

HEALTH

❖ **Endometriosis**

➤ **CONTEXT:** A U.S. based company named DotLab has announced a blood test to reliably diagnose endometriosis.

- The significance of this technology is highlighted by the fact that people have to wait for 6.7 years on average for a diagnosis, even as the number of people with endometriosis could be much higher than the estimated 190 million worldwide (about 42 million in India alone), due to the number of cases that go undiagnosed.

➤ **What is Endometriosis?**

- Endometriosis is a painful chronic disease in which tissue similar to the lining of the uterus, or endometrium, grows outside of it.
- Despite its prevalence, popular awareness of endometriosis remains low even as its diagnosis is marred by experiences of medical misogyny and gaslighting.

➤ **Why is endometriosis hard to diagnose?**

- Doctors often struggle to diagnose endometriosis because of its variety of symptoms, including painful menstruation, urination, sexual intercourse, bowel movements, fatigue, and sometimes infertility. There are also no reliable non-invasive diagnostic tools (ultrasound can't accurately detect all forms of endometriosis). Laparoscopic surgery is required for a definitive diagnosis.

- DotLab claims that its blood test is the first of its kind: a non-invasive method to accurately diagnose endometriosis.

- ✓ This test relies on detecting microRNA, which are small, non-coding RNA segments that regulate gene expression.

- ✓ Many studies have identified microRNAs that are expressed differently in people with endometriosis. So, on paper at least, researchers can use these unique expression patterns as a sign of the disease. Currently, researchers are exploring the use of microRNA from saliva and blood as diagnostic biomarkers.

- The blood test by DotLab is the product of a study in which researchers identified blood-based microRNAs that were expressed differently in people with endometriosis, relative to a group of people who didn't have the disease.

- The researchers then created an algorithm combining the expression values of these microRNAs to predict the presence or absence of endometriosis. They validated it with a different group of people and found that it was able to accurately identify those who did have endometriosis.

➤ **Is the new test available to use?**

- This microRNA screen is at testing level only". Indeed, DotLab is actively recruiting people to participate in ongoing clinical trials expected to be completed by September 2024. The U.S. Food and Drug Administration hasn't yet approved the test.

- The researchers also noted that while the test was able to accurately identify both mild and advanced endometriosis, it wasn't able to differentiate between the stage and the severity of the disease.

- According to director of the Indian Centre for Endometriosis, an "educational resource" for physicians and patients, agreed that the test could give a 'yes' or 'no' answer about whether someone has endometriosis – "but it's not giving any status or a stage of the disease and which organs involved.

- The importance of the test's sensitivity and specificity, found to be 83% and 96%, respectively.

- ✓ Sensitivity refers to the test's ability to correctly identify the disease based on microRNA expression levels, i.e. its ability to identify true-positive results.

- ✓ Specificity is a measure of the test's ability to reliably say that some abnormal microRNA expression is the result of endometriosis, and not some other condition. It's the test's ability to avoid false-positive results.

➤ **What do we know about endometriosis?**

- Endometriosis was first characterised in 1860 but its first biomarkers were found only 150 years later.

- People have been looking for biomarkers of endometriosis for years. Most of them were related to inflammation, which is not specific to endometriosis because it's observed in many diseases. Even when a marker was found, the results were inconsistent.

- "Endometriosis is not a life-threatening disease and it comes under reproductive biology, which is not greatly supported by funding agencies so pharma companies are not focusing enough on this disease.

- Endometriosis research is severely underfunded worldwide. A May 2022 report by the U.S. National Institutes of Health stated that endometriosis research accounted for only 0.05% of the institutes' total research budget.

- There are isolated pockets of well-funded research, however. In 2021, for instance, Rahul Gajbhiye, a clinician-scientist at the Indian Council of Medical Research's National Institute for Research in Reproductive Health, Mumbai, received a grant of Rs 3.6 crore to study endometriosis. Better funding is one component of designing effective and accessible diagnostic tools.

➤ **What are the benefits of a test for endometriosis?**

- Further, if the test is successful, it could have clinical implications that include reduced time to diagnosis, disease progress, fewer years of discomfort, and lower surgical risk

- Gynaecologist noted that doctors prescribe treatment for symptomatic relief even before a formal diagnosis and that most doctors only advise surgery if medical management does not successfully ameliorate symptoms.
- “If a blood test tells you the diagnosis, there is no need to do a laparoscopy if [the person] is benefitting from medical management. The results of the test sound promising, and if successful, it could reduce the time to diagnosis.
- In addition to these clinical implications, understanding which microRNAs are abnormal in endometriosis could also help researchers identify which genes, and thus which pathways, are involved in the disease, which in turn could help unravel its complex biology and offer potential targets for therapy.

INDIA AND ITS NEIGHBOUR

❖ **What is behind China’s renaming spree?**

➤ **CONTEXT: Recently the Chinese government announced it would “standardise” the names of 11 places in Arunachal Pradesh. The Ministry of Civil Affairs in Beijing published a list of 11 places along with a map showing the Indian State of Arunachal Pradesh as a part of China’s Tibet Autonomous Region.**

- While India dismissed the renaming, which is a largely symbolic move and unlikely to have any tangible on-the-ground impact on the border dispute, it has underlined a hardening Chinese stance on the boundary, the dim prospects of any meaningful progress in the long-running talks, as well as the current strained relations between the neighbours.

➤ **What are the places on the list?**

- The Chinese Ministry of Civil Affairs notification announced 11 “place names for public use”, in Mandarin, Tibetan and English (pinyin transliteration of the Chinese names). These include five mountain peaks, two more populated areas, two land areas and two rivers. All of the 11 sites are on Indian territory, and the southernmost is close to Itanagar.
- The Chinese government referred to the location of the sites as “Zangnan”, or “south Tibet”, which is how it refers to Arunachal Pradesh. China claims as much as 90,000 sq km in the eastern sector of the India-China boundary, covering the entire State.
- The list of names follows a new rule on the management of place names by the State Council, or China’s cabinet, that came into effect on May 1 2022, which said the regulation “requires strict management over the naming and renaming of localities and sites” and standardising names.

➤ **Is this the first such renaming attempt?**

- This is the third time China is issuing names for places in Arunachal Pradesh, a gesture seen as provocative by India and one that has coincided with periods of strains in relations.
- In 2017, the first list of “standardised” names was issued for six places in Arunachal, which was then seen as a retaliatory move after the Tibetan spiritual leader, the Dalai Lama, visited the State.
- The second such list was issued in December 2021, more than a year into the crisis sparked by China’s multiple transgressions across the Line of Actual Control (LAC) starting in April 2020. The second list coincided with a new border law passed by the Chinese government that called for various Chinese civilian and military agencies to take steps to “safeguard” Chinese territory, including through such administrative measures. The second list had 15 places, including eight towns, four mountains, two rivers and the Sela mountain pass.
- Zhang Yongpan, a leading border expert at Beijing’s Chinese Academy of Social Sciences, told that the renaming lists, as well as the border law, were “important moves made by the country to safeguard national sovereignty, better maintain national security and manage border-related matters at the legal level amid regional tensions, including frictions with India.”
- The border law, which took effect on January 1, 2022, contains 62 articles covering delineation and border defence as well as immigration, border management and trade. The issuing of new names is related to Article 7, which calls for promoting border education at all levels of government.

➤ **What is behind China’s moves?**

- As with the two previous cases, India rejected the Chinese announcement. “Arunachal Pradesh is, has been, and will always be an integral and inalienable part of India. Attempts to assign invented names will not alter this reality,” Government said.
- More broadly, the moves from China point to a hardening of its stand on territorial disputes, which are now seen less as matters to be resolved diplomatically and bilaterally, but as questions of China’s sovereignty. Besides the renaming, the new border law as well as the new regulations from the State Council all underscore how under current leader Xi Jinping, the protection of national sovereignty and territory has been mandated under various laws.
- This has also driven more activity along the borders from local-level authorities, such as stepped up programmes to build new civilian settlements (including some that have come up on territory disputed by both Bhutan and India) as well as other border infrastructure.

➤ **What will be the impact on the boundary dispute?**

- Though this symbolic gesture may have little real impact on the ground, it, at the same time, also does reflect how the situation along the borders, described by India as “stable but unpredictable”, is the most concerning

since the normalisation of ties between India and China in 1988, when they agreed to shelve differences and maintain peace along the boundary.

- Both sides also took tentative steps towards a permanent settlement, by appointing Special Representatives (SRs) in 2003 to find a solution to the dispute. This was, however, predicated on maintaining peace and tranquillity through a range of mechanisms set up by both sides. China's 2020 transgressions have, however, left those arrangements in tatters.
- A large number of troops from both sides, for the first time in decades, have been stationed permanently in forward areas. Discussions to disengage have moved slowly, and both are yet to reach an agreement on **Demchok and Depsang** after having disengaged in four other friction areas.
- In the eyes of most observers, the most realistic permanent package settlement is one that would see minor adjustments along the Line of Actual Control (LAC) in both the western sector, where India sees China as occupying as much as 38,000 sq km in Aksai Chin, and in the eastern sector, where China claims as much as 90,000 sq km in Arunachal. Differences in the middle sector are less complex. The "swap" in the west and east tacitly suggested by then leader Deng Xiaoping in the 1980s was also along these lines.
- China, however, has increasingly been vocal about its Arunachal claims and its officials have said any settlement would require India to give up territory in the east, a departure from the Deng suggestion and an unthinkable prospect for any Indian government. The renaming and issuing of "standardised" names by the Chinese government (which has essentially conveyed to the Chinese public that the eastern sector is also non-negotiable for China) has only underlined the hardening Chinese stand, which has left prospects of a settlement dimmer than ever.

1. **India's tiger population tops 3,000, shows census**

➤ **CONTEXT: The tiger population numbers were made public by Prime Minister Narendra Modi in Mysuru, at an event to mark the International Big Cat Alliance conference and the 50th anniversary of Project Tiger.**

- India has at least 3,167 tigers, according to estimates from the latest tiger census made public on Sunday. While this is ostensibly an increase since the census of 2018, the numbers are not strictly comparable, as a key calculation to compute the maximum and minimum range of the tiger population is yet to be done.
- There were 2,967 tigers recorded in 2018, and 2,226 in 2014.

➤ **Western Ghats decline**

- The tiger population has grown the most in the Shivalik hills and the Gangetic flood plains, followed by central India, the northeastern hills, the Brahmaputra flood plains, and the Sundarbans. There was a decline in the Western Ghats numbers, though "major populations" were said to be stable.
- The tiger numbers are estimated by adding animals caught in camera traps, and those that may not have been captured in this way. The latter are estimated by statistical techniques. According to scientists involved in the census exercise they have found 3,080 unique tigers in camera traps this time. In the last census, it was 2,603. However, for the latest census, they have not finished computing the estimates of tigers outside such traps as well as the State-wise break-up of tigers, so the numbers may differ. They expect it to be done within three in next three months.

- In their four-year estimates, the scientists provide a range of the estimated tiger population, and the mean value is highlighted as the latest tiger population.
- For instance, in 2018, the tiger population was a minimum of 2,603 and a maximum 3,346 with a mean value of 2,967.
- The current estimate also does not give numbers on the proportion of tigers outside protected areas, which are a growing number and a key marker of the environmental threats as well as man-animal conflicts. However, the authors of the census report warn that nearly all of the five major tiger-zones face challenges to the growth of the tiger population due to the increasing demands from infrastructure development.
- Since 1973, when Project Tiger was established, the number of dedicated tiger reserves has grown from nine reserves covering 18,278 square km to 53 reserves spanning 75,796 square km, which is roughly 2.3% of India's land area. However, experts have said that most of the country's tigers are focused within a handful of reserves which are fast approaching their peak carrying capacity, and unless new regions are developed as reserves, it may be a challenge to ensure further growth in numbers.
- Following the translocation of cheetahs from Africa, India is now looking at international initiatives to translocate tigers into other locations. It is in talks with Cambodia, where the tiger has gone extinct due to poaching, to create a suitable habitat there and ship a few tigers from India to revive the big cat's population in that country.

2. **Bharat Gaurav scheme**

➤ **CONTEXT: The Indian Railways, in association with the South Star Rail, a Coimbatore-based company, will operate a tourist train to Kashmir Valley under the Bharat Gaurav scheme.**

➤ **About the scheme:**

- In 2021, the Indian Railways launched Bharat Gaurav trains that will be operated by private players and run on theme-based circuits.

➤ **Aim and purpose:**

- It offers operators the “Right of Use” of its rakes and infrastructure, the Railways has liberalised and simplified a part of operations that was otherwise carried out mostly by the Indian Railway Catering and Tourism Corporation (IRCTC).

- While any entity can run these trains, including state governments, it is implied that the policy is targeted at tour operators.

➤ **Key features**

- Under this programme, private players and tour operators can procure trains from railways on lease and operate them on any circuit of their choice and decide fares, routes, and quality of services.

- The railways will ensure that there is no abnormality in the prices.

- The railways have allocated around 190 trains for these theme-based circuits.

- It is described as the third segment in services offered by the national transporter after the freight and passenger segments.

- Unlike the regular train service, the Bharat Gaurav trains will showcase India’s rich cultural heritage and historical places to the people of India and the world.

- Under the Bharat Gaurav scheme, the service providers will offer an all-inclusive package to tourists, including: rail travel, hotel accommodation, sightseeing arrangement, visit historical or heritage sites, tour guides.

- Providers will also have full flexibility to decide package costs based on the level of services being offered.

3. **URANIUM-241**

➤ **CONTEXT: Physicists in Japan discovered a previously unknown isotope of uranium, with atomic number 92 and mass number 241, i.e. uranium-241.**

- Over the past several decades, physicists have found that determining the properties of neutron-rich isotopes is difficult due to problems caused in creating them. For that reason, ongoing research has been looking for new ways to synthesize them under lab conditions.

➤ **Why does a new isotope matter?**

- The arrangement of protons and neutrons in an atomic nucleus follows some rules. These rules are based on the nuclei’s properties and structure.

- “In general, an atom’s mass is slightly lower than the sum of the masses of protons, neutrons, and electrons.

- So systematically measuring the mass of uranium and its neighborhood elements yields essential nuclear information to understand the synthesis of such heavy elements in explosive astronomical events.

➤ **The new Research Techniques**

➤ **Multinucleon Transfer**

- In this new effort, the research team tried a new approach—they fired a sample of uranium-238 nuclei at a sample of platinum-198 nuclei using an isotope separation system.

- Such interactions are known to result in multinucleon transfer, in which isotopes swap neutrons and protons.

- The collision resulted in the creation of a large number of fragments, which the researchers studied to determine their makeup.

➤ **Time-of-Flight Mass Spectrometry**

- They found evidence of 19 heavy isotopes holding from 143 to 150 neutrons.

- Each was measured using time-of-flight mass spectrometry, a technique that involves determining the mass of a traveling ion by tracking the time it takes to travel a given distance when its initial acceleration is known.

➤ **Findings**

- The research team noted that most of the isotopes they measured had never been measured before.

- They also noted that one of them, uranium-241, had never been observed before and that it marks the first time since 1979 that a neutron-rich uranium isotope has been discovered.

- The researchers also calculated that uranium-241 likely has a half-life of just 40 minutes.

➤ **Significance**

- The technique used by the team represents a pathway to better understanding the shapes of large nuclei associated with the heavy elements, which could yield changes to models used to build nuclear power plants and weapons and to theories describing the behavior of exploding stars.

ANSWER WRITING

Q. Unplanned Urbanization Has Accentuated a Visible Crisis in Groundwater Management. Establishing the Vicious Relationship Between them, Chart out the Measures That Can be Taken.

- The groundwater level in 33% of the wells monitored by the Central Ground Water Board declined by 0-2 metres in 2020-2021, as compared to the decadal average. It also showed a decline of more than 4 metres in a few pockets of Delhi, Chennai, Indore, Vijayawada, Dehradun, Allahabad, Lucknow, etc., over the years. Like, Kolkata witnessed a decline in water table from 20 to 7 m since 2000; Ghaziabad has a drop to 12m; and Delhi has a drop of 0.5-2 m per year.

- The awaited peril: India is the largest user of groundwater with 1/4th of the total global withdrawal. Indian cities cater to about 48% of its water supply from groundwater. The unmanaged groundwater and burgeoning

population may result in seasonal water shortages by 2050 for an estimated 3.1 billion people, and perpetual water shortage for almost a billion. Further, water & food security will be compromised leading to more poverty despite developments.

- Urbanization & groundwater – the vicious link: water supply, sanitation and drainage are key requirements of urbanization process. Groundwater being easily available near water-demand sites, it reduces the capital & operational costs, thus making it vulnerable to over-exploitation.
 - ✓ The ever growing urban population increases demand for water as well as management of waste & polluted water.
 - ✓ Unplanned urbanization has led to increase in built-up & paved area eliminating infiltration, reducing evapotranspiration and therefore, increases surface runoffs and urban flooding.
 - ✓ Overexploitation of groundwater and increased number of private bore/tube wells to fulfill the demand-supply leads to deepening of water table, land subsidence, saline water intrusion and aquifer contamination.
 - ✓ Transformation of natural landscape, watershed & flow direction often modifies groundwater cycle resulting in sharper decline or rise of groundwater levels accompanied by deteriorating quality. The subsoil strata becoming loose can result in hydraulic & corrosion effects on the building foundations.
 - ✓ Urban groundwater is polluted by seepage contaminated with heavy metals, micro-pollutants, microbiological contamination through sewage system and on-site sanitation. Nitrate, Arsenic, Fluoride are some major elements responsible for groundwater pollution.
 - ✓ Institutional vacuum is created as various organizations that manage groundwater lack accountability & responsibility. They are handicapped by limited knowledge and capacity. Also, there remains insufficient legal & regulatory mandate.
- **Way forward:**
 - For planning & management of groundwater, there needs to be focus on Integrated Water Resource Management Framework.
 - Adopting water sensitive urban design and planning that can help maintain the water cycle by managing groundwater, surface water and rainwater for demand-supply.
 - Taking a blue green infrastructure approach – green (trees, parks, gardens, etc.) and blue (wetlands, ponds, lakes, etc.) – while city/town planning. E.g. Bhopal's green-blue smart city plan.
 - Provision of waste water recycle to promote circular economy and sustainability.
 - Interventions like rainwater harvesting, stormwater harvesting, rain garden, bio-retention ponds that intercept rainfall with vegetated lands are effective alternatives.
 - Aquifer characterization & robust monitoring of urban groundwater quality and its data are imperative.
 - Strengthening regulatory frameworks and stakeholder participation. Public awareness as well as trust building between formal water sector institutions and communities will fill the void in urban groundwater management.

MCQs

1. With reference to Endometriosis consider the following
 1. Endometriosis is an inflammatory condition where endometrial tissue grows outside of the uterus.
 2. Endometriosis can cause infertility
 3. April is Endometriosis Awareness Month.
 Which of the above statement/s is/are correct?
 - a) **1 and 2 only**
 - b) 2 and 3 only
 - c) 1 and 3 only
 - d) 1,2 and 3
2. Sela Pass recently seen in news is located in which of the following state?
 - a) Assam
 - b) Tripura
 - c) Arunachal Pradesh
 - d) Maharashtra
3. The term 'M-STripes' is sometimes seen in the news in the context of
 - a) Captive breeding of Wild Fauna
 - b) **Maintenance of Tiger Reserves**
 - c) Indigenous Satellite Navigation System
 - d) Security of National Highways
4. With regard to 'Project Tiger', which one of the following statements is not correct?
 - a) It was launched in India in the year 1973.
 - b) The objective of the Project is to preserve the habitats and tigers therein as natural heritage.
 - c) The Project emphasized to ensure viable population of tigers in India.
 - d) **There are no Tiger Reserves in north-eastern part of India.**
5. 'Bharat Gaurav' scheme, which was seen in the news recently, is launched by which Union Ministry?

- a) Ministry of Culture
b) Ministry of Education
c) Ministry of External Affairs
d) **Ministry of Railways**
6. Consider the following statements:
1. Uranium-235 and U-238 are chemically identical, but differ in their physical properties.
2. Uranium enrichment is an isotope separation from non-fissile U-238 to fissile U-235.
3. Enrichment of Uranium is done by the centripetal process.
Which of the statements given above is/are correct?
a) **1 and 2 only**
b) 2 and 3 only
c) 1 and 3 only
d) 1,2 and 3
7. With reference to National Tiger Conservation Authority consider the following
1. The National Tiger Conservation Authority is set up under the Chairmanship of the Minister for Environment and Forests.
2. Every 4 years the National Tiger Conservation Authority (NTCA) conducts a tiger census across India.
Which of the above statement/s is/are correct?
a) 1 only
b) 2 only
c) **Both 1 and 2**
d) Neither 1 nor 2
8. With reference to Artemis II Mission consider the following
1. First human mission to the moon's vicinity since 1972.
2. The Space Launch System (SLS) mega-rocket and Orion spacecraft will be used to launch the crew on the lunar flyby mission.
3. NASA will land the first woman and first person of color on the Moon.
Which of the above statement/s is/are correct?
a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) **1,2 and 3**
9. With regards to International Prize of Statistics consider the following?
1. It is awarded to an individual only once every two years for significant breakthroughs utilising statistics to improve science, technology, and human welfare.
2. There is no monetary award given under this prize.
Which of the above statement/s is/are not correct?
a) 1 only
b) **2 only**
c) Both 1 and 2
d) Neither 1 nor 2
10. With reference to the Pradhan Mantri Mudra Yojana (PMMY), consider the following statements:
1. It is a flagship scheme of the Ministry of Rural Development.
2. There are three types of loans provided under PMMY.
Which of the statements given above is/are correct?
a) 1 only
b) **2 only**
c) Both 1 and 2
d) Neither 1 nor 2