



CURRENT AFFAIRS



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BACTERIOPHAGES

This article covers "Daily Current Affairs" and the topic details "Bacteriophages". The topic "Bacteriophages" has relevance in the "Science and Technology" section of the UPSC CSE exam.

For Prelims:

What are Bacteriophages?

For Mains:

GS3: Science and Technology

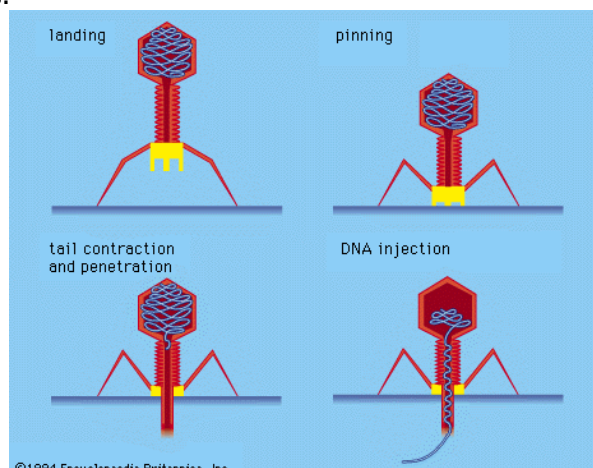
Why in the news?

Due to the increasing antibiotic resistance, scientists are exploring the potential of bacteriophages, which actively seek and eliminate bacteria, as a possible cure for bacterial infections.

What are Bacteriophages?

Bacteriophages, or phages, are viruses that infect only bacterial cells. They are abundant and diverse in size and structure.

- They consist of genetic material encased in a protein shell. Phages use Brownian motion to reach their targets since they are not motile.
- Phages are specific to certain bacterial hosts and may have two replication strategies: lytic or lysogenic.
- In the lytic cycle, they attach to a host cell, use its resources to make new phages, and then destroy the cell to release the new phages.
- In the lysogenic cycle, the phage's genetic material integrates into the host cell's chromosome without killing it. This integrated form is called a prophage and can later switch to the lytic cycle under certain conditions.



Functions:

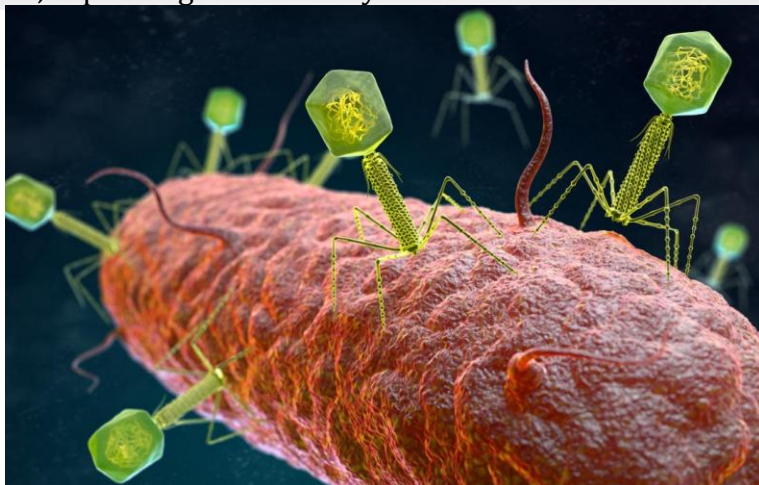
- Despite their inability to infect and replicate within human cells, **bacteriophages play a significant role in the human microbiome**, serving as essential facilitators of **genetic exchange between pathogenic and non-pathogenic bacteria**.
- Bacteriophages can also **control microbial populations by preying on specific bacteria without harming others**. Researchers have explored using phages to treat bacterial infections, but challenges exist, like bacterial diversity and resistance.
- Phages are **more immunogenic than antimicrobial drugs and are quickly cleared from the blood**. Their large size limits their use to topical applications, and using phage enzymes might be a more straightforward approach.

Phages are clinically important for several reasons:

1. Phages' presence can be used as a **biomarker** for the presence of their host bacteria in complex environmental samples, such as in detecting fecal contamination in water sources.
2. Phages can be engineered to **introduce genes into specific bacteria** for clinical purposes, although this is still being tested.
3. Phages have been used to **distinguish different strains** of the same bacterial species. Each strain may be resistant or susceptible to different phages, allowing for strain identification.
4. Bacteriophages were crucial in early discoveries of molecular biology, such as proving DNA's role in genetic transmission, understanding gene regulation, and revealing the genetic code.

Phages Used Worldwide

- **History in Soviet-era Russia:** Due to antibiotic scarcity, phages were used to treat bacterial infections in countries like Georgia, Ukraine, and Russia, and their use has continued for decades.
- **Phage Tourism in Georgia:**
 - Georgia is a prominent destination for phage therapy, attracting patients from around the world seeking treatment. Scientists have found evidence that phages can work against infections resistant to conventional antibiotics.
 - Global Center of Phage Therapy: Georgia has become a major global center for phage therapy, housing one of the world's largest collections of therapeutic bacteriophages.
- **Adoption in Belgium, US, and Germany:** Other countries like Belgium and the US have also started using phages in specialized therapy centers for exceptional cases. Germany is showing interest in exploring phage therapies for various applications, including human medicine, foodborne infections, and crop protection.
- **Call for Exploration:** A recent research report from Germany urges policymakers to explore and utilize phages further, expanding their use beyond human medicine into other areas.



NPR Photo: Bacteriophages infecting a bacterium

The main challenges include:

- **Lack of Standardization:** Phage therapy must be customized for each patient's bacterial infection, requiring a precise tailoring of phages to target specific bacteria.
- **Rapid Availability:** To be effective, the right mix of phages must be available quickly before the infection worsens.
- **Bacterial Resistance:** Bacteria can develop resistance to phage therapies, reducing their long-term effectiveness.

Currently, bacteriophages are not expected to replace antibiotics entirely. However, scientists remain optimistic that they could be used in combination with antibiotics to enhance their effectiveness, particularly against bacteria strains that are resistant to antibiotics.

Sources:

What are Bacteriophages, the 'good viruses' that fight bacteria?

Q1. With reference to Bacteriophages, consider the following statements:

1. Bacteriophages are bacterias that infect only human cells.
2. Bacteriophages play a significant role in the human microbiome.
3. Bacteriophages can also regulate microbial populations by targeting certain bacteria while leaving others unharmed.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 3 only
- (d) None

Answer: (b)

Q2. Question consists of two statements, one labeled as the 'Assertion (A)' and the other as 'Reason (R)'. Examine these two statements carefully and select the answer to this question using the codes given below:

Assertion (A): Phages use Newtonian motion to reach their targets.

Reason (R): Although certain phages may exhibit structures resembling "heads," "legs," and "tails," these phages are non-motile despite their appearance.

1. Both A and R are individually true and R is the correct explanation of A.
2. Both A and R are individually true but R is not the correct explanation of A
3. A is true but R is false.
4. A is false but R is true.

Answer: (d)

Q3. Discuss bacteriophage's clinical importance, global use, challenges, and improving effectiveness.

Gaurav Nikumbh

WOMEN EMPOWERMENT GAP

This article covers "Daily Current Affairs" and the topic details "Women Empowerment Gap". The topic "Women Empowerment Gap" has relevance in the Social Justice section of the UPSC CSE exam.

For Prelims:

Key Findings of the Report?

For Mains:

GS 2: Social Justice

Recommendations for Comprehensive Policy Action?

Indian Initiatives to Reduce Gender Gap?

About UN Women?

Why in the news?

Only an abysmal 1 percent of women across the world live in countries that have managed to achieve both high women empowerment and gender parity, according to a new report by the United Nations.

Key Findings of the Report:

- **Global Women's Empowerment:** Only 1% of women globally live in countries with high women's empowerment and gender parity.
- **Male-Dominated Leadership:** Leadership roles and decision-making remain predominantly male-dominated, restricting opportunities for women.
- **Women Achieving Full Potential:** On average, women achieve only 60% of their full potential, according to the Women's Empowerment Index (WEI).
- **Gender Gap in Human Development:** Women lag behind men by 28% across key dimensions of human development, as measured by the Global Gender Parity Index (GGPI).
- **Lack of Complete Empowerment:** In the comprehensive analysis of 114 countries, it was found that none of them have achieved complete women's empowerment or gender parity.
- **Low Women's Empowerment Worldwide:** The vast majority of women worldwide, over 90%, live in countries where women's empowerment is categorized as low or moderate, and where progress towards achieving gender parity is also limited or moderate.
- **Challenges in Highly Developed Countries:** Gender equality challenges persist even in highly developed countries. Over 85 countries, including more than half in the high or very high human development categories, show low or moderate women's empowerment and gender parity.
- **Economic Progress Not Enough:** Economic progress alone does not ensure gender equality.
- **Gender Gap in India:** India has low women's empowerment and gender parity despite moderate human development, highlighting the need for concerted efforts to bridge the gender gap and uplift women's status.
- **Gender Equality and Women's Empowerment:** Gender equality alone does not guarantee women's empowerment. No country with a gender gap has achieved high women's empowerment. About 8% of women live in countries with low empowerment but high gender parity.



Recommendations for Comprehensive Policy Action:

- **Health Policies:** Governments should support and promote universal access to sexual and reproductive health for all.
- **Equality in Education:** In the digital age, empowering women and girls can be achieved by focusing on reducing disparities in skills and the quality of education, particularly in STEM fields.
- **Work-life Balance and Support for Families:** Investing in policies and services that promote work-life balance is crucial to empower women and support their participation in the workforce.
- **Women's Equal Participation:** Establish targets and action plans to achieve gender parity in all spheres of public life, while eliminating discriminatory laws and regulations that hold women back.
- **Violence Against Women:** It is essential to implement a range of measures that focus on prevention of violence, changing social norms, and eliminating discriminatory laws and policies.

The Women's Empowerment Index (WEI):

- The WEI is a composite index developed by UN Women and UNDP.
- It measures women's empowerment across five dimensions; life and good health, education, skill-building and knowledge, labor and financial inclusion, participation in decision-making, and freedom from violence.
- The WEI captures women's power and freedom to make choices and seize life opportunities.
- It serves as a baseline for monitoring progress towards Sustainable Development Goal 5 (SDG5) on gender equality and empowerment of women and girls.

The Global Gender Parity Index (GGPI):

- The GGPI is a composite index that assesses gender disparities in key dimensions of human development, including health, education, inclusion, and decision-making.
- It reflects the status of women relative to men across different contexts and dimensions, highlighting the multidimensional and interrelated nature of gender equality.

Indian Initiatives to Reduce Gender Gap in Social, Economic, and Political Life:

Economic Participation, Health and Survival:

- **Beti Bachao Beti Padhao:** Ensures the protection, survival, and education of the girl child.
- **Mahila Shakti Kendra:** Empowers rural women with opportunities for skill development and employment.
- **Rashtriya Mahila Kosh:** Provides micro-credit at concessional terms to poor women for various livelihood and income-generating activities.
- **Sukanya Samridhi Yojana:** Empowers girls economically by opening bank accounts for them.
- **Female Entrepreneurship:** Initiatives like Stand-Up India and Mahila e-Haat support women entrepreneurs and SHGs (Self-Help Groups).

Education:

- **Kasturba Gandhi Balika Vidyalaya:** Schools opened in Educationally Backward Blocks (EBBs) to improve girls' education.

Political Participation:

- **Political Reservation:** 33% of seats in Panchayati Raj Institutions reserved for women.
- **Capacity Building of Elected Women Representatives:** Empowering women to participate effectively in governance processes.

These initiatives aim to address gender disparities in various aspects of life and foster women's empowerment and gender parity in India.

UN Women

- UN Women established in 2010 by the UN General Assembly to advance women's rights and needs globally.
- Supports UN Member States in achieving gender equality and setting global standards.
- Collaborates with governments and civil society to design and implement beneficial laws, policies, programs, and services for women and girls.
- **Focuses on four strategic priorities:**
 1. Women's leadership and political participation.
 2. Women's economic empowerment.
 3. Ending violence against women.
 4. Peace, security, and humanitarian action.

SOURCE:

<https://www.downtoearth.org.in/news/world/only-1-women-live-in-countries-with-high-gender-parity-female-empowerment-un-report-90685>

Q.1 Which of the following gives 'Global Gender Gap Index' ranking to the countries of the world?

- (a) World Economic Forum
- (b) UN Human Rights Council
- (c) UN Women
- (d) World Health Organization

ANSWER: (a)

Q.2 What are the four strategic priorities of UN Women to accelerate progress on gender equality and women's empowerment worldwide?

- (a) Women's economic empowerment, sustainable development, healthcare improvement, and education equality.
- (b) Ensuring women's access to technology, promoting cultural diversity, eradicating child labor, and fostering environmental conservation.
- (c) Women's leadership and political participation, women's economic empowerment, ending violence against women, and peace, security, and humanitarian action.
- (d) Advancing women's access to finance, promoting gender-responsive budgeting, improving maternal healthcare, and ensuring equal pay for equal work.

ANSWER: (c)

Q.3 Discuss the major challenges in achieving women's empowerment and gender equality globally, and propose comprehensive strategies that governments and stakeholders can adopt to overcome these challenges

Rishabh