Topics

- Transferring of panchayat between states
- The green chromide
- Genome editing
- Sleeping beauty and transposon
- RNA Bridge
- Mains

By saurabh Pandey

THE HINDU

- Graphene
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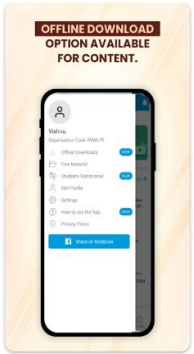

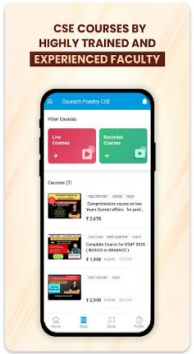

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Q What impact coalition dharma has on fiscal federalism ??

Q गठबंधन धर्म का राजकोषीय संघवाद पर क्या प्रभाव पड़ता है ??

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BY SAURABH PANDEY SIR

Naidu, Revanth agree on transfer of 5 panchayats from A.P. to Telangana

The process of re-merger is likely to take some time as the two States need to follow the procedures to get Andhra Pradesh Reorganisation Act, 2014, amended with the help of the Union government as Parliament had passed the legislation

M. Rajeev
HYDERABAD

The meeting of Telangana Chief Minister A. Revanth Reddy and his Andhra Pradesh counterpart, N. Chandrababu Naidu, on Saturday, the first such after four-and-a-half years, saw some crucial decisions being taken.

Chief Ministers A. Revanth Reddy and N. Chandrababu Naidu during their meeting on Saturday. X/@REVANTH_ANUMULA

The transfer of five gram panchayats around the temple town of Bhadrachalam from Andhra Pradesh to Telangana was one of the issues in focus ahead of the much-awaited meeting. The two Chief Ministers reportedly reached a consensus on the re-merger of the gram panchayats with Telangana to remove the difficulties faced by residents in accessing medical and other services.

The two governments are planning to expeditiously initiate steps in this regard. The process, however, is likely to take some time as the two States need to follow procedures for seeking an amendment to the Andhra Pradesh Reorganisation Act, 2014, by the Union government as the Act was passed by Parliament.

The gram panchayats of Etapaka, Gundala, Purushottapatnam, Kannaigudem and Pichukalapalem, along with seven mandals of Khammam district, were merged with Andhra Pradesh by the Modi government in its first term within days of the formation of Telangana. As a result, the endowment lands of Bhadrachalam temple located in these villages went to Andhra Pradesh, while the temple town remained in Telangana. Several representations were subsequently made for the re-merger of these villages with Telangana owing to the legal issues involved in the management of those temple lands.

This apart, people also face issues in accessing villages closer to Bhadrachalam, as they have to cross the Andhra Pradesh boundary and re-enter Telangana to reach them.

With consent obtained at the highest levels, officials of the two States have reportedly focused on the legal formalities required to be completed. Since this will need an amendment to the legislation passed by Parliament, the Telangana government will need to pass a resolution in the Assembly seeking the neighbouring State's cooperation in transferring these five panchayats to Telangana.

Once Andhra Pradesh gives its consent, the issue would reach the Centre for amending the Act.

Officials say that the Centre would not have any objection to the process and are hopeful that the amendment Bill would be introduced in Parliament.

Naidu, Revanth agree on transfer of 5 panchayats from A.P. to Telangana

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Kerala varsity to launch genome editing mission to boost pearl spot production

K.A. Martin
KOCHI

Genome editing will help enhance breeding and seed production of pearl spots, says Kerala University of Fisheries. H. VIBHU

Pearl spot farmers in Kerala have for ages endured the drudgery of finding brood stocks in the wild, breeding them in vastly uncontrolled environments and releasing fingerlings into aquaculture ponds only to see the fish barely achieving body weight of 300 to 400 grams in a year.

That may soon be a thing of the past as the Kerala University of Fisheries and Ocean Studies (Kufos) prepares to launch a genome editing mission to see if the State fish can revolutionise aquaculture as genetically improved farmed tilapia (GIFT) did decades ago.

Genome editing will target the genetic make-up of the fish that inhibits a faster rate of growth. It will also help enhance breeding and seed production of pearl spots, said Kufos Vice-Chancellor Pradeep Kumar T.

Achieving higher body weight at an enhanced rate will be a great blessing for aqua farmers in the State because pearl spots fetch a premium in the market whereas tilapia does not. Pearl spots are sold in the retail market for about ₹650 to ₹700 a kg, while tilapia fetches between ₹250 and ₹300 a kg.

But, tilapia achieves a body weight of 600 to 700 grams in six months compared with 12 months needed for pearl spots to achieve 300 to 400 grams. According to data available for 2020, Kerala produces 2,000 tonnes of pearl spots annually against the market demand of 10,000 tonnes.

The green chromide

- The green chromide (*Etroplus suratensis*) is a species of cichlid fish that is native to fresh and brackish water habitats in some parts in India such as Kerala, Goa, Chilika Lake in Odisha and Sri Lanka.
- The species was first described by Marcus Elieser Bloch in 1790.
- This species and other members of the genus *Etroplus* are relatively closely related to the *Paretroplus* cichlids from Madagascar.
- Other common names include pearlspot cichlid, banded pearlspot, and striped chromide

- **The green chromide lives in brackish water habitat types, such as river deltas.**
- **It eats mainly aquatic plants, including filamentous algae and diatoms, but it consumes the occasional mollusk and other animal matter.**

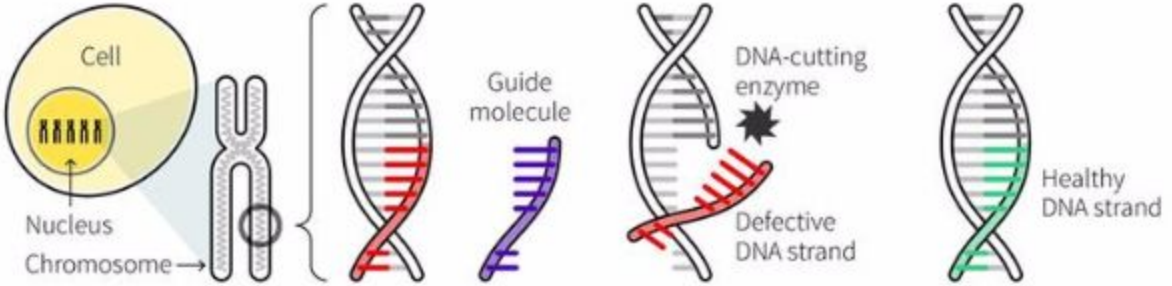
Why in News ??

- **Kerala varsity to launch genome editing mission to boost pearl spot production.**
-

DNA editing

A DNA editing technique, called CRISPR/Cas9, works like a biological version of a word-processing programme's "find and replace" function.

HOW THE TECHNIQUE WORKS



A cell is transfected with an enzyme complex containing:
- Guide molecule
- Healthy DNA copy
- DNA-cutting enzyme

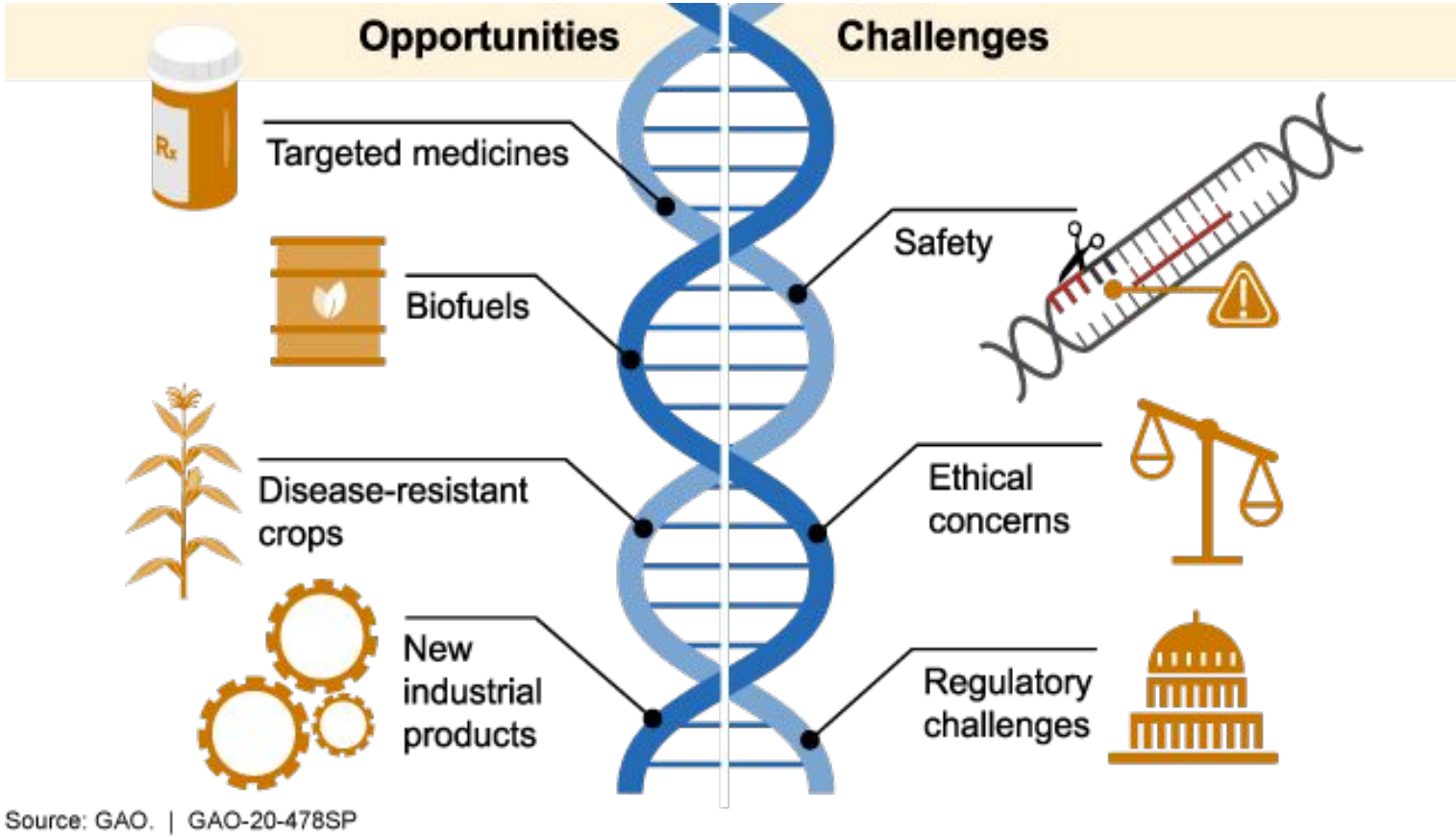
A specially designed synthetic guide molecule finds the target DNA strand.

An enzyme cuts off the target DNA strand.

The defective DNA strand is replaced with a healthy copy.

Sources: Reuters; Nature; Massachusetts Institute of Technology

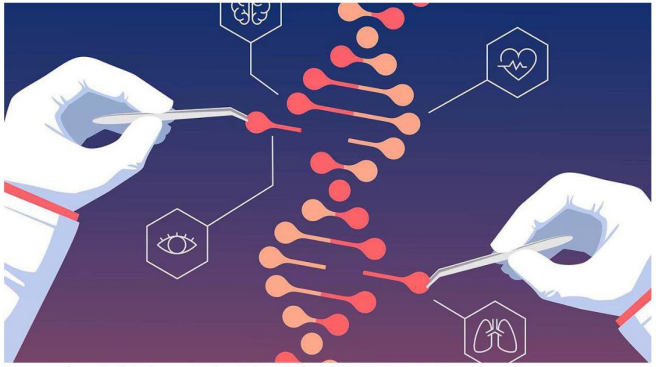
New uses of Gene Editing



Jumping genes and RNA bridges promise to shake up biomedicine

The discovery of transposons revolutionised our understanding of genetics, in particular their role in enabling nature's wondrous diversity. Over the years, researchers have attempted to resurrect inactive transposons in animal genomes, hoping the results will be useful for genetic corrections to cure diseases

Sridhar Sivasubbu
Vinod Scaria



Transposons influence the effects of genes and are thus called the tools of evolution. GETTY IMAGES/ISTOCKPHOTO

THE GIST

Transposons influence the effects of genes by turning 'on' or 'off' their expression. They have the ability to rearrange the genome and thus enable nature's diversity

Researchers have reconstructed a transposon called 'sleeping beauty' using the genomes of a fish. It had been dormant for millions of years. A similar synthetic transposon may, in the future, allow us to turn off a problem gene or over-express another

A new RNA-guided gene editing system that uses bacterial transposons can treat a wide variety of genetic diseases: a functional copy of a gene can be replaced in a given genomic location. It may also be able to treat chromosomal inversions or deletions

The year was 1948. It had only been about half a century since scientists had rediscovered Gregor Mendel's work on inheritance in pea plants. This year, a scientist working on the genetics of the maize plant would challenge the then prevailing concept that genes are stable and arranged in an orderly manner on the chromosome. Barbara McClintock at the Carnegie Institution found that some genes were able to move around within the genome. These genes were called mobile elements or transposons.

Prof. McClintock also made another significant observation: depending on where the mobile elements were inserted, they had the ability to reversibly alter gene expression. She used corn kernels' colours as a surrogate to understand hereditary characteristics, and in this way figured out transposons moved about in the genome of the maize plant. She was awarded the Nobel Prize in Physiology or Medicine in 1983 for this work.

Between 1948 and 1983, researchers found transposons in an array of life-forms, including bacteriophages, bacteria, plants, worms, fruit flies, mosquitos, mice, and humans. They were nicknamed 'jumping genes'.

'Sleeping beauty' transposon

The discovery of transposons revolutionised our understanding of genetics, in particular their role in enabling nature's wondrous diversity. Transposons influence the effects of genes by turning "on" or "off" their expression using a variety of epigenetic mechanisms. They are thus rightly called the tools of evolution, for their ability to rearrange the genome and introduce changes.

More than 45% of the human genome consists of transposable elements. Just as they create diversity, they also create mutations in genes and lead to diseases. However, most of the transposons have themselves inherited mutations and have become inactive, and thus can't move around within the gnome.

Over the years, researchers have attempted to resurrect inactive transposons from the genomes of the animal kingdom, hoping that the results will be useful in biomedical applications like genetic correction to cure a disease or for gene therapy.

For example, in 1997, researchers studied the genomes of fish and reconstructed a transposon called "sleeping beauty" at the molecular level. This transposon became dormant in vertebrates millions of years ago. The researchers elegantly reprogrammed the synthetic avatar to work in human cells. In future, a similar synthetic transposon inspired by nature may be able to turn off a problem gene or over-express another to accentuate some desirable characteristic.

Researchers have already discovered several naturally occurring vertebrate transposons and continue to look for more.

RNA-guided transposons

On June 26, *Nature* published a paper by researchers at the University of California, Berkeley, and the Arc Institute in the U.S. describing a new RNA-guided gene editing system. This tool builds on an older discovery: that one of the genes in the ISI10 family of bacterial transposons contains the instructions for cells to make an RNA molecule with two loops.

Scientists found this RNA could bind to two pieces of DNA, rather than the usual one piece, and form a bridge between them. This is a very useful ability.

In the new study, the researchers used the bridge RNA to edit the DNA. The two loops of the RNA can independently bind to two separate pieces of DNA. One of the loops identifies the target site in the genome that needs to be altered. The other loop specifies the DNA to be inserted in its place. Each loop is independently programmable, which means researchers can mix and match any target and donor DNA sequences of interest.

> Barbara McClintock at the Carnegie Institution found that some genes were able to move around within the genome. These genes were called mobile elements or transposons

In their paper, they reported that in *Escherichia coli* bacteria, the bridge RNA had more than 60% insertion efficiency (i.e. ability to introduce a desired gene) and a 94% specificity (ability to target the intended location on the genome).

Boon for synthetic biology

In a separate paper published on the same day, researchers from the University of Tokyo described the structural and molecular mechanisms of genome modification guided by bridge RNA. The researchers used cryo-electron microscopy to study the ISI10 transposons. They found that it works as a dimer – a complex compound formed by bonding two copies of a simpler compound. One copy binds to the target DNA and the other binds to the donor DNA, bridged by the bridge RNA.

This alternative form of genome-editing has many advantages. CRISPR-mediated editing sometimes leaves small bits of nucleotides added/deleted during the repair process. DNA recombination mediated by bridge RNA on the other hand makes a clean cut, making the edit specific and tidy. Equally importantly, the latter can facilitate the addition, deletion or inversion of DNA sequences of virtually any length. Researchers can exploit this feature by inserting any desirable genetic cargo – such as a functional copy of a faulty, disease-causing gene – into any location on a genome.

Such an ability spells a big boon for synthetic biology, where entire sets of genes need to be inserted or removed from organisms. Similarly, the technique can be used to manage, or even treat, a wide variety of genetic diseases: a functional copy of a gene can be replaced in a given genomic location. Researchers may also be able to treat chromosomal inversions or deletions, which are currently beyond the reach of any of the editing tools we have.

As Prof. McClintock said in her Nobel Prize lecture in 1983: "Unquestionably we will emerge from this revolutionary period with modified views of components of cells and how they operate, but only, however, to await the emergence of the next revolutionary phase that again will bring startling changes in concepts."

(Sridhar Sivasubbu and Vinod Scaria are senior consultants at the Vishwanath Cancer Care Foundation and adjunct professors at IIT, Kanpur and the Dr. D.Y. Patil Medical College, Hospital and Research Center, Pune.)

‘sleeping beauty’

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What are transposon ??

transposon, class of genetic elements that can “jump” to different locations within a genome.

Although these elements are frequently called “jumping genes,” they are always maintained in an integrated site in the genome. In addition, most transposons eventually become inactive and no longer move.

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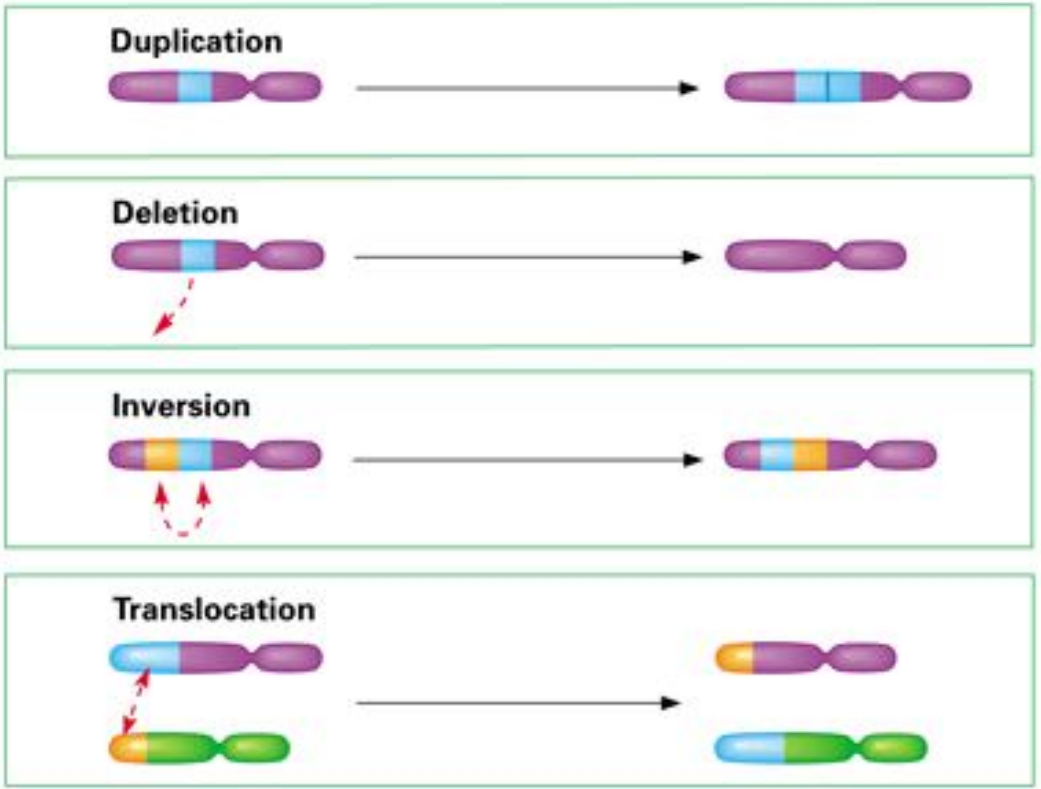
Chromosome Aberration



RNA bridge

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WHAT IS IT?

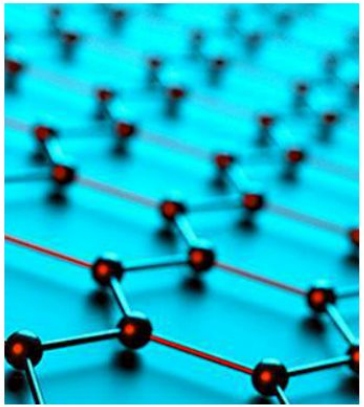
Graphene: a simple wonder

Karthik Vinod

When the same element is able to exist in different forms, the forms are called allotropes. Graphene, thus, is an allotrope of carbon, along with diamond and graphite. It consists of a single layer of carbon atoms that are linked to each other in a honeycomb pattern.
Graphene is among the most versatile materials known to humankind. As a nanomaterial, it is stronger than diamond, more conductive than silver, more elastic than rubber, and lighter than aluminium. Many people called it a "wonder material".

It is simple to make graphene: use scotch tape to peel away the lead of a pencil for a while. Under a microscope, you should be able to see graphene residue left on the tape.

However, scientists use more sophisticated techniques in laboratories, like chemical vapour deposition, to deposit graphene in order to make stronger car tires or when making chips to replace those made of silicon in smartphones. When graphene is mixed with concrete, the latter becomes 25% stronger and less carbon-intensive. Graphene also develops some unusual properties in a twisted bilayer form. In 2019, for example, physicists found that when one sheet of graphene is placed above another and rotated by 1.1 degrees relative to the bottom layer, the stack becomes a superconductor at low temperature.



Graphene is among the most versatile materials known to humankind. As a nanomaterial, it is stronger than diamond, more conductive than silver, more elastic than rubber, and lighter than aluminium. GETTY IMAGES/ISTOCKPHOTO

(Karthik Vinod is interning with The Hindu.*)*

For feedback and suggestions
for 'Science', please write to
science@thehindu.co.in
with the subject 'Daily page'

All about Graphene

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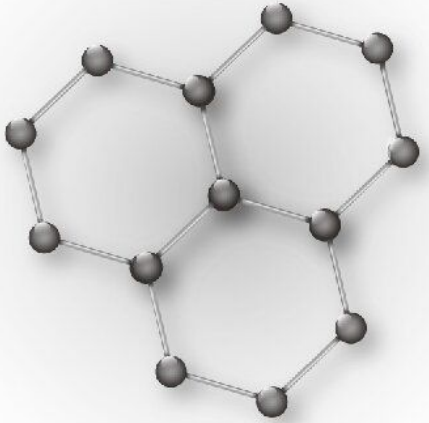
Graphene, the material of the future

The so-called "God's material" is tipped to revolutionise electronics, the aerospace industry, energy and medicine

Composition

A one-atom-thick layer of carbon atoms tightly fitted together



Its structure is similar to a honeycomb

STRONG
200 times stronger than steel

TOUGH
Tougher than diamond

LIGHT
1 m² weighs less than 1 g

FLEXIBLE
More flexible than carbon fibre

CONDUCTIVE
High thermal and electrical conductivity

BIOCOMPATIBLE
Not toxic for biological cells

ECO-FRIENDLY
Made of pure carbon, like graphite

DAMP-PROOF
Repels water and corrosion

Fake news on graphene

- Is it a component of Covid-19 vaccines? NO
- Does it have natural magnetic properties? NO
- Does it become "active" with 5G technology? NO
- Does it affect neural functions? NO

Sources: graphenano.com, graphene flagship.eu

AFP

The problem of special packages

R. Mohan

a former Indian Revenue Service officer

Coalition politics is back at the Union level in a substantial way. The Bharatiya Janata Party is dependent on the Janata Dal (United) of Bihar and the Telugu Desam Party of Andhra Pradesh for its parliamentary majority. This is in contrast to 2014 and 2019, when *de facto* single-party governments came to office. With single-party majority becoming a thing of the past, demand for State-specific discretionary grants, or 'special packages', are back with a bang in public discussion.

The positive aspect of single-party dominance being tempered by the presence of coalition partners that can act as a check if unitary trends surge cannot be underestimated. Nevertheless, this is the time to test the hypothesis that when single-party dominance at the Union level fades, federal tendencies bloom and when a single-party majority under a strong leader at the Union level prevails, federal tendencies wilt.

If a healthy federal structure is to be nurtured, the fiscal boundaries, principles of assignment of taxes, and the basis for grants have to be transparent and objective. A federal setup can be asymmetric in a country that is characterised by linguistic, cultural, and economic diversity. But issues of asymmetry should be addressed by means of constitutional provisions that have both transparency and stability.

The Constitution has provisions that address the issues of specific States, or States that have a special status with regard to certain matters mentioned in the Constitution. These provisions are covered, for instance, in Articles 371A to H (Article 370 for the erstwhile State of Jammu and Kashmir, of course, is abrogated).

Purely discretionary

On the contrary, special packages are purely discretionary. They may be need-based, but the need is not the proximate reason for granting a special package, which is an additional grant under Article 282, which falls under 'Miscellaneous Financial Provisions'. More often than not, they are the result of the bargaining power of some State-level political parties that can tilt the scales of parliamentary majority. What does this augur for the health of our federal set-up?

That the outcome of an election can determine the fiscal distribution of national resources to a State or States goes against the grain of fiscal federalism (or, more correctly, of federal finance). Some States may be justified in their demands for funds, but allocation has to be through the mechanism of the Finance Commission. The Commission is constituted by the President every five years or earlier to make recommendations regarding the distribution of a share of taxes collected by the Union to the States, and how this is to be distributed among the States, as per Article 280; and disbursement of grants to States in need of assistance, as provided in Article 275. The 16th Finance Commission, which is already in existence, cannot be bypassed solely on account of partisan political exigencies.

When the same political party is in power at the Union and State levels, it is called a 'double-engine sarkar. The main engine has lost the power to run on its own and the owners of smaller engines that are needed to pull the train along are making their own demands. While individual States may well need special packages, process is of the utmost importance. How have these events impacted the political and fiscal relations between the Union and the States?

That the outcome of an election can determine the fiscal distribution of national resources to a State or States goes against the grain of fiscal federalism

Federal tendencies

The first issue here is the extent to which our polity is federal. The Constitution has been famously described as having a quasi-federal framework. C.H. Alexandrowicz, however, disputed this description in his work *Constitutional Developments in India* (1957), stating that in situations other than an Emergency, it assumes a federal character. The Supreme Court has made the succinct observation that our polity is amphibian – it can assume unitary and federal characters depending on whether or not there is an Emergency under Articles 352 and 356 in force (*State of Rajasthan and Others v Union of India*, 1977).

Be that as it may, it is often argued that the prevailing political environment crucially determines whether federal tendencies bloom or wilt. Keeping this proposition in mind, the hypothesis stated above can be put to test.

How fiscal distribution is done is cardinal in the test of whether or not federalism is strong. In the recent past, some States raised concerns about their share in the divisible pool of Union taxes facing a decline. Tax distribution is formula-based, and it is for the 16th Finance Commission to address this issue and undertake the delicate task of balancing the interests of the States *inter se*, and with those of the Centre.

The focus here is on grants, in the disbursement of which scope for discretion is wider. In our constitutional framework, the primary task of recommending grants to States in need of assistance is that of the Finance Commission, until Parliament makes legislation in this regard.

But the fact now is that the flow of discretionary grants to the States through Article 282 have far overtaken (by almost a factor of four) that of the grants recommended by the Finance Commissions. Acceding to demands for special packages which are raised by State-based parties, holding the key to parliamentary majority, will weaken the foundations of fiscal federalism, as it will result in diverting national resources away from other States, which too may have pressing needs. If this is allowed to happen, we will see the paradox of federal tendencies wilting instead of blooming when single-party dominance fades.

SAURABH PANDEY
CSE
FROM BASICS TO UPSC BRILLIANCE

Federal structure and special package

- If a healthy federal structure is to be nurtured, the □fiscal boundaries, principles of assignment of taxes, and the basis for grants have to be transparent and objective.
- A federal setup can be asymmetric in a country that is characterised by linguistic, cultural, and economic diversity.
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A law around low-carbon climate resilient development

Navroz K. Dubash
Senior Fellow at the Sustainable Futures Collaborative

Aditya Valiathan Pillai
Fellow at the Sustainable Futures Collaborative

Shibani Ghosh
Visiting Fellow at the Sustainable Futures Collaborative

In a landmark judgment, the Supreme Court of India recently recognised a right to be "free from the adverse impacts of climate change" in *M.K. Ranjitsinh and Others vs Union of India* – sourcing it from the right to life and the right to equality. In a previous article on this page in this daily, "Court on climate right and how India can enforce it" (July 1, 2024), we argued that while this is indeed an important step in establishing climate jurisprudence in India, it raises the very important question of just how this right will be protected.

Earlier, we had suggested that a patchwork of judicial interventions would fall short of the encompassing and systemic approach climate change requires. There is, therefore, a strong case for climate legislation, but only if it is tailored to the Indian context. Taking this issue forward provides an opportunity, but also a challenge, for the new government.

Law to inform development choices

Preparing India to reduce the risks of climate change and address its impacts requires nothing less than re-orienting development toward low-carbon and climate resilient futures. Any law that attempts to take this on must ensure these objectives are internalised in routine decision-making at all levels of development. Because climate change relentlessly targets the vulnerable, and because an energy transition must be just, it must be grounded in the imperative of advancing social justice.

While the concept of climate law is often associated with a top-down approach of setting and achieving targets, in a developing country, this approach is limited because addressing climate change is about more than limiting emissions.

Instead, it requires careful, ongoing, consideration of each developmental choice and its long-run synergies and tradeoffs with low-carbon and climate resilient futures. To achieve this, the substantive right of protection against adverse effects of climate change must be realised, in part, through well-defined procedures in law that are applicable across levels of government. Climate action is more credible when a well-designed institutional structure is strategising, prioritising, troubleshooting and evaluating policies behind the scenes.

Several countries (67 according to one estimate) have experimented with 'framework climate laws' that build governance capacity to address climate change. Umbrella laws that define government-wide goals and substantiate them with a set of processes and accountability measures are a known and increasingly popular way of bringing climate action to the heart of government.

However, these laws vary, and India's approach must be tailored to our context. Starting from a low base of per capita emissions – less than half the global average – India's emissions are still growing, and our objective should be to squeeze out as much development as possible from each ton of carbon and avoid locking-in to high carbon futures. Moreover, India is highly vulnerable to climate impacts, and climate resilience must be an essential element of the new law. In meeting both objectives, considerations of social equity must be central. Consequently, India's law must ensure development, but in a low-carbon direction while building resilience to ever more pervasive climate impacts.

The 'M.K. Ranjitsinh' judgment must be used to pass a climate law that is well suited to the Indian context

What we arrive at, then, is a law that helps navigate developmental choices. It must create the basis for thoughtful decision-making toward achieving a low-carbon, resilient society. For example, since Indian cities are still growing and changing rapidly, what could low-carbon, climate resilient cities of the future look like? And what levers exist to shape those cities? How can city planning minimise the risk of floods and vulnerability to heatwaves? How should transport needs be met through technology shifts such as electric vehicle adoption and greater attention to public transport and lifestyle shifts?

Have a low carbon development body

A framework climate law should lay out an institutional structure capable of crafting viable answers to these questions. Our ongoing work at the Sustainable Futures Collaborative provides some suggestions. An immediate priority is to create a knowledge body in government capable of rigorously parsing policy options and the futures they might generate. We recommend an independent 'low-carbon development commission', staffed with experts and technical staff, which could offer both national and State governments practical ways of achieving low-carbon growth and resilience.

This body could also serve as a platform for deliberative decision-making. Vulnerable communities and those that may lose from technological change need to be systematically consulted. Hearing their concerns and incorporating some of their ideas could lead to longer-lasting policy outcomes. An example is South Africa's Presidential Climate Commission, which is tasked with charting a course toward just transition based on inputs and representations from stakeholders.

Effective climate governance also requires the ability to set directions, make strategic choices, and encourage the consideration of low carbon choices and climate change impacts within line ministries. Accordingly, the law could create a high-level strategic body, which we label a 'climate cabinet', a core group of Ministers plus representation from Chief Ministers of States, tasked with driving strategy through government. Across the world, climate policy is often defeated by siloed decision-making. This is one way of fixing it.

A whole-of-government approach will also require dedicated coordination mechanisms for implementation. The Ministry of Environment, Forest and Climate Change should continue to play a central role, but it needs to be complemented by higher-level coordination. Here, the pre-existing Executive Committee on Climate Change (made up of senior bureaucrats from multiple Ministries), provides a useful template but only if it is reinvigorated with clearly specified legal powers and duties.

Engagement with the federal structure

Not least, the law must pay attention to India's federal structure. Many areas crucial to reducing emissions and improving resilience – electricity, agriculture, water, health and soil – are wholly or partially the preserve of State and local governments. When a climate impact is felt, it is felt first, and most viscerally, at local levels.

Any institutional structure or regulatory instrument created to protect the Court's newly established climate right must meaningfully engage with subnational governments. First, the law must establish a channel for subnational governments to access national scientific capacity, potentially through the low-carbon development commission as an intermediary, as a step toward solving the pervasive problem of insufficient local climate scientific capacity.

Second, it could articulate ways of financing local action, for example by requiring centrally-sponsored schemes to be more aligned with climate goals or by requiring national departments to climate tag expenditure towards local climate resilience.

Third, the law could establish coordination mechanisms that allow the Centre and States to consult on major climate decisions. It could also require the Centre and States to put out periodically updated medium-term climate plans built around unified goals. To enable development of State-specific solutions, States could also build complementary institutions to those at the Centre, providing knowledge, strategy-setting, deliberation and coordination functions.

The framework law proposed here – one that enables and catalyses action across national Ministries and the federal structure – cannot be the only legal tool in the country's regulatory arsenal. Complementary sectoral laws and amendments may be required, but they would be informed by the approach laid out by the framework law.

The Court's historical pronouncement in *M.K. Ranjitsinh* opens the door to legal and governance changes that make possible an actionable right against the adverse effects of climate change. But to realise this promise, this open door has to actually be used to pass a climate law that is well suited to the Indian context, that steers Indian development choices toward a low-carbon and climate resilient future, and that also advances justice.

SAURABH PANDEY
CSE
FROM BASICS TO UPSC BRILLIANCE

M.K. Ranjitsinh and Others vs Union of India

- I n a landmark judgment, the Supreme Court of India recently recognised a right to be “free from the adverse impacts of climate change” in M.K. Ranjitsinh and Others vs Union of India — sourcing it from the right to life and the right to equality.
- In a previous article on this page in this daily, “Court on climate right and how India can enforce it” (July 1, 2024), we argued that while this is indeed an important step in establishing climate jurisprudence in India, it raises the very important question of just how this right will be protected.

- **The Court’s historical pronouncement in M.K. Ranjitsinh opens the door to legal and governance changes that make possible an actionable right against the adverse effects of climate change.**
- **But to realise this promise, this open door has to actually be used to pass a climate law that is well suited to the Indian context, that steers Indian development choices toward a low-carbon and climate resilient future, and that also advances justice.**

The ANRF plan has got off on the wrong foot

In 2023, both Houses of Parliament passed the Anusandhan National Research Foundation (ANRF) Bill, marking a historic start to an initiative to seed, grow, and facilitate research in India, especially in India's universities and colleges.

The 2019 National Research Foundation (NRF) project report explicitly mentioned that "growing outstanding research cells already existing at State Universities" is one of the ANRF's top priority. The scientific community welcomed the Bill and was hoping that the ANRF would provide much-needed breathing space for Indian academia for research free from the bureaucracy, in addition to providing a funding boost and a chance to work together with industry partners.

Lack of industry representation

Nearly a year later and the ANRF has got off on the wrong foot. Recently, it announced a 15-member Governing Board and a 16-member Executive Council, which lack representation from organisations the ANRF envisioned aiding and facilitating.

For example, the ANRF aims to strengthen the research infrastructure of universities. Even acknowledging that more than 95% of students attend State universities and colleges in India, the board and the executive council do not have any members from Central or State universities or colleges. In addition to the Principal Scientific Adviser, they are represented by people who are usually in any high-powered committees of the Government of India – Secretaries from all science departments (Department of Science and Technology (DST), Department of Biotechnology (DBT), Department of Scientific and Industrial Research (DSIR), earth sciences, agriculture, health research, atomic energy, new and renewable energy, electronics and information technology), higher education and defence research and development, directors of the Indian Institute of Science and Tata Institute of Fundamental Research, the Chair of the Indian Council of Historical Research, a Princeton mathematics professor, a science administrator and former Director of the United States National Science Foundation from Brown University and a Silicon Valley serial entrepreneur.

Binay Panda

Professor at the Jawaharlal Nehru University

The composition of the Anusandhan National Research Foundation's governing board and executive council shows that it could become just another government department

However, the board and the council need representatives who understand the bottlenecks in the current system, especially in the university system, and know how to get things done on the ground rather than being in an advisory role.

Most importantly, the ANRF needs to avoid the confusion that can arise from multiple committees. Therefore, creating a single committee to formulate and implement strategies on the ground is crucial. This emphasis on ground-level knowledge and experience among the committee members should reassure the research community and stakeholders that the ANRF's decision-making process will be informed, competent, and timely.

The lack of adequate industry representation and diversity is one of the most glaring omissions from the current board and council, especially when the ANRF plans to raise more than 70% of its funding from non-government sources and industry. The sole industry representative, Romesh T. Wadhwani, is an Indian-American businessman based in Silicon Valley, U.S., and the sole woman representative is the Secretary of the DSIR. There is no representation from Indian industry or any entrepreneurs from the country or eminent academics from the Central and State universities on the committee.

R&D underfunding

India underfunds research and development. In addition to increasing the research and development budget to 4% of GDP, a significant overhaul of the current funding system is required to boost research and to make innovation coming out of Indian organisations globally competitive. To achieve this, the ANRF must: be adequately staffed; implement a robust grant management system; have an internal standard peer-review system with an incentive for reviewers; ensure timely disbursal of research grants and student fellowships with a quick turn-around time (less than six months) between application and fund disbursal; have a system free from bureaucratic hurdles both at the funding body and at grantee institutions; provide flexibility of spending money without following the government's stringent general financial rules (GFR), and permit purchases without going through the Government e-marketplace (GeM) portal.

The ANRF must function unlike any other current government science department, It should have more diverse representations of practising natural and social scientists from the university system, with more women and young entrepreneurs in its committee. Additionally, the future chief executive officer of the ANRF must have a background in both industry and academia, and be someone who can raise money for the ANRF and understand the global innovation ecosystem. A complete overhaul is required for the ANRF to avoid becoming like any other government department and to bridge research and teaching in our universities.

Anusandhan National Research Foundation (ANRF) Bill

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- The 2019 National Research Foundation (NRF) project report explicitly mentioned that "growing outstanding research cells already existing at State Universities" is one of the ANRF's top priority.

- **The Anusandhan National Research Foundation Bill, 2023 was introduced in Lok Sabha on August 4, 2023.**
- **It repeals the Science and Engineering Research Board Act, 2008 and dissolves the Science and Engineering Research Board set up under it.**
- **The Bill provides for establishing the Anusandhan National Research Foundation (NRF).**
- **Functions of NRF: NRF will be the apex body in the country to provide strategic direction for research, innovation, and entrepreneurship in the fields of: (i) natural sciences including mathematics, (ii) engineering and technology, (iii) environmental and earth sciences, (iv) health and agriculture, and (v) scientific and technological interfaces of humanities and social sciences.**

- **Key functions of NRF include: (i) preparing short-term, medium-term, and long-term roadmaps and formulating programs for research and development (R&D), (ii) facilitating and financing the growth of R&D and related infrastructure in universities, colleges, and research institutions, (iii) providing grants for research proposals, (iv) supporting translation of research into capital intensive technology, (v) encouraging international collaboration, (vi) encouraging investments in the Foundation by private and public sector entities, and (vii) undertaking annual survey of scientific research, outcomes, and spending.**

- **Funds for NRF: The Foundation will be financed through: (i) grants and loans from the central government, (ii) donations to the fund, (iii) income from investments of the amounts received by the Foundation, and (iv) all amounts with the Fund for Science and Engineering Research set up under the 2008 Act.**
- **Governing Board: NRF will have a Governing Board headed by the Prime Minister of India. The Board will provide strategic direction to the Foundation and monitor the implementation. Other members of the Board are: (i) the Union Ministers of Science and Technology, Education as Vice Presidents, (ii) the Principal Scientific Advisor as Member Secretary, and (iii) Secretaries to the Departments of Science and Technology, Biotechnology, and Scientific and Industrial Research.**

- **Executive Council: The Foundation will have an Executive Council to undert implementation.**
- **The functions of the Executive Council include: (i) considering applications for the grant of financial assistance, (ii) prescribing regulations regarding applications for financial assistance, requirements for extension of assistance, and grounds for revocation of assistance, and (iii) preparing budget of the Foundation and maintaining its accounts.**
- **The Council will have the power to authorise an officer to visit the applicants for grants and verify the accuracy of submissions made by them.**
- **The Principal Scientific Advisor will be the chairperson of the Council.**

On expunction powers in Parliament

Why did the Opposition engage in a war of words with the government over expunging certain remarks? What is the process to expunge remarks in Parliament? Can a member of the Lok Sabha direct a remark against a Minister? What do the various rules state?

EXPLAINER

Sumeda

The story so far:

The first special session of the 18th Lok Sabha witnessed heated discussions, with the Opposition clashing with the government over a range of issues, ultimately concluding with a war of words over the expunction of the remarks of the leaders of Opposition in both Houses. Rajya Sabha Chairman Jagdeep Dhankhar removed portions of Leader of Opposition (LoP) Mallikarjun Kharge's speech, which was critical of Prime Minister Narendra Modi and the Rashtriya Swayamsevak Sangh. Meanwhile, in the Lower House, parts of Rahul Gandhi's remarks on the PM and the BJP were expunged from the records on the orders of Speaker Om Birla, sparking allegations of different yardsticks being applied for different MPs.

War of words: Leader Of Opposition in Rajya Sabha Mallikarjun Kharge speaks in the House. ANI

When are remarks expunged?

Parliament maintains a verbatim record of everything that is spoken and takes place during proceedings. While Article 105 of the Constitution confers certain privileges and freedom of speech in Parliament on MPs, it is subject to other provisions of the Constitution and the rules of the House. On the orders of the presiding officer, that is, the Chairman in the Upper House and the Speaker in the Lower House, words, phrases and expressions which are deemed "defamatory, indecent, unparliamentary or undignified" are deleted or expunged from records. For this purpose, the Lok Sabha Secretariat maintains a comprehensive list of 'unparliamentary' words and expressions.

The rules of parliamentary etiquette, which are laid out to ensure discipline and decorum in the Rajya Sabha, say, "When the Chair holds that a particular word or expression is unparliamentary, it should be immediately withdrawn without any attempt to raise any debate over it. Words or expressions held to be unparliamentary and ordered to be expunged by the Chair are omitted from the printed debates."

There have been recorded instances where the scope of expunction has been broadened. Speakers, at their discretion, have ordered the expunction of words deemed prejudicial to national interest or detrimental to maintaining friendly relations with a foreign State, derogatory to dignitaries, likely to offend national sentiments or affect the religious susceptibilities of a section of community, likely to discredit the Army, not in good taste or otherwise objectionable or likely to bring the House into ridicule or lower the dignity of the Chair, the House or the members, authors M. N. Kaul and S. L. Shakdher note in their book *Practice and Procedure of Parliament*. For instance, Prime Minister Jawaharlal Nehru once objected when a member referred to the President of Pakistan while asking a supplementary question about the international situation. Mr. Nehru said it would "not be proper" for the Head of a foreign state to be mentioned in the language the member had used. The objectionable words were then expunged.

Members must withdraw objectionable remarks deemed irrelevant to the debate upon the Chair's request and failure to comply may lead to expunction. Similarly, quoting from an unreferenced document or speaking after being asked to desist can result in an expunction.

What about remarks against an MP?

If an MP makes an allegation against their colleague or an outsider, Rule 353 of the Lok Sabha outlines the procedural framework to be followed. "The Rule does not prohibit the making of any allegation. The only requirement is advance notice, on receipt of which the Minister concerned will conduct an inquiry into the allegation and come up with the facts when the MP makes the allegation in the House," former Lok Sabha Secretary General P.D.T. Achary says. If the allegation is neither defamatory nor incriminatory, the above rule would not apply, he adds.

"The rule does not obviously apply to an allegation against a Minister in the government. Since the Council of Ministers is accountable to Parliament, the Members of the House have the right to question Ministers and make imputations against their conduct as Ministers," Mr. Achary adds.

How do officers expunge remarks?

The Chairman and Speaker are vested with the power to order the expunction of remarks under Rule 261, and Rule 380 and 381 of the Rules of Procedure of the Rajya Sabha and Lok Sabha, respectively.

Rule 261 states, "If the Chairman is of opinion that a word or words have or have been used in debate which is or are defamatory or indecent or unparliamentary or undignified, he may in his discretion, order that such word or words be expunged from the proceedings of the Council." The Lower House has a similar provision.

The expunged portions are marked by asterisks with an explanatory footnote stating 'expunged as ordered by the Chair.' If the Chair directs that nothing will go on record during a member's speech or interruption, footnote 'not recorded' is inserted. A comprehensive list of words and phrases is circulated to media outlets at the end of the day's proceedings. Once expunged, these words or phrases cease to exist on the official record. However, the relevance of the practice of expunging remarks has lately come into question, in a digital age where expunged content remains accessible due to the live telecast of proceedings and wider circulation of screenshots and videos on social media.

THE GIST

- Rajya Sabha Chairman Jagdeep Dhankhar removed portions of Mallikarjun Kharge's speech, which was critical of Prime Minister Narendra Modi and the RSS. Meanwhile, in the Lower House, parts of Rahul Gandhi's remarks on the PM and the BJP were expunged from the records on the orders of Speaker Om Birla.
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Vadhavan, a global port in the making

Global ambitions: JNPA and MMB will develop the port at an estimated cost of ₹76,220 crore. JNPA WEBSITE

Rajesh Menon

Container ships today handle almost 16% of the world's maritime trade — from 37 million 20-foot equivalent units (TEUs) in 1980, the volume of containerised trade surged to 850 million TEUs by 2023. Gearing up to handle the massive quantities of containers, ports around the world have bulked up infrastructure and transformed into mega ports. In 2021-22, Shanghai port led by handling 44 million TEUs, followed by Singapore with 37 million TEUs.

Clearly, Chinese ports have the edge, cumulatively handling 250 million TEUs, against which India's 20 million TEUs pales in comparison. While India's share of containerised trade is increasing alongside global growth, it continues to grapple with shortfalls in productivity, turnaround of ships, utilisation of berths and technology enablement.

Private investors

India's 7,517-km coastline extends across nine States and four Union territories.

In recent years, the government has initiated policy measures to attract private investments in the ports sector, including allowing 100 % foreign direct investment (FDI). Currently, the country has 76 functional ports — 12 major and 64 non-major — and nine more under development. The total cargo handling capacity countrywide is about 2,700 million tonne per annum (MTPA) with 60-65% on an average.

The growing Indian economy and trade, wherein 95% of export-import cargo volume is shipped, necessitates an expanded port capacity. Further, as ship sizes continue to increase, we need ports that can accommodate them. Our ports with high-volume cargo handling capacity have an average of 8-12 m draft. Bigger vessels require at least 12-20 m draft. This will also enable big mother vessels to call at our ports, helping reduce logistic costs and avert the need for transshipment.

New development

In this context, the approval for the setting up of an all-weather, deepwater mega port at Vadhavan, near Dahanu, in Palghar district of Maharashtra, assumes importance. A special purpose vehicle (SPV) created by Jawaharlal Nehru Port Authority (JNPA) and Maharashtra Maritime Board (MMB) with a shareholding of 74% and 26%, respectively, will develop the port at an estimated cost of ₹76,220 crore.

The port will have nine container terminals, each 1,000 m long; four multipurpose berths, including a coastal berth, four liquid cargo berths, a berth for roll-on, roll-off or Ro-Ro ships, and a Coast Guard berth. The 20-m draft, capable of berthing large vessels, will be created through reclamation of 1,448 hectare from the sea. The plan is to create a cumulative cargo handling capacity of 298 MTPA, including around 23.2 million TEUs of container-handling capacity.

The port will cater to hinterland industrial areas in Maharashtra, south and north Gujarat, Rajasthan, National Capital Region, Madhya Pradesh, Chhattisgarh, and other central and north Indian States.

(The writer is a maritime expert)

Vadhavan port project

- The Indian government recently approved a significant project that could prove pivotal for the country's commerce and economy. Named the 'Vadhavan Port Project,' it is estimated to cost approximately Rs 76,220 crores.
- Located in Palghar district, Maharashtra, Vadhavan Port will be a modern, all-weather deep-water port. The total project cost, including land acquisition, is Rs 76,220 crores.
- The Vadhavan Port Project proposes to develop a greenfield deep-draft port in Maharashtra's Vadhavan.
- The objective is to construct a state-of-the-art container port that will elevate India's maritime trade to new heights.

Why is this Port Project Important?

- The significance of this project lies in its potential to redefine India's maritime trade. Designed to accommodate large container ships, Vadhavan Port aims to handle a cumulative capacity of 298 million metric tons (MMT) of cargo annually, including approximately 23.2 million Twenty-Foot Equivalent Units (TEUs) of containers. This will position it among Asia's largest ports.
- It will be an integral part of the India-Middle East-Europe Corridor (IMEC), empowering India to compete in global trade and bolstering the country's economic development.

How to manage 'brain-eating amoeba' cases

What are the symptoms of the rare and fatal disease of primary amoebic meningoencephalitis?

A.S. Jayanth

The story so far:

There have been four cases, including three deaths, of the rare, but fatal primary amoebic meningoencephalitis (PAM) in Kerala in the last two months. A 14-year-old boy from Thikkodi in Kozhikode district tested positive for the infection on July 5. He is undergoing medical treatment now and his condition is reported to be stable.

Where have the fatalities occurred?

There have been three deaths so far – E.P. Mridul, 12, from Feroke in Kozhikode district, died at a private hospital in Kozhikode city on July 3. V. Dakshina, 13, of Kannur, succumbed to it at a private hospital in the city on June 12. Fadva, 5, of Munniyur in Malappuram, died at the Government Medical College Hospital, Kozhikode, on May 20.

What is PAM?

Primary amoebic meningoencephalitis or PAM is caused by Naegleria fowleri, an amoeba that thrives in warm freshwater lakes, ponds and rivers. It can also survive in poorly maintained swimming pools in rare cases. As it can infect the brain and destroy the tissues there, this one-celled organism is also called 'brain-eating amoeba'. These infections, though rare, are fatal and 97% of the patients don't survive. The infection happens when people go for a swim in lakes, ponds or rivers, during the summer. Experts say that it could occur if the atmospheric temperature is high and water levels are low. The amoeba enters the body through the nose and reaches the brain. It destroys brain tissues and causes their swelling. In recent cases, children have been found to be more vulnerable to it. The infection does not spread from people to people. Swallowing water containing the amoeba does not lead to it either.

Primary amoebic meningoencephalitis is caused by Naegleria fowleri, an amoeba that thrives in freshwater lakes, ponds and rivers

What are the symptoms of PAM?

According to the Centers for Disease Control and Prevention (CDC) in the U.S., headache, fever, nausea, and vomiting are its early symptoms. The disease, however, can progress rapidly. Stiff neck, confusion, lack of attention to people and surroundings, loss of balance, and hallucinations are the later symptoms. It usually leads to coma and death after five days, says the CDC. Most people die within one to 18 days.

Experts point out that warming of the atmosphere and stagnant and unhygienic water resources could be some of the conditions leading to the infection. This type of amoeba is found to be more active in warm water.

How is it diagnosed and treated?

The infection can be diagnosed through PCR tests of the cerebrospinal fluid. However, as PAM is a rare condition, detection can sometimes be hard. In Kozhikode, doctors at the Government Medical College Hospital suspected its possibility in the five-year-old girl from Malappuram after she exhibited symptoms similar to that of bacterial meningitis, whose instances have come down in recent times, mainly due to vaccination. There are no standard treatment methods available and the doctors are following the guidelines of the CDC for now. According to sources, the State Health department has procured miltefosine, a broad-spectrum anti-microbial drug, from Germany for the treatment of infected persons. Paediatricians say that Azithromycin and Amphotericin B, some of the other medicines suggested, are available.

Has it been reported in Kerala before?

First detected in the Alappuzha municipality in 2016, it was reported in Malappuram in 2019 and 2020, Kozhikode in 2020, Thrissur in 2022, and again in Alappuzha in 2023. Health Minister Veena George convened a meeting on July 1 to take stock of the situation and it was decided to formulate special guidelines for the treatment.

Health officials have said that there is a chance of the amoeba entering the brain through the holes in a layer that separates the nose and the brain or through possible holes in the ear drum. So, children having infections in their ear have been advised against taking baths in ponds or in stagnated water resources. Diving too should be avoided. Those running water theme parks and swimming pools have been asked to chlorinate the water there at regular intervals. Kerala Chief Minister Pinarayi Vijayan convened another meeting on July 5 and issued directions to keep water resources clean. Children have been asked to use swimming nose clips to prevent the infection.

What can be done to reduce the risk?

Holding the nose or wearing a nose clip while jumping or diving into fresh water are some of the steps suggested to avoid the infection. The head should be kept high while entering warm water. Steer clear from digging in shallow waters, say experts. Distilled or boiled water should be used for clearing nasal passages.

SAURABH PANDEY
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FROM BASICS TO UPSC BRILLIANCE

What is PAM ??

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- **Primary amoebic meningoencephalitis or PAM is caused by Naegleria fowleri, an amoeba that thrives in warm freshwater lakes, ponds and rivers.**
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- **These infections, though rare, are fatal and 97% of the patients don’t survive.**

- The infection happens when people go for a swim in lakes, ponds or rivers, during the summer.
- Experts say that it could occur if the atmospheric temperature is high and water levels are low.
- The amoeba enters the body through the nose and reaches the brain. It destroys brain tissues and causes their swelling. In recent cases, children have been found to be more vulnerable to it.
- The infection does not spread from people to people. Swallowing water containing the amoeba does not lead to it either

Extinct humans occupied the Tibetan plateau 1,60,000 years ago

The Hindu Bureau

Bone remains found in a Tibetan cave 3,280 metres above sea level indicate an ancient group of humans survived here for many millennia, according to a new study published in the journal *Nature*.

The Denisovans are an extinct species of ancient human that lived at the same time and in the same places as Neanderthals and Homo sapiens. Only a handful of Denisovan remains have ever been discovered by archaeologists. Little is known about the group, including when they became extinct, but evidence exists to suggest they interbred with both Neanderthals and Homo sapiens.

The scientists identified one rib bone as belonging to a new Denisovan individual.

The layer where the rib was found was dated to between 48,000 and 32,000 years ago, implying that this Denisovan individual lived at a time when modern humans were dispersing across the Eurasian continent. The results indicate that Denisovans lived through two cold periods, but also during a warmer interglacial period between the Middle and Late Pleistocene eras.

The research team studied more than 2,500 bones from the Baishiya Karst Cave on the high-altitude Tibetan Plateau, one of the only two places where Denisovans are known to have lived.

Their new analysis has identified a new Denisovan fossil and shed light on the species' ability to survive in fluctuating climatic conditions – including the ice age – on the Tibetan plateau from around 200,000 to 40,000 years ago.

Bone remains from Baishya Karst Cave were broken into numerous fragments preventing identification. The team used a novel scientific method that exploits differences in bone collagen between animals to determine which species the bone remains came from.

The research team determined that most of the bones were from blue sheep, known as the bharal, as well as wild yaks, equids, the extinct woolly rhino, and the spotted hyena. The researchers also identified bone fragments from small mammals, such as marmots, and birds.

The team was able to identify that Denisovans hunted, butchered and ate a range of animal species.

Detailed analysis of the fragmented bone surfaces shows the Denisovans removed meat and bone marrow from the bones, but also indicate the humans used them as raw material to produce tools.

Denisovans

- The Denisovans are an extinct species of ancient human that lived at the same time and in the same places as Neanderthals and Homo sapiens.
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- **Baishiya Karst Cave is a high-altitude paleoanthropological site and a Tibetan Buddhist sanctuary located on the northeastern edge of the Tibetan Plateau in Xiahe County, Gansu, China.**
- **This karst cave is the site of the discovery of the earliest hominin fossil found on the Tibetan Plateau, the Xiahe mandible**

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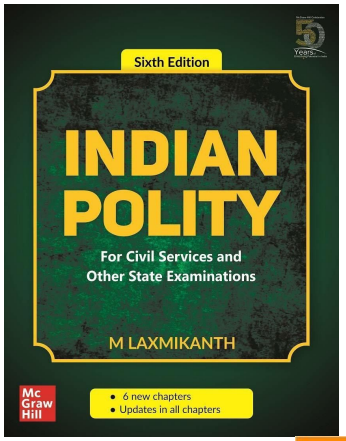

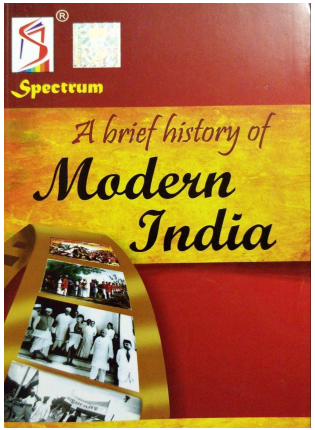

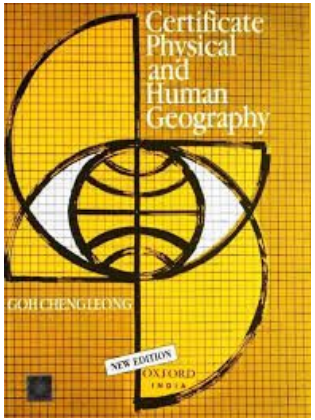

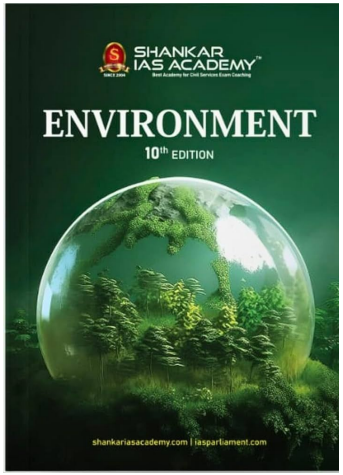

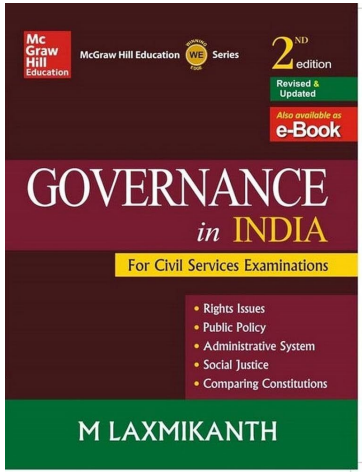

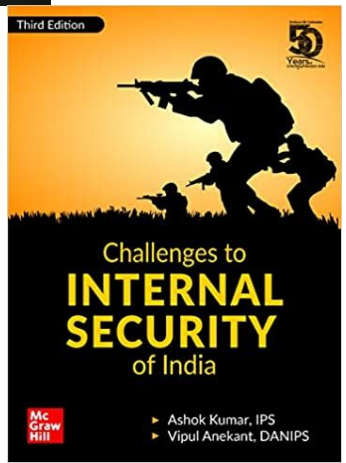

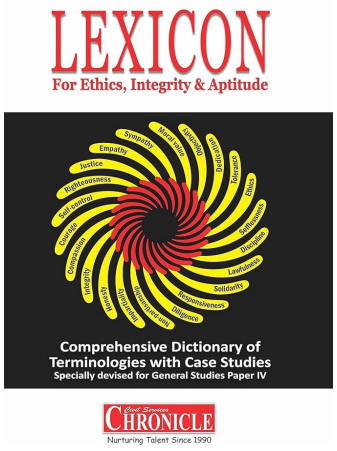

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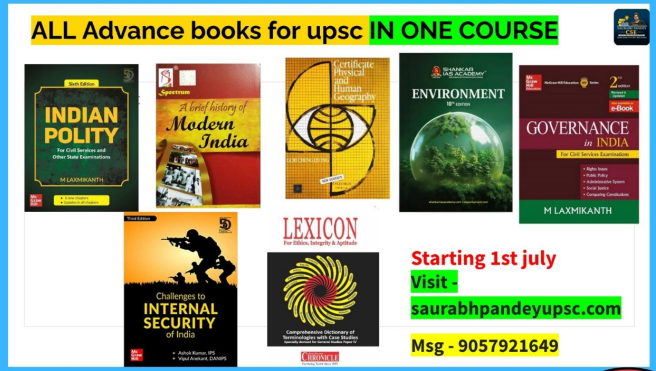

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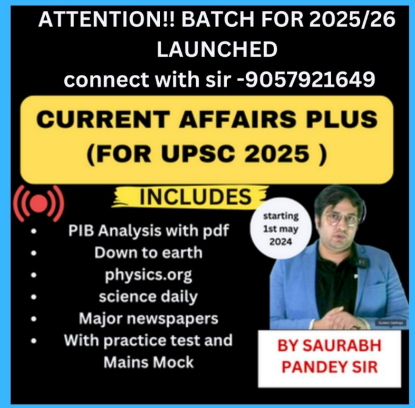

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