

Topics

- Biases in brain
- Catatumbo lightning
- Okavango delta
- Model code of conduct
- Benefits of bamboo
- Starliner
- Leprosy
- Hurler syndrome
- Nitrogen fixation - nitroblast
- Mains



Target Mains -2024/25

Q “Biodiversity in African continent will not remain untouched of global boiling” Explain.

प्रश्न "अफ्रीकी महाद्वीप में जैव विविधता वैश्विक उबाल से अछूती नहीं रहेगी" स्पष्ट करें

send your answer - Saurabh pandey upsc telegram channel

Where does ‘us versus them’ bias in the brain come from?

Modern genetics has established that all humans are equal. But human history is replete with people from one cultural or social group treating those from others as if they are less than human. The basis of this deep-seated tendency continues to be the focus of intense research efforts in psychology and neuroscience

Reeteka Sud

“All animals are equal, but some are more equal than others” – this line from George Orwell’s 1945 classic *Animal Farm* perfectly describes how bias operates in human societies. In a study published in May last year, psychologists explored how people subconsciously evaluate different racial groups. They screened responses from more than 60,000 participants belonging to four groups: ‘white’, ‘black’, ‘Hispanics’, and ‘Asians’ (67% of them lived in the U.S.).

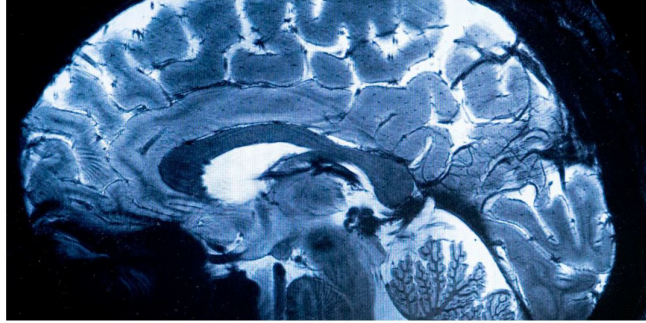
Using a psychological test called an implicit association test (IAT), scientists found stark differences between participants’ explicit statements and their implicit beliefs. While everyone said they believed in the equality of all races, they also harboured implicit biases in favour of socially advantaged groups. This bias was also universal, irrespective of the racial identity of the participants.

The IAT is built on the premise that if two things – words, concepts, events, etc. – have co-occurred in our experience over and over again, we put those two things together very quickly. The test includes a series of quick-fire rounds to sort words related to concepts (e.g. “thin”, “fat”, “white”, “black”, etc.) and assessments (“good” or “bad”) into categories. A participant’s score is based on the time taken to sort words when concepts and assessments are combined. For example, if test subjects combine “white” with “good” faster than they do “white” with “bad”, the test suggests they have an implicit bias favouring white people.

The brain’s shifting criteria

That all humans are equal is a scientific fact established by modern genetics. However, the history of humankind is replete with people from one cultural or social group treating those from others as if they are less than human – a phenomenon called pseudo-speciation. The basis of this deep-seated tendency in people continues to be the focus of intense research efforts in psychology and neuroscience.

Many recent studies have found that our brains process information about in-groups (i.e. “us”) and out-groups (“them”) differently. In particular, a study published on March 18, 2024, in *Frontiers in Psychology* reported that, bizarrely, the criteria our brains use to categorise others as “us” or “them” shift constantly. Researchers asked half of a group of young, white participants to describe how



A better understanding of the human brain in the context of intergroup threats can also shed light on ways to improve reconciliation. ALAIN JOCARD/IAFP

they – as white people – differed from black individuals. They asked the other half to describe how they differed from old persons. In this way, the researchers drew the participants’ attention to specific aspects of their own social identity (“white” or “young”) and to perceived differences from the respective outgroups.

Assessing the participant responses with IAT, the researchers found that directing participants’ attention to different facets of their *in-group* identity was sufficient to change their intergroup bias. That is, the participants’ preferences changed depending on whether their brains used age or race to classify others.

Bias is learned

Neuroimaging studies have corroborated such findings from psychology research, and have clarified that information-processing in the brain is different depending on whether it pertains to “us” or to “them”.

Brain regions that activate in response to the direct experience of pain as well as empathy for the pain of others include parts of the anterior cingulate cortex and insula. The first report showing this selective processing was published more than a decade ago. Participants were shown images of others in distress (e.g. people affected by natural disasters) and non-painful situations (e.g. people at a picnic). In response to the former, lower activation in these brain regions when those in distress belonged to racial groups different from the participants. Since then, several other studies have



Psychologists explored how people subconsciously evaluate different racial groups in a study involving more than 60,000 participants

substantiated these findings. Depending on the context, this differential processing could be harmless, lead to subtle forms of in-group favouritism or, in extreme cases, to intergroup violence.

Bias doesn’t exist at birth. It is a learned response built on cultural associations together with the brain’s biology. Yet preferential bias towards in-group members doesn’t mean an individual will be hostile towards out-group members. Factors that lead to hostility include the notion of associating an out-group with a threat. Uncertain circumstances – such as those we witnessed during the pandemic – can also heighten mistrust towards the outgroup.

The biology behind ‘facts of life’

Neuroimaging studies that have explored the basis of intergroup threats have highlighted the role of a specific brain region called the amygdala. An almond-shaped region situated deep in the brain, the amygdala is deemed to be processing our emotions. Recent learning-imaging studies have shown the amygdala activates to a greater degree when the source of threat is from an out-group member.

In one 2020 study, psychologists imaged the brains of white, non-Muslim participants as they watched short videos of Muslim males with stereotypical appearances threatening their in-group and found this activated the amygdala more, as expected. This study was unique because it also included videos of reconciliatory statements – and watching them activated a very different neural circuit, involving different parts of the cortex, which are higher brain regions that control impulses and regulate emotions. The amygdala being activated by something perceived as a threat is an automatic part of information processing in the brain. But cortical activation implies more of a cognitive effort.

We need more research to better understand neural processing, particularly the extent to which these results are generalisable. A better understanding of the human brain in the context of intergroup threats can also shed light on ways to improve reconciliation.

Whenever you hear social and/or cultural narratives presented as a “fact of life” – that, say, “they are bad people” – and find yourself getting sucked into it, remember that somewhere behind this statement is a misapprehension bit of brain biology. Being aware of our own biology can make us more informed, and more than face with narratives that produce more than inform.

Dr. Reeteka Sud is a neuroscientist by training and a senior scientist at the Center for Brain and Mind, Department of Psychiatry, NIMHANS, Bengaluru.

THE GIST

In a study, scientists found stark differences between participants’ explicit statements and their implicit beliefs. While everyone said they believed in the equality of all races, they also harboured implicit biases in favour of socially advantaged groups. This bias was universal, irrespective of racial identity

Studies have found that the criteria our brains use to categorise others as ‘us’ or ‘them’ shift constantly

Bias doesn’t exist at birth. It is a learned response built on cultural associations together with the brain’s biology. Factors that lead to hostility include associating an out-group with a threat. Uncertain circumstances can also heighten mistrust towards the outgroup



- **In a study, scientists found stark differences between participants' explicit statements and their implicit beliefs.**
- **While everyone said they believed in the equality of all races, they also harboured implicit biases in favour of socially advantaged groups.**
- **This bias was universal, irrespective of racial identity**
Studies have found that the criteria our brains use to categorise others as 'us' or 'them' shift constantly
Bias doesn't exist at birth.

- **It is a learned response built on cultural associations together with the brain's biology.**
- **Factors that lead to hostility include associating an out-group with a threat.**
- **Uncertain circumstances can also heighten mistrust towards the outgroup**

WHAT IS IT?

Catatumbo lightning: a torrent of current

Arkatapa Basu

Catatumbo lightning is a mesmerising natural phenomenon that occurs over the Catatumbo River in Venezuela, where lightning strikes almost continuously. This phenomenon primarily happens at the mouth of the Catatumbo River, where it meets Lake Maracaibo, the largest lake in Venezuela.


A convergence of several factors give rise to the unique conditions required for Catatumbo lightning. Warm, moist air from the Caribbean Sea is pushed towards the Andes mountains, where it collides with cooler air descending from the peaks. This collision creates a perfect storm of sorts, as the warmer air is forced to rise rapidly by the shape of the local landscape. And as it does, it cools and condenses, forming towering cumulonimbus clouds.

Meanwhile, the combination of strong winds and temperature differentials generates electrical charges within these clouds. The cumulonimbus clouds — sometimes reaching heights of more than 5 km — load up on static electricity. When the electrical potential within the clouds becomes too great, it discharges in the form of lightning. Catatumbo lightning is distinguished by its frequency and duration: the strikes occur for up to 160 nights in a year, with an



A convergence of several factors give rise to the unique conditions required for Catatumbo lightning. GETTY IMAGES/ISTOCKPHOTO

average of 28 lightning strikes per minute at its peak. Thanks to this constant flow of current, the area has earned the title of “the lightning capital of the world”.


For feedback and suggestions
for 'Science', please write to
science@teehindia.com
with the subject 'Daily page'

- **Catatumbo lightning is a mesmerising natural phenomenon that occurs over the Catatumbo River in Venezuela, where lightning strikes almost continuously.**
- **This phenomenon primarily happens at the mouth of the Catatumbo River, where it meets Lake Maracaibo, the largest lake in Venezuela.**
- **A convergence of several factors give rise to the unique conditions required for Catatumbo lightning.**

- **Warm, moist air from the Caribbean Sea is pushed towards the Andes mountains, where it collides with cooler air descending from the peaks.**
- **This collision creates a perfect storm of sorts, as the warmer air is forced to rise rapidly by the shape of the local landscape.**
- **And as it does, it cools and condenses, forming towering cumulonimbus clouds. Meanwhile, the combination of strong winds and temperature differentials generates electrical charges within these clouds.**

- **The cumulonimbus clouds – sometimes reaching heights of more than 5 km – load up on static electricity.**
- **When the electrical potential within the clouds becomes too great, it discharges in the form of lightning**

BIG SHOT



SAURABH PANDEY UPSC

An aerial view of hippopotamuses stuck in a dry channel in a park near Lilongwe, Botswana, that has dried up across southern Africa has been driven mostly by the El Nino weather pattern, not climate change, scientists have said. Zambia, Zimbabwe and Malawi have declared a national disaster over the severe dry spell that started in January and has devastated the agricultural sector, decimating crops and pastures. AFP

OKAVANGO DELTA



SAURABH PANDEY UPSC

- **An aerial view of hipopotamuses stuck in a dry channel in the Okavango Delta, Botswana.**
- **A drought across southern Africa has been driven mostly by the El Nino weather pattern, not climate change, scientists have said.**
- **Zambia, Zimbabwe and Malawi have declared a national disaster over the severe dry spell that started in January and has devastated the agricultural sector, decimating crops and pastures**

The PM's speeches fall foul of the Model Code of Conduct



The nation is in the grip of the Lok Sabha elections. Political manifestos are in the news, not for their good content, but for what they don't contain. The Prime Minister's recent statement that the Congress wants to take away properties, including gold and *mangalsutra*, from the people and distribute it among members of the minority community reflects the quality of the narrative in the ongoing election. The Prime Minister, who is the leader of the world's largest democracy, and his advisors are expected to know the facts.

The contents of the two manifestos

The Congress in its manifesto titled 'Nyay Patra' has listed out the various issues facing the country and has declared its aims and objectives in dealing with them if voted to power. The manifesto covers diverse topics such as equity; religious and linguistic minorities; senior citizens, persons with disabilities, and LGBTQIA+; health; youth; education; sports, women's empowerment; farmers, workers; art, culture, and heritage; economy; taxation and tax reforms; and defending the Constitution.

Under the head 'wealth', the manifesto says, "Wealth and wealth creation are the goals of any business... The Congress is committed to rapid growth and generation of wealth. We have set a target of doubling the GDP in the next 10 years." Under 'welfare' it says, "Welfare of all is the goal of all work and the creation of wealth. Under a Congress government, the welfare of the poor will be the first charge on all government resources... The Nav Sankalp Economic Policy will aim to build a fair, just and equal-opportunity economy and bring prosperity to all sections of the people." Under 'equity', it says, "The people belonging to the SC, ST and OBC communities have not yet been able to catch up with the rest and are still left behind. While OBC, SC and ST constitute nearly 70 per cent of India's population, their representation in high-ranking professions, services and businesses is disproportionately low... Congress will conduct a nation-wide Socio-Economic and Caste Census to enumerate the castes and sub-castes and their socio-economic conditions. Based on the data, we will strengthen the agenda for affirmative action." Nowhere does it suggest that wealth will be taken from the people and redistributed to others. The Congress is not Robin Hood.

This manifesto echoes the Preamble of the Constitution which resolves "to constitute India into sovereign, socialist, secular, democratic republic and to secure to all its citizens: justice, social, economic and political; liberty of thought, expression, belief, faith and worship; and equality of status and of opportunity. The Supreme Court has declared that the Preamble is the basic structure of the Constitution. Article 39 of the Constitution, a Directive



Dushyant Dave

is Senior Advocate and former president of the Supreme Court Bar Association

Principle of State Policy, inter alia provides that, "the State shall, in particular, direct its policy towards securing that the citizens, men and women equally, have the right to an adequate means of livelihood; that the ownership and control of the material resources of the community are so distributed as best to subserve the common good; and that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment." Article 38 empowers the State "to secure a social order for the promotion of welfare of the people, and to "strive to minimise the inequalities in income, and endeavour to eliminate inequalities in status, facilities and opportunities". Article 46 provides for the promotion of educational and economic interests of the weaker section of the people and, in particular, of the Scheduled Castes and the Scheduled Tribes.

The Bharatiya Janata Party (BJP) is aggressively pushing the agenda for a uniform civil code, which is also a Directive Principle, under Article 44. If this be so, the Prime Minister and the BJP should not have any reservations, much less objection, to the Congress manifesto. It is unfortunate that a serious document has been turned upside down to misguide the nation.

The BJP's manifesto, 'Sankalp Patra', begins with '10 years of good governance and Vikas'. Under the title Garib Parivar Jan, it declares that "80+ crore citizens are receiving free rations since 2020 through PM Garib Kalyan Anna Yojana". It also says the party "empowered citizens by transferring ₹34 lakh crore directly to their accounts", "34+ crore citizens are receiving free health insurance of ₹5 lakh under Ayushman Bharat", and "4+ crore families now have pucca houses under the PM Awas Yojana and other initiatives". These declarations coupled with guarantees on other issues, including to continue to provide free rations for the next five years, reflect the BJP's commitment to the goals set out in the Preamble. Therefore, the Prime Minister and the BJP should be the last to accuse the Congress on its commitments in its manifestos.

No law to govern manifesto

In *S. Subramaniam Balaji v. Government of Tamil Nadu & Ors.* (2013), the Supreme Court had bemoaned the absence of a law to govern the contents of the election manifesto and directed the Election Commission of India (ECI) to frame guidelines in consultation with all recognised political parties. The ECI held a meeting on August 12, 2013, with various political parties on the formulation of guidelines on election

manifestos. As there were no instructions from the political parties, the ECI, on April 24, 2014, outlined 'Guidelines on election manifestos', which says: "Although, the law is obvious that the Congress in the election manifesto cannot be

construed as 'corrupt practice' under Section 123 of the RP (Representation of the People) Act, the reality cannot be ruled out that distribution of freebies of any kind, undoubtedly, influences all people. It states the root of free and fair elections to a large degree".

The Model Code of Conduct (MCC) issued by the ECI on March 16, 2024, expressly provides under the heading 'General Conduct' that "no party or candidate shall include in any activity which may aggravate existing differences or create mutual hatred or cause tension between different castes and communities, religious or linguistic". It also says "criticism of other political parties, when made, shall be confined to their policies and programme, past record and work. Parties and candidates shall refrain from criticism of all aspects of private life, not connected with the public activities of the leaders or workers of other parties. Criticism of other parties or their workers based on unverified allegations or distortion shall be avoided. And "there shall be no appeal to caste or communal feelings for securing votes." It prohibits activities which are "corrupt practices and offences under the election law".

In a series of judgments in 1996, the Supreme Court declared speeches of religious nature to influence voters as corrupt practices, such as statements by Bal Thackeray that "we are fighting this election for the protection of Hinduism. Therefore, we do not care for the votes of the Muslims. This country belongs to Hindus and will remain so". The Supreme Court in 2017 interpreted Section 123 of the Representation of People Act, 1951. Dr Justice Thakur, speaking for the Court, held, "An appeal in the name of religion, race, caste, community or language is impermissible under the Representation of the People Act, 1951 and would constitute a corrupt practice sufficient to annul the election in which such an appeal was made..." So interpreted, religion, race, caste, community or language would not be allowed to play any role in the electoral process and should an appeal be made on any of those considerations, the same would constitute a corrupt practice.

The Prime Minister's tirade against the Opposition and minority community only show that he has no positive issues to persuade them to vote for him. His statements clearly fall foul of the MCC and also amount to corrupt practice as declared by the Supreme Court. The Prime Minister must scrupulously adhere to the MCC in letter and spirit. If he ceases to be the role model, nothing will be left of our great democracy.

Yet, the malaise continues because of the weak rule of law. The holding of free and fair elections is the constitutional mandate of the ECI. It has miserably failed in its duty, only to prove that composition of the ECI as approved by the Supreme Court is defective.

If the Prime Minister ceases to be the role model, nothing will be left of our great democracy

SAURABH PANDEY JPSC



- **Article 46 provides for the promotion of educational and economic interests of the weaker section of the people and, in particular, of the Scheduled Castes and the Scheduled Tribes.**
- **In S. Subramaniam Balaji v. Government of Tamil Nadu & Ors. (2013), the Supreme Court had bemoaned the absence of a law to govern the contents of the election manifesto and directed the Election Commission of India (ECI) to frame guidelines in consultation with all recognised political parties.**



- **The ECI held a meeting on August 12, 2013, with various political parties on the formulation of guidelines on election manifestos.**
- **It then issued ‘Instructions to political parties on manifestos’ on April 24, 2015, outlining ‘Guidelines on election manifestos’, which says: “Although, the law is obvious that the promises in the election manifesto cannot be construed as ‘corrupt practice’ under Section 123 of the RP (Representation of the People) Act, the reality cannot be ruled out that distribution of freebies of any kind, undoubtedly, influences all people.**
- **It states the root of free and fair elections to a large degree”.**

- **The Model Code of Conduct (MCC) issued by the ECI on March 16, 2024, expressly provides under the heading ‘General Conduct’ that “no party or candidate shall include in any activity which may aggravate existing differences or create mutual hatred or cause tension between different castes and communities, religious or linguistic”**



- It also says “criticism of other political parties, when made shall be confined to their policies and programme, past record and work.
- Parties and candidates shall refrain from criticism of all aspects of private life, not connected with the public activities of the leaders or workers of other parties.
- Criticism of other parties or their workers based on unverified allegations or distortion shall be avoided.
- And “there shall be no appeal to caste or communal feelings for securing votes.”
- It prohibits activities which are “corrupt practices and offences under the election law”



- **In a series of judgments in 1996, the Supreme Court declared speeches of religious nature to influence voters as corrupt practices.**
- **The Supreme Court in 2017 interpreted Section 123 of the Representation of People Act, 1951. Dr Justice Thakur, speaking for the Court, held, “An appeal in the name of religion, race, caste, community or language is impermissible under the Representation of the People Act, 1951 and would constitute a corrupt practice sufficient to annul the election in which such an appeal was made...”**

- **So interpreted, religion, race, caste, community or language would not be allowed to play any role in the electoral process and should an appeal be made on any of those considerations, the same would constitute a corrupt practice**

Kenyan students plant bamboos around school to filter filthy air from trash dump

Associated Press
NAIROBI

Armed with gardening hoes while others cradled bamboo seedlings, students gathered outside their school in Kenya's capital as they hoped the fully grown bamboo would help to filter filthy air from one of Africa's largest trash dumps next door.

More than 100 bamboo plantings dot the ground around Dandora secondary school, which shares a name with the dumpsite that was declared full 23 years ago. Hundreds of trucks still drive in daily to dump more trash.

Allan Sila, 17, said sitting

in his classroom is like studying in a smelly latrine.

Acrid smoke billowing from the burning of trash fills the air every morning, hindering visibility and leaving some students with respiratory issues. "Asthma is a disease that is commonly known," Mr. Sila said.

The school's principal, Eutyclus Maina, recalled being greeted by the smell and smoke when he was posted to the school last year. He knew he had to do something.

"My motivation for initiating the bamboo project in the school was to mitigate the effects of the dumpsite. It really pollutes

the air that we breathe," he said. He said he researched online and came across the use of bamboo. He believes it will help reduce the cases of respiratory infections in the community.

Promoted by UN

The fast-growing bamboo has been promoted by the United Nations and others for its high uptake of carbon dioxide.

Aderiana Mbandi is an air quality research and policy expert at the United Nations Environment Programme (UNEP), based in Nairobi. She said the impact of air pollution is felt in all parts of the body including the brain, and the



A Dandora Secondary school building next to garbage from one of Africa's largest garbage dump in Nairobi, Kenya on April 22. AP

best way to reduce its effects is minimising exposure. The seedlings the students began planting in last August are already

nine feet tall. The giant bamboo variety is expected to reach 40 feet when mature, depending on soil conditions.

Students hope that the bamboo will help transform the school compound into a green haven in the litter-strewn Dandora neighbourhood.

The publicly funded school relies on donations to afford the seedlings that is sold in retail at 400 Kenyan shillings each.

But the school management is determined to keep going until bamboo lines the 900-metre wall that separates the school and the dumpsite.

The Dandora dump occupies about 123 acres of land and receives more than 2,000 tonne of waste daily from around Nairobi, home to 4 million people.

Its stench can be smelled kilometres away.

UNEP, in partnership with the Stockholm Environment Institute, deployed sensors to the Dandora neighbourhood from October to April to monitor pollution levels from the dumpsite.

Out of the 166 days monitored, only 12 had a daily average of excellent air quality according to World Health Organization guidelines.

Other pollutants

Nairobi's air is also polluted by emissions from secondhand cars that make up much of the city's transport. Other pollutants in-

clude smoke from industries that are often located near residential areas.

The Dandora school is also planting trees including jacaranda and grevillea. Student Josiah Nyamwata called them easy to obtain and easy to plant. "The other advantage is that the trees will be helpful in order to boost our air circulation around our school," he said.

The air is not the only challenge faced by the school. Vultures from the dumpsite circling in search of food often create a nuisance to the students at mealtimes forcing them to guard their plates from being snatched.



The fast-growing bamboo has been promoted by the United Nations and others for its high uptake of carbon dioxide.

- **The Bamboos (Bambusoidea) consists of 1439 different species in 116 genera.**
- **It is one of the 12 subfamilies of the grass family (Poaceae) and the only one to diversify in forests. Bamboo is a great plant for individuals concern with a green environment.**

●
.



- **Bamboo is the fastest growing plant on this planet.**
- **It has been recorded growing at an amazing 47.6 inches in a 24 hour period.**
- **Bamboo is a crucial element in the balance of oxygen and carbon dioxide in the atmosphere.**
- **A grove of bamboo release 35% more oxygen than an equivalent stand of trees. Because of this, planting bamboo is a great way to reduce your carbon footprint and help fight global warming.**

- **Bamboo is a viable replacement for wood. It can be harvest in 3-5 years versus 10-20 for most softwoods.**
- **It can out yield pine 6 to 1 in biomass production.**
- **It is also one of the strongest building materials with a tensile strength of 28,000 psi. To help give you an idea how much this is, mild steel measures 23,000 psi.**
- **It is a great soil conservation tool. It greatly reduces erosion with a sum of stem flow rate and canopy intercept of 25%**

FOR UPSC 2025 /26



Launched

1- Current affairs plus - PIB, YOJANA, Down to earth , physics.org , Major newspapers.

2- Books series - all advanced books in one course

UPCOMING

1- Mains Mentorship program

2- GS-1 ,2,3 and 4

3- Mapping

4- NCERTS

5- Test series for 2025

6- essay

7- Agriculture optional

**DOWNLOAD - Saurabh
pandey cse app**

+91 90579 21649

SAURABH PANDEY UPSC

Why is Boeing crewed space test significant?

When was the project announced? What delayed the mission? By how much has the budget been overshoot? How many missions has competitor SpaceX flown to the International Space Station? Why is the crewed space flight important for Boeing?

Vasudevan Mukunth

The story so far:

At 8.04 am IST on May 7, an Atlas V rocket is set to lift off with a team of two veteran astronauts – Barry Wilmore and Sunita Williams – sitting inside a spacecraft called Starliner, built by Boeing, on the capsule's third test flight and the first with astronauts on board. The astronauts will be set for the International Space Station (ISS) in low-earth orbit. If the mission succeeds, the U.S. will for the first time in its history have two spacecraft to launch astronauts to space.

What is the Boeing Starliner?

Starliner is a spacecraft that transports astronauts in space, after being launched there by a rocket. It consists of a crew capsule and a service module. The crew capsule houses the astronauts; like others of its kind, it will be able to survive reentry and return to the ground. The service module consists of the equipment and systems the astronauts need to survive in space, including air and temperature control, water supply, sanitation, etc., plus the engines and fuel required to manoeuvre the spacecraft. The service module won't be reusable.

Starliner is more than 4 metres wide and can

Since 2014, a dark cloud has hung above Boeing over issues with its commercial airliners

house up to seven astronauts. It can be fitted atop an Atlas V rocket, operated by United Launch Alliance, a joint venture between Boeing and Lockheed Martin.

When was Starliner commissioned?

On September 16, 2014, NASA announced it had awarded contracts to SpaceX and Boeing to fly astronauts to the ISS. The "maximum potential values" of the fixed price contracts, based on U.S. Federal Acquisition Regulations, were \$4.2 billion for Boeing and \$2.6 billion for SpaceX.

Boeing was expected to conduct Starliner's first crewed launch in 2017. A slew of delays followed, however, and its first uncrewed orbital test flight happened only in December 2019, when the capsule was launched and expected to dock with the ISS. But a software error left it in the wrong orbit and it returned safely to ground the next day without docking. In May 2022, Boeing repeated the test flight, this time as a full success – docking with the ISS, undocking after four days, and returning to the ground. The May 7 test will repeat this procedure but with astronauts onboard.

Even if the launch happens on time, it will ultimately have been delayed by seven years and with Boeing having overshoot its budget by \$1.4 billion. Boeing identified many technical problems even after the 2022 flight, and then there was the pandemic.

What is Starliner's purpose?

Since being awarded the NASA contracts, SpaceX has flown 13 missions to the ISS onboard its Dragon crew capsule (which can also house seven astronauts). Assuming Starliner's crewed test flight is successful, SpaceX and Boeing will take turns launching astronauts to the ISS – each crew's expedition lasts up to six months – until the ISS is decommissioned next decade. After NASA shut its Space Shuttle programme in 2011 and before SpaceX's Dragon capsule got ready in 2020, only Russia's Soyuz rocket and capsule could ferry astronauts to and from the ISS.

What is at stake for Boeing?

Since 2014, a dark cloud has hung above Boeing over issues with its commercial airliners.

Boeing's 737 Max 8 airline entered into use in 2017, competing with European rival Airbus's A320neo. In October 2018, a Max 8 operated by Lion Air crashed 13 minutes after take off, killing all 189 people on board. In March 2019, a Max 8 Ethiopian Airlines flight crashed six minutes into its flight, killing the 157 onboard. These incidents were the result of troubles with the Max 8's Manoeuvring Characteristics Augmentation System (MCAS).

The 737 Max 8 succeeded the 737 Next Generation vehicle with some design changes. Since pilots had already received simulator training to operate the Next Generation, Boeing designed the MCAS to compensate for these changes and installed it on the Max 8, saying pilots wouldn't need to be trained anew for the latter. But a glitch with MCAS prevented its normal function. And because pilots hadn't been trained for the Max 8, pilot error allowed the glitch to persist in a way that led to crashes.

The legal disputes, compensatory payments, and order cancellations that followed are expected to have cost Boeing more than \$60 billion. A September 2020 U.S. Congressional report also concluded Boeing had cut corners to operationalise its Max 8 aeroplanes, including hiding critical safety information from pilots.

Commercial airlines and spacecraft are different sectors, but in 2015, Boeing consolidated their development together with some other divisions, creating a company called BDS Development. The stated aims included lowering Starliner's development costs. The May 7 test is happening against this extended backdrop, and whose success will give both Boeing and NASA confidence – but whose failure, should that come to pass, will add to the company's many woes.

What is the flight test profile?

Starliner's first crew flight test will be piloted by two veteran astronauts, Mr. Wilmore and Ms. Williams. After being launched by an Atlas V rocket, Starliner will carry them to the ISS, where the duo will stay for eight days. The capsule will return and descend to the ground, probably at a location in New Mexico.

In March, Mr. Wilmore told Ars Technica Boeing's aeroplane division and the Starliner programme "don't cross". He also asked people to step back from expectations that the test will be flawless, that it was being conducted so Boeing could fix any final issues in preparation for commercial operations.



Ready for launch: A Boeing CST-100 Starliner spacecraft is rolled out at the Kennedy Space Center in Cape Canaveral, Florida on April 16. AFP

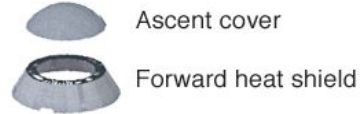


- **Boeing is finally poised to launch astronauts to the International Space Station for NASA.**
- **Starliner is a spacecraft that transports astronauts in space, after being launched there by a rocket.**
- **It consists of a crew capsule and a service module.**
- **The crew capsule houses the astronauts; like others of its kind, it will be able to survive reentry and return to the ground.**
- **The service module consists of the equipment and systems the astronauts need to survive in space, including air and temperature control, water supply, sanitation, etc., plus the engines and fuel required to manoeuvre the spacecraft. The service module won't be reusable.**

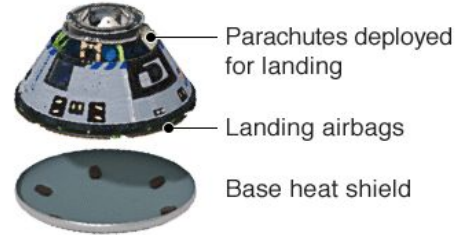
Boeing Starliner



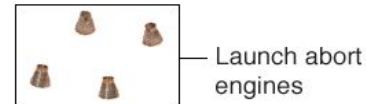
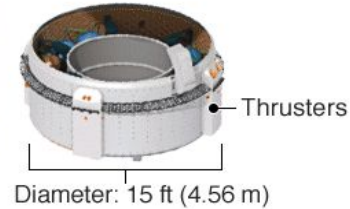
Service and crew module



Reusable crew module (up to 7 people)



Service module





What is Starliner's purpose?

Since being awarded the NASA contracts, SpaceX has flown 13 missions to the ISS onboard its Dragon crew capsule (which can also house seven astronauts).

Assuming Starliner's crewed test flight is successful, SpaceX and Boeing will take turns launching astronauts to the ISS — each crew's expedition lasts up to six months — until the ISS is decommissioned next decade.

How is Kejriwal functioning from Tihar Jail?

With the Delhi Chief Minister in jail, how is the administration carrying out its tasks?

Jaldeep Deo Bhandi
Rocky Soibam Singh

The story so far: Delhi Chief Minister Arvind Kejriwal has been lodged in Tihar Jail since April 1, after being arrested by the Enforcement Directorate (ED) on charges of corruption and money laundering in the execution of the Delhi government's now scrapped excise policy for 2021-22. On Friday, the Supreme Court overturned the ED that it may "consider" granting interim bail to Mr. Kejriwal due to the Lok Sabha election. Delhi votes on May 25.

What is the Aam Aadmi Party's strategy? Foreseeing his arrest, the Aam Aadmi Party in December, 2023 ran a "Main Bhai Kejriwal" campaign that asked the people of Delhi if Mr. Kejriwal should continue as the Chief Minister of Delhi from jail if arrested. After his arrest, in an unprecedented decision, AAP decided that Mr. Kejriwal would remain the Chief Minister, and that he would run the government from Delhi, while proclaiming it as the "will of the people of Delhi".

Mr. Kejriwal's decision has led to a peculiar situation in the capital where various administration decisions have been stalled. For instance, the election to appoint the Mayor and Deputy Mayor of the Municipal Corporation of Delhi (MCD) scheduled to be held on April 26 was postponed after Lieutenant Governor Vinod Kumar Saxena refused to appoint a presiding officer to conduct the election saying he "did not deem it appropriate to exercise his power as Administrator to appoint the Presiding Officer in the absence of inputs from the Chief Minister."

Is the Chief Minister meeting his Ministers? When Mr. Kejriwal was in the custody of the ED from March 21 to April 1, he was sending written instructions to his Ministers on ensuring uninterrupted water supply and medicine as well as messages to the public to be read out by his wife Surashita Kejriwal.

However, since being lodged in Tihar Jail, communication has been reduced to media bites from those going to visit him. The Tihar Jail Manual says that every interview with a prisoner shall take place in the presence of a prison officer, who shall be positioned at a place from where he can see and hear what passes between the prisoner and his interviewer and he shall prevent any article being passed between the two parties. Since April 1, apart from his family and lawyers, Mr. Kejriwal has met AAP general secretary Sandeep Pathak and Cabinet Ministers Anil and Manish Bhatnagar once, and the Punjab counterpart Bhagwant Mann on two occasions. Mr. Pathak said Mr. Kejriwal would meet two Cabinet Ministers every week for 30 minutes each.

How is the government being run? Mr. Kejriwal does not have any portfolios under him and there have been no cabinet meetings since his arrest. There has also not been a session of the Delhi Assembly since then. Individual ministers have been looking after their own departments. The party is currently focused on its election campaign. While deferring the MCD elections, the LG said that the circumstances were "peculiar" and "unprecedented" where the serving Chief Minister "cannot discharge his constitutional obligations as Chief Minister."

The Constitution is silent about whether a person can continue as Chief Minister as a remand prisoner. Section 83(a) of the Representation of People Act of 1951, states that an MLA or MP can be disqualified if convicted and sentenced to at least two years in prison. Mr. Kejriwal has not yet been convicted in the case.

When can President's Rule be imposed? President's Rule can be imposed in Delhi under Article 239A of the Constitution. Delhi's power structure is characterised by a delicate balance between the elected government and the Central government-appointed LG. If Mr. Kejriwal continues to remain in prison, stalling various administrative work, the LG can recommend to the President who can invoke Article 239A citing "failure of constitutional machinery". President's rule under Article 239A was invoked in Delhi only once, in 2014, subsequent to Mr. Kejriwal's resignation 49 days into his first tenure as Chief Minister.

What are the challenges going forward? While the Constitution is silent about whether a person can continue as Chief Minister as a remand prisoner, Section 83(a) of the Representation of People Act of 1951, states that an MLA or MP can be disqualified if convicted and sentenced to at least two years in prison. Mr. Kejriwal has not yet been convicted in the case. The High Court said national and public interest demands that no person who holds this post is incommunicado or absent for a long stretch of time or for an uncertain period of time.



When can President's Rule be imposed?

- **President's Rule can be imposed in Delhi under Article 239AB of the Constitution. Delhi's power structure is characterised by a delicate balance between the elected government and the Central government-appointed LG.**
- **If Mr. Kejriwal continues to remain in prison, stalling various administrative work, the LG can recommend to the President who can invoke Article 239AB citing "failure of constitutional machinery".**
- **President's rule under Article 239AB was invoked in Delhi only once, in 2014, subsequent to Mr. Kejriwal's resignation 49 days into his first tenure as Chief Minister.**

Leprosy spread between red squirrels and people: study

The Hindu Bureau

Evidence from archaeological sites in the medieval English city of Winchester shows that English red squirrels once served as an important host for *Mycobacterium leprae* strains that caused leprosy in people according to a study published in the journal *Current Biology*.

Leprosy is one of the oldest recorded diseases in human history and is still

prevalent to this day in Asia, Africa, and South America. “For thousands of years, humans were thought to be the only natural host of *M. leprae* until the discovery of *M. leprae* in several wild animals in recent decades, such as armadillos and, more recently, red squirrels and chimpanzees,” the authors write. While scientists have traced the evolutionary history of the mycobacterium that causes it,

how it may have spread to people from animals in the past was not known beyond some hints that red squirrels in England may have served as a host.

In the new study, the researchers studied 25 human and 12 squirrel samples to look for *M. leprae* at two archaeological sites in Winchester. The city was well known for its leprosurium and connections to the fur trade. In the Middle Ages, squirrel fur was used

to trim and line garments. Many people also raised them as pets.

The researchers sequenced and reconstructed four genomes representing medieval strains of *M. leprae*, including one from a red squirrel. An analysis to understand their relationships found that all of them belonged to a single branch on the *M. leprae* family tree. They also showed a close relationship between the squirrel

strain and a newly constructed one isolated from the remains of a medieval person, says a release. The study found that the medieval squirrel strain is more closely related to human strains from medieval Winchester than to modern squirrel strains from England, indicating that the infection was circulating between people and animals in the Middle Ages in a way that hadn’t been detected before.

“These findings on the natural reservoir of *M. leprae* indicated that *M. leprae* circulates in more wild animals than we suspected, and zoonotic infection may contribute to the epidemic of leprosy. Therefore, it is inevitable that leprosy epidemics can persist for a long time in the future, and we should remain vigilant against the spread of *M. leprae* between humans and wildlife,” they write.

- **Red squirrels once served as an important host for *Mycobacterium leprae* strains that caused leprosy in people .**

LEPROSY



Leprosy Primarily Affects the SKIN and the PERIPHERAL NERVES



It May also Strike the EYES and the Thin Tissue Lining the Inside of the NOSE, KIDNEYS, and MALE REPRODUCTIVE ORGANS

LEPROSY, Also Known as Hansen's Disease (HD), is a Long-Term Infection by the Bacteria *Mycobacterium Lepae* or *Mycobacterium Lepromatosis*



It Usually Takes About 3 TO 5 YEARS for Symptoms to Appear
Some People do not develop Symptoms UNTIL 30 YEARS LATER



COMPLICATIONS

Permanent Damage to the Nerves	Permanent Damage to the Legs	Permanent Damage to the Arms
Permanent Damage to the Nose	Disfiguration of the Face	Muscle Weakness Inability to Flex
Blindness or Glaucoma	Kidney Failure	Erectile Dysfunction

Red squirrels are a small mammal which falls under a rodent group called Sciuridae (meaning shadow-tailed).

Examples of the squirrel family includes tree squirrels, ground squirrels and flying squirrels.





Genetically corrected stem cells mitigates deformities

A treatment protocol that combines autologous stem cell transplants with gene therapy shows signs of correcting skeletal deformities in eight children with Hurler syndrome, a rare disease that stunts skeletal system growth. Promising results from a phase 1 trial suggest that similar strategies may counteract one of the debilitating complications of this rare disorder, which has no cure. Patients who received autologous stem cells containing the corrected gene displayed close-to-normal skeletal growth patterns.



- **A treatment protocol that combines autologous stem cell transplants with gene therapy shows signs of correcting skeletal deformities in eight children with Hurler syndrome, a rare disease that stunts skeletal system growth.**



- **Hurler syndrome** is a rare autosomal recessive lysosomal storage disorder.
- Affected individuals demonstrate typical coarse facial features including a flat nasal bridge and excessive hair growth.
- Usually manifests as cognitive developmental delay, corneal clouding, cardiac disease, and characteristics musculoskeletal manifestations

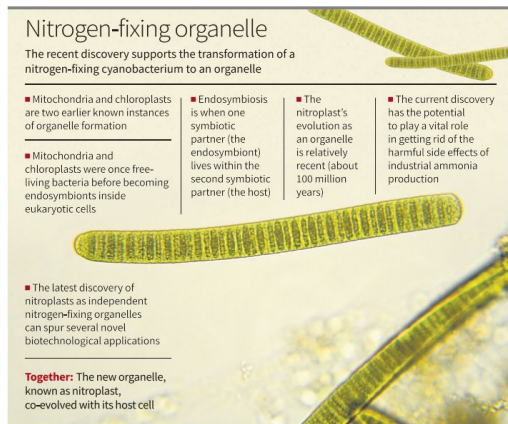
Can the new organelle help engineer plants to fix nitrogen?

The endosymbiotic theory states that organelles like mitochondria and chloroplasts, the sites of cellular respiration and photosynthesis, were once free-living bacteria that were later ingested by the recipient cells

Binay Panda

As proposed by Charles Darwin in the nineteenth century, natural selection, the engine that drives evolution, is how species adapt to their environments. Unlike the Neo-Darwinist consensus, the American evolutionary biologist Lynn Margulis did not believe that random genetic mutations were the sole cause of inherited variation. She came up with a new theory called symbiogenesis. The endosymbiotic theory states that organelles like mitochondria and chloroplasts, the sites of cellular respiration and photosynthesis, were once free-living bacteria that were later ingested by the recipient cells. The theory of symbiogenesis was fiercely challenged, including Margulis's manuscript, which was rejected by 15 academic journals before finally being published in *The Journal of Theoretical Biology* in 1967. It was not until many years later that mitochondria and chloroplasts were accepted as once being free-living bacteria before becoming endosymbionts inside eukaryotic cells.

Two papers published recently, one in the journal *Science* and another in the *Cell*, have generated new interest in the endosymbiotic theory. The discovery concerns nitrogen fixation. Nitrogen is a key component in proteins and DNA of all living organisms. Although nitrogen gas makes up about 78% of the Earth's atmosphere by



volume, plants and animals lack a system that can utilise atmospheric nitrogen. Bacteria and archaea help convert atmospheric nitrogen gas to ammonia by nitrogen fixation to make nitrogen usable for plants. Unlike many free-living nitrogen-fixing bacteria, legumes, a class of plants in the family Fabaceae, bear the nitrogen-fixing bacteria in their root nodules. Ammonia is converted to nitrites and nitrates and then back into atmospheric nitrogen with the help of bacteria to complete the cycle. In marine environments, like on Earth, bacteria and archaea are also involved in ammonification and nitrification. Beyond mitochondria and chloroplasts, the current discovery extends the ear-

lier reports of a nitrogen-fixing cyanobacterium in marine algae and establishes it as a new organelle. The new organelle that the authors call nitroplast co-evolved with its host cell.

In 1998, Jonathan Zehr at the University of California, Santa Cruz, U.S. discovered a cyanobacterium *Candidatus Atelocyanobacterium thalassa* or UCYN-A in the water of the Pacific Ocean capable of fixing nitrogen. Later, Kyoko Hagiwara at Kochi University, Japan, found the marine algae *Braarudosphaera bigelowii* as the host for UCYN-A and could successfully culture the host cells. Both teams had established a symbiotic relationship between the cyanobacterium and the marine single-cell eukaryotic algae.

Bonafide organelles

need to satisfy several criteria. First, the organelle must be integrated into the function and overall architecture of the host cell. Second, proteins must be imported to the organelle from the host cell to carry out some of its functions. Third, organelles must be in sync with the host cell's growth. Last, organelles must be inherited in the newly dividing cells during host cell division. All these above criteria were satisfied by nitroplast, as presented by several lines of evidence by the authors. During a symbiont's transformation into an organelle within a eukaryotic cell, its genome becomes highly reduced. Some proteins are still in the host cell's proteins to perform some of its essential functions. In line with expecta-

tions, nearly half of the nitroplasts' proteins are from the host cell. Although the reports present evidence of establishing nitroplasts as organelles, the loss of some of nitroplasts' genetic material and migration to the host cell nucleus still needs to be established. Unlike mitochondria and chloroplast endosymbiosis, which happened nearly two billion years back, nitroplast's evolution as an organelle is relatively recent (about 100 million years).

The discovery has revolutionary implications, especially in agriculture. Agriculture was transformed in the last century by the discovery of a method for synthesising ammonia from nitrogen and hydrogen in the laboratory. The current discovery has the potential to play a vital role in getting rid of the harmful side effects of industrial ammonia production. Several novel biotechnological applications may use the result of the current discovery of nitroplasts as independent nitrogen-fixing organelles. They are engineering host cells and their nitroplasts with minimal genomes sufficient to grow efficiently and fix nitrogen, making plant cells fix nitrogen by engineering them to include nitroplasts and organelle transformation in plant cells to introduce nitroplast and its host genes to fix nitrogen. Although promising and futuristic, all these are highly challenging and far from reality.

(Binay Panda is a Professor at JNU, New Delhi)



Nitrogen Fixation

Nitrogen fixation is the process of converting atmospheric nitrogen (N_2) into ammonia (NH_3) or other usable nitrogenous compounds.

Bacteria / Archaea



Symbiotic and free-living bacteria fix nitrogen in soil and root nodules.

Lightning



Lightning breaks the $N \equiv N$ bond, so nitrogen makes other

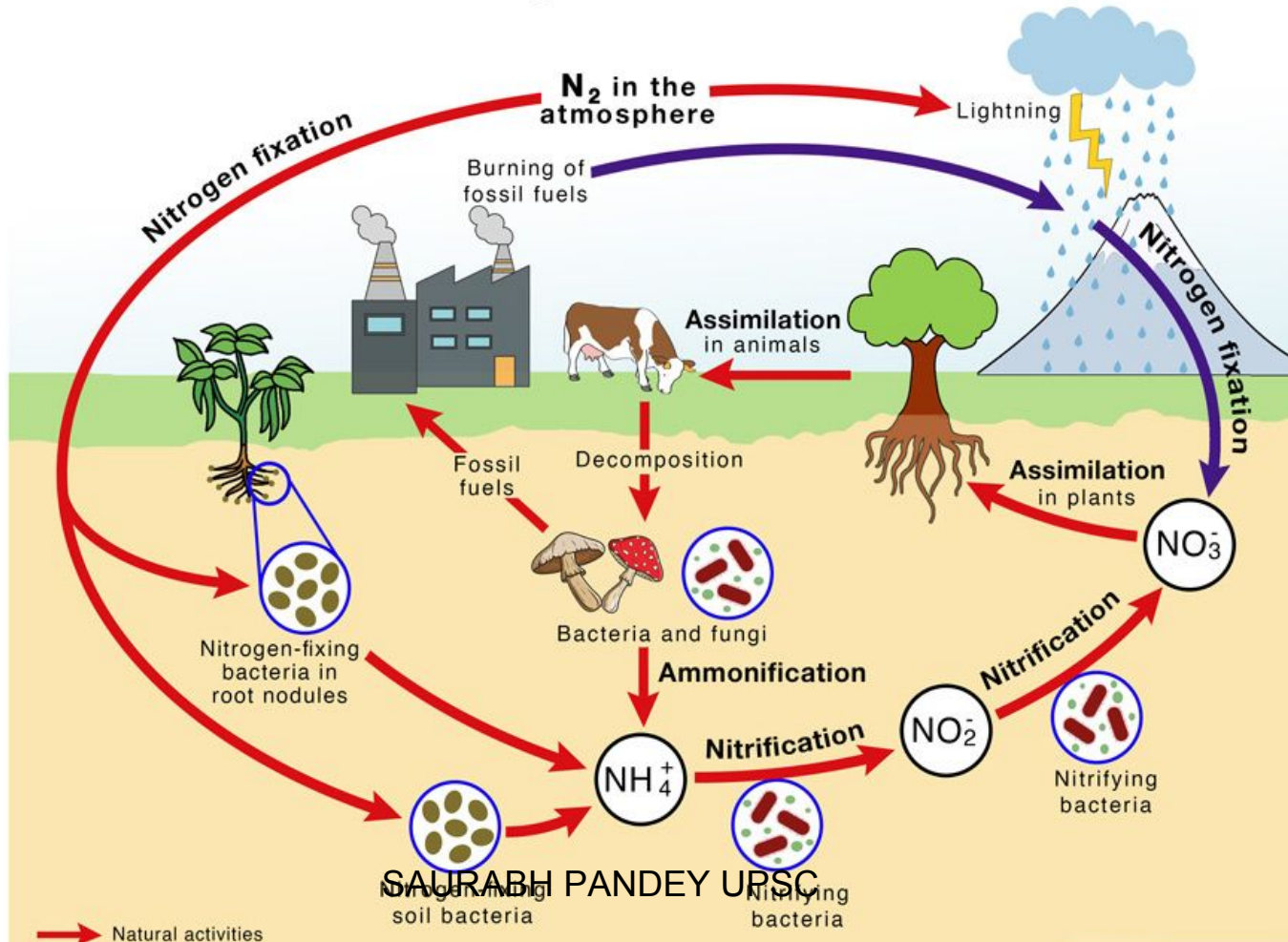
SAURABH PANDEY CSE INSTITUTE UPSC

Industrial Processes



The Haber process, Frank-Caro process, and others fix nitrogen.

Nitrogen Fixation



- **The endosymbiotic theory states that organelles like mitochondria and chloroplasts, the sites of cellular respiration and photosynthesis, were once free-living bacteria that were later ingested by the recipient cells.**
- **Nitrogen is a key component in proteins and DNA of all living organisms. Although nitrogen gas makes up about 78% of the Earth's atmosphere by volume, plants and animals lack a system that can utilise atmospheric nitrogen.**
- **Bacteria and archaea help convert atmospheric nitrogen gas to ammonia by nitrogen fixation to make nitrogen usable for plants.**

Nitrogen-fixing organelle

The recent discovery supports the transformation of a nitrogen-fixing cyanobacterium to an organelle

- Mitochondria and chloroplasts are two earlier known instances of organelle formation

- Mitochondria and chloroplasts were once free-living bacteria before becoming endosymbionts inside eukaryotic cells

- Endosymbiosis is when one symbiotic partner (the endosymbiont) lives within the second symbiotic partner (the host)

- The nitroplast's evolution as an organelle is relatively recent (about 100 million years)

- The current discovery has the potential to play a vital role in getting rid of the harmful side effects of industrial ammonia production

- The latest discovery of nitroplasts as independent nitrogen-fixing organelles can spur several novel biotechnological applications

Together: The new organelle, known as nitroplast, co-evolved with its host cell

SAURABH PANDEY UPSC



- **In marine environments, like on Earth, bacteria and archaea are also involved in ammonification, nitrification, and denitrification.**
- **Beyond mitochondria and chloroplasts, the current discovery extends the earlier reports of a nitrogen-fixing cyanobacterium in marine algae and establishes it as a new organelle.**
- **The new organelle that the authors call nitroplast coevolved with its host cell.**

- **Unlike many free living nitrogen-fixing bacteria, legumes, a class of plants in the family Fabaceae, bear the nitrogen-fixing bacteria in their root nodules.**
- **Ammonia is converted to nitrites and nitrates and then back into atmospheric nitrogen with the help of bacteria to complete the cycle.**



- **The discovery has revolutionary implications, especially in agriculture. Agriculture was transformed in the last century by the discovery of a method for synthesising ammonia from nitrogen and hydrogen in the laboratory.**
- **The current discovery has the potential to play a vital role in getting rid of the harmful side effects of industrial ammonia production.**
- **Several novel biotechnological applications may use the result of the current discovery of nitroplasts as independent nitrogen-fixing organelles.**

- **They are engineering host cells and their nitroplasts with minimal genomes sufficient to grow efficiently and fix nitrogen, making plant cells fix nitrogen by engineering them to include nitroplasts and organelle transformation in plant cells to introduce nitroplast and its host genes to fix nitrogen**

FOR UPSC 2025 /26



Launched

1- Current affairs plus - PIB, YOJANA, Down to earth , physics.org , Major newspapers.

2- Books series - all advanced books in one course

UPCOMING

1- Mains Mentorship program

2- GS-1 ,2,3 and 4

3- Mapping

4- NCERTS

5- Test series for 2025

6- essay

7- Agriculture optional

**DOWNLOAD - Saurabh
pandey cse app**

+91 90579 21649

SAURABH PANDEY UPSC



Courses for 2024 prelims (40 PER OFF TODAY)

1- PT 730 - 2YRS CURRENT AFFAIRS

2- INTERNATIONAL RELATIONS

3- Agriculture for GS

4- Advance topics of science tech

5- prelims vijay series (10 full length testS)

9057921649

Visit - saurabhpandeyupsc.com

SAURABH PANDEY UPSC

Target Mains -2024/25

Q “Biodiversity in African continent will not remain untouched of global boiling” Explain.

प्रश्न "अफ्रीकी महाद्वीप में जैव विविधता वैश्विक उबाल से अछूती नहीं रहेगी" स्पष्ट करें

send your answer - Saurabh pandey upsc telegram channel



SAURABH PANDEY UPSC



SAURABH PANDEY UPSC



SAURABH PANDEY UPSC



SAURABH PANDEY UPSC



SAURABH PANDEY UPSC