal Ministry -** Ministry of Minority Affairs.

• **It aims** - For transparent, time-bound registration, empowers beneficiaries with digital access, resolves disputes, and provides real-time data for policy.

• **New Registration Rules -** All Waqf properties must be registered within six months with geotagged data. Unregistered properties will be deemed disputed.

• **Waqf Act Reforms -** The Waqf (Amendment) Act, 2025, mandates digital registration, empowers Waqf Tribunals to adjudicate unregistered properties, and introduces High Court appeals.

Jan Aushadhi Kendra Experiential Learning Program

Program Launch

The Jan Aushadhi Kendra (JAK) Experiential Learning Program launched on June 1, by the Government of India, part of the 'Seva Se Seekhen' campaign.

• **Collaborative Initiative** - This program is a collaboration between the Ministry of Youth Affairs and Sports and the Department of Pharmaceuticals.

• **Overview & Target -** It places five youth volunteers from various platforms in each district's JAK for 15 days, offering hands-on learning in affordable medicine distribution.

• **Volunteer Roles -** Volunteers assist with daily operations, customer interaction, inventory management, and promote generic medicine awareness.

• **Participant Benefits -**Youth gain practical exposure, learn inventory and record-keeping, develop business and customer handling skills, and understand accessible healthcare.

• **Nationwide Impact -** The program aims for nationwide deployment in all states and Union Territories, fostering experiential learning and public health awareness.

International Relations and Issues

Israel Deploys Laser Defense

Israel has successfully deployed its **Magen (Shield of Light)** laser defense system in live combat, intercepting Hezbollah drones.

• **System Name & Developer -** Part of the Iron Beam program, Magen was developed by Rafael Advanced Defense Systems.

• **How It Works -** It uses high-energy laser beams to silently burn and disable aerial threats like drones, achieving thermal damage in seconds.

• **Key Features -** Magen offers speed-of-light interception at an ultra-low operational cost (around $5 per shot), high accuracy, and silent operation. It also features AI-integrated threat assessment.

• **Strategic Significance -** Israel is the **first nation** to effectively use a combat laser defense system in real war conditions.

• **Future Implications -** This deployment paves the way for various future laser systems, including vehicle-mounted, naval, and airborne versions like Lite Beam and Naval Iron Beam.

International Day of Innocent Children Victims of Aggression

June 4th marks the International Day of Innocent Children Victims of Aggression.

• **Core Purpose** - This day acknowledges the severe physical, mental, and emotional suffering of children globally due to aggression, violence, and abuse.

• **UN Commitment** - It reinforces the United Nations' dedication to protecting children's rights, as outlined in the Convention on the Rights of the Child.

• **Call to Action** - The day urges global cooperation to prevent violence against children, uphold humanitarian law, and ensure accountability for rights violations.

• **Historical Origin** - Established on August 19, 1982, by the UN General Assembly, it initially responded to Palestinian and Lebanese children victims of aggression during the 1982 Lebanon War.

• **Global Scope** - While rooted in that conflict, the day now recognizes the suffering of all child victims of aggression worldwide.

IATA's 81st AGM in India

India recently hosted the International Air Transport Association's (IATA) 81st Annual General Meeting (AGM) and the World Air Transport Summit (WATS) at Bharat Mandapam, New Delhi.

• **Marks a significant** - Return, as India last hosted the AGM 42 years ago in 1983. The Prime Minister of India addressed the event.
• **IATA -** Founded in Havana, Cuba, on April 19, 1945, IATA serves as the primary mechanism for inter-airline cooperation.
• **Mission** - Is to promote safe, reliable, secure, and economical air services globally. It is the successor to the International Air Traffic Association, established in 1919.
• **Membership** - Starting with 57 members from 31 nations, primarily in Europe and North America, IATA has grown substantially.
• **Reach** - Today, it boasts approximately 350 member airlines from 120 nations worldwide, collectively representing over 80% of global air traffic.
• **Head Office -** IATA's head office is located in Montreal, Canada.
• **Aims** - To promoting the growth of international air transportation and fostering collaboration among airlines & strengthen safety across all facets of air travel and to establish international air traffic rules and regulations.
• **First Indian Member** - Notably, SpiceJet was the first Indian airline to join IATA.

Economy

C CARES 2.0 Launched

Recently, Union Coal Minister launched C CARES Version 2.0. Developed by C-DAC for CMPFO, this upgrade signifies a major digital transformation for coal sector workers' Provident Fund and pension disbursements.

• **Aims to** - Streamline PF and pension processes, providing a unified digital link between workers, coal management, and CMPFO, ultimately enhancing transparency and user convenience.
• **Background -** Established in 1948, CMPFO serves over 3.3 lakh PF subscribers and 6.3 lakh pensioners. Version 2.0 builds upon the original C CARES, emphasizing real-time updates and direct transfers.
• **Features -** C CARES 2.0 offers digital and financial modules with real-time claim tracking and Direct Benefit Transfer (DBT). It also includes a mobile app for workers and an administrative dashboard for monitoring.
• **Initial Rollout -** Rolled out in five regional offices, including Godavarikhani and Asansol-I, with a nationwide rollout planned from July 1st, 2025.
• **Significance -** This initiative empowers coal workers with efficient services, reduces processing times, and aligns with the Digital India and 'Minimum Government, Maximum Governance' vision.

Environment

Caspian Gull

A Kozhikode-based ornithologist has announced the first-ever sighting of a Caspian Gull (*Larus cachinnans*), a rare migratory bird, in Kerala.

• **Identification -** Caspian Gulls are slender, with long legs, wings, and neck. Key identifiers include a slender bill, dark eye, pale legs, and a grey plumage between Herring and Yellow-legged Gulls.
• **Their distinctive** - wing patterns and "laughing" call are also crucial.
• **Breeding Grounds -** They primarily breed around the Black and Caspian Seas.
• **Expanding Range -** Their distribution is expanding westward into Europe.
• **Migration -** These gulls are migratory, wintering in southern Asia, the Middle East, and northeastern Africa.
• **Diverse Diet -** They are opportunistic feeders, consuming fish, invertebrates, small mammals, and carrion.
• **First Kerala Record -** A rare migratory Caspian Gull was recently sighted for the first time in Kerala, India.

Security

FPV Drones: Ukraine's Latest Weapon

Ukraine recently employed First-Person View (FPV) drones to attack Russia, reportedly destroying over 40 planes.

• **FPV Drones -** FPV drones are **unmanned aerial vehicles (UAVs)** equipped with AI. This AI allows them to process real-time video, avoid obstacles, and perform missions like surveillance with precision.
• **The "first-person view"** - Means the pilot sees what the drone sees via a camera feed, often through specialized goggles.
• **Deployment and Range -** Before FPV drones, a reconnaissance drone surveys the target area. FPV drones have a smaller range, typically a few kilometers.
• **Advantages -** Their key benefits are low cost and deep strike capabilities while remaining largely undetected.
• **Challenges -** A major hurdle is the operator's limited external view, potentially causing disorientation. Sometimes, a visual observer is needed.
• **Features -** These drones boast GPS-independent navigation, a SmartPilot system for visual-inertial navigation, and LiDAR technology for enhanced precision.
• **Other Uses -** Beyond defense, FPV drones are also used for filming and other non-military purposes.



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