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NOBEL PRIZE FOR PHYSIOLOGY: DISCOVERY OF MICRORNA

Medicine Nobel 2024:
Victor Ambros and Gary Ruvkun get the call for discovery of microRNA

The finding revealed what biologists believed they knew about gene regulation to be incomplete

- Victor Ambros and Gary Ruvkun have been jointly awarded the Nobel Prize for Physiology for 2024, the Nobel Academy at the Karolinska Institutet announced on Monday
- They were awarded the prestigious prize for the discovery of microRNA and its role in post-transcriptional gene regulation
- "Victor Ambros and Gary Ruvkun were interested in how different cell types develop. They discovered microRNA, a new class of tiny RNA molecules that play a crucial role in gene regulation," the Nobel Assembly said in a statement
- Ambros and Ruvkun's work revealed a then previously unknown principle of gene regulation that turned out to be essential for multicellular organisms, including humans
- The duo made their finding by studying the 1-mm-long roundworm *Caenorhabditis elegans*
- The body makes proteins in a complex process with two broad steps: transcription and translation
- During transcription, a cell copies a DNA sequence into messenger RNA (mRNA) in the nucleus. The mRNA moves from the nucleus, through the cell fluid, and attaches itself to the ribosome
- During translation, another type of RNA called transfer RNA (tRNA) 'brings' amino acids to the ribosome, where they are linked together in the order specified by the mRNA to make a protein
- MicroRNA, or miRNA, regulates the production of proteins by bonding with and subsequently silencing the mRNA at an appropriate juncture. The process is called post-transcriptional gene regulation
- Ambros and Ruvkun found the first miRNA gene in *C. elegans* in 1993. It was called lin-4. They confirmed its role by modifying the miRNA to result in different parts of the worm's developmental process to be thrown out of sync
- By studying a second miRNA gene they found seven years later, called let-7, they confirmed miRNAs are actually present across the animal kingdom
- "MiRNAs are proving to be fundamentally important for how organisms develop and function," the Assembly added in its statement

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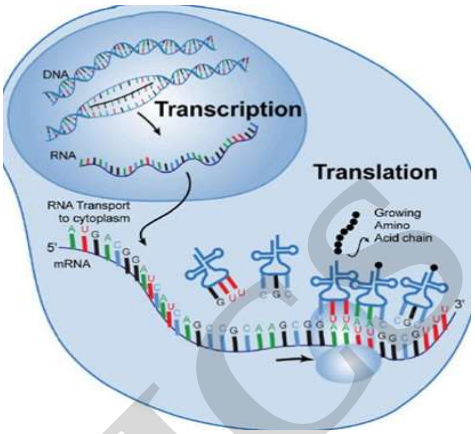
- ❖ They discovered microRNA, a new class of tiny RNA molecules that play a crucial role in gene regulation.

- The body makes proteins in a complex process with two broad steps: transcription and translation.
- **Transcription** is the process of **copying DNA into mRNA or messenger RNA.**
- **Translation** is the process of **reading the mRNA to assemble a protein.**
- Together, these processes allow the genetic code stored in DNA to direct the production of proteins, which are crucial for almost all cellular functions.



Role of MicroRNA, or miRNA?

- To **regulates the production of proteins** by bonding with and subsequently silencing the mRNA at an appropriate juncture.
- The **process is called post- transcriptional gene regulation.**
- (Think of miRNAs as managers in a factory. They don't build the products (proteins) themselves but oversee and limit how many products are made by controlling the workers (mRNA).
- This regulation helps cells respond to changes and function properly.)
- Ambros and Ruvkun **found the first miRNA gene in C. elegans in 1993.** It was called lin-4. They confirmed its role by modifying the miRNA to result in different parts of the worm's developmental process to be thrown out of sync.
    - By studying a second miRNA gene they found seven years later, called let-7, they confirmed miRNAs are actually present across the animal kingdom.
- Diseases like **cancer, diabetes, and autoimmune conditions are linked to abnormal levels of microRNAs (miRNAs).**
- In cancer, these abnormalities can involve an increase or decrease in miRNA genes, problems with how they are controlled, or issues in the process that makes them.
- Research shows that abnormal miRNAs can influence cancer cell behavior, such as promoting growth, preventing cell death, and helping cancer cells spread.
- Some miRNAs might be useful as markers for diagnosing and predicting cancer, and as potential treatment targets.
- In autoimmune diseases like rheumatoid arthritis and multiple sclerosis, faulty miRNAs can trigger the immune system to produce harmful antibodies, worsening the condition. While some miRNA-based diagnostic tools are already in use, they are not yet widely available, and drugs targeting miRNAs are still being tested in clinical trials.

WITH MALDIVES FACING A FOREX CRUNCH, INDIA GIVES $750-MN CURRENCY SWAP ARRANGEMENT

With Maldives facing a forex crunch, India gives $750-mn currency swap arrangement

Suhasini Haidar
NEW DELHI

India signed a major currency swap agreement with the Maldives for $750 million to help the island nation tide over its current foreign currency crunch, after Prime Minister Narendra Modi met with Maldivian President Mohamed Muizzu in New Delhi on Monday.

The swap arrangement for $400 million and an additional ₹3,000 crore ($357 million), signed between the Reserve Bank of India and the Maldives Monetary Authority under the South Asian Association for Regional Cooperation (SAARC) Currency Swap Framework, will be available until 2027. It enables payments between the two countries to be made in different currencies.

Boosting ties: Mohamed Muizzu with Narendra Modi during his first bilateral trip to India, in Delhi on Monday. SUSHIL KUMAR VERMA

Among the agreements signed are for the launch of the RuPay card in the Maldives and handover of 700 houses built with assistance by India. Memorandums of understanding were inked between the Central Bureau of Investigation and the Anti-Corruption Commission of the Maldives and between policing institutes and judicial training institutes; and also for cooperation in sports and youth affairs.

Speaking of people-to-people ties, which were hit by a "boycott Maldives" social media campaign in India in response to criticism of Mr. Modi in the islands, Mr. Muizzu said he hoped Indian tourists, whose numbers have halved this year, would return. "India is one of our largest tourism source markets and we hope to welcome more Indian tourists to the Maldives, allowing for shared growth and understanding between our peoples," Mr. Muizzu said in a joint press event after the talks.

India also agreed to step up cooperation on trade in national currencies, and to work on a Free Trade Agreement, as Foreign Secretary Vikram Misri said that other requests made by the Maldives, understood to include debt repayment waivers, further credit lines, and economic assistance, would be "studied" and decided on in the "coming weeks and months". The two countries released a "vision statement" for a "comprehensive economic and maritime security partnership" to be negotiated in the future; inaugurated a jointly constructed runway for an international airport at Hanimadhoo island; and signed an agreement for India to support the Maldives on the refit of a Coast Guard ship.

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- India signed a major **currency swap agreement with the Maldives for $750** million.
- India sealed two currency swap deals – one in US dollars($400 Million) and another 3000 Crores ($357 Mn) in Indian Rupees.

What is currency swap agreement ?

- An agreement **between two central banks** to exchange a cash flow in one currency against a cash flow in another currency according to predetermined terms and conditions.
- It can help in meeting forex pressures.

- Signed under South Asian Association for Regional Cooperation (SAARC) **Currency Swap Framework (SCSA)** till 2027
- Between RBI and Maldives Monetary Authority
- India also has similar kind of agreement with other countries e.g Japan of $ 75 Bn where India is a possible beneficiary

SCSA:

- Initiated by the RBI to provide member countries of the SAARC with a safety net during balance of payment crises
- The total currency swap arrangement has a pool of $2 billion.
- Each member can access a specific portion of this pool, determined by a set formula
- The arrangement includes all eight SAARC countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka.

HIGH-PERFORMANCE BUILDINGS

GETTY IMAGES

How high-performance buildings are the next step towards a sustainable future

As urbanisation accelerates, India risks surpassing global benchmarks for energy efficiency and carbon emissions in buildings. In such a scenario, HPBs offer resilience through adaptive, self-sufficient structures. They promote social well-being by nurturing healthier indoor environments

Sandhya Patil

The conversation around sustainability in the buildings sector has often centred on climate change, resource use, and energy efficiency. Buildings are significant contributors to global emissions, especially in fast-growing cities, so improving their energy and carbon efficiency is vital. Failing to act could result in higher energy consumption, greater dependence on fossil fuels, and missed climate targets, all of which will further strain urban infrastructure.

Globally, buildings account for nearly 40% of total final energy consumption over their lifespan, primarily for operational needs such as running HVAC systems and lighting.

This significant energy use leads to approximately 28% of energy-related carbon emissions arising from both on-site energy consumption and indirect emissions from power plants and other off-site sources. In India, buildings account for more than 30% of the national energy use and 20% of its carbon emissions, according to the Bureau of Energy Efficiency.

As urbanisation accelerates, India risks surpassing global benchmarks for energy efficiency and carbon emissions in buildings, including standards set by the International Energy Agency, building certification programmes, and the European Union's Energy Performance of Buildings Directive.

With India's urban population expected to reach 600 million by 2030, this challenge is becoming even more urgent. As cities grow, the demand for new construction also increases, and without action the sector's carbon footprint will increase drastically.

Adopting energy-efficient and low-carbon building practices is thus key to meet climate goals and to promote sustainable urban growth.

What are high-performance buildings?

Terms like "green buildings" and "high-performance buildings" (HPBs) are often used interchangeably in the field of sustainable construction. Both concepts aim to reduce environmental impact and energy consumption and improve occupant comfort, but differ significantly in their methods and outcomes.

Green buildings are often seen as a foundational step toward sustainable development, with certification programmes playing a crucial role in their creation. These programmes assess the design intent and the final outcomes across various categories, using established benchmarks to ensure the builder is meeting essential sustainability goals. Their key areas of concern are energy efficiency, water conservation, and materials sourcing.

HPBs elevate these ideas by striving for peak efficiency in every aspect of their form and function. From energy and water use to occupant health and comfort, HPBs are designed with specific, measurable goals to achieve results beyond what the local government requires. They use advanced technologies and smart design strategies to continuously track their performance metrics, ideally in real-time. Specifically, HPBs leverage site-specific design approaches, such as natural lighting, ventilation, and terrain water management using sustainable materials, insulation, and low U-value windows to maximise thermal efficiency and reduce energy demand.

Advanced technologies include energy-efficient HVAC systems, greywater recycling, rainwater harvesting, smart lighting controls, and advanced metering. A 'building management system' (BMS) allows operators to monitor an HPB's performance, including sharing real-time analytics to optimise resource use.

Some HPBs already exist in India. One notable example is Unnati in Greater Noida, which features a façade designed according to the Sun's path in the local sky to improve thermal comfort and reduce glare. This is complemented by high-performance glass with a low solar heat gain coefficient, which improves energy efficiency and indoor environmental quality.

Similarly, Indira Paryavaran Bhawan in New Delhi utilises an advanced HVAC system featuring a unit where chilled water circulates through beams in the ceiling, taking advantage of natural convection and reducing energy consumption.

These building designs have paved the way for net-zero buildings (structures that generate as much energy and water as they consume) and grid-interactive buildings, which actively participate in energy demand management. Both push the boundaries of sustainability.

Benefits of HPBs

HPBs offer environmental benefits and address long-term operational challenges that building owners and occupants often face. Rather than focusing solely on saving energy, HPBs create a holistic environment where technology, design, and sustainability intersect to enhance building performance.

For example, their use of smart systems to dynamically manage resource use ensures building systems last longer and don't need frequent upgrades. The Infosys campus in Bengaluru has a facility that monitors the entire building's performance using a BMS and makes the requisite changes as and when to maintain peak performance. These buildings often achieve higher returns on investment due to higher property value and lower maintenance costs. Similar examples include the Atal Akshay Urja Bhavan in New Delhi and the Infosys campus in Hyderabad.

HPBs that take advantage of automation and artificial intelligence in addition to existing features can even create intelligent ecosystems. For example, computers in buildings can adjust lighting, temperature, and ventilation based on occupancy patterns or weather conditions to create a more personalised, energy-efficient milieu.

From a market perspective, HPBs are becoming a symbol of forward-thinking development. Beyond their immediate benefits, they signal a shift toward buildings that prioritise the well-being of occupants with superior air filtration systems, maximal natural light, and optimal thermal comfort.

How can HPBs help India's cities?

Life in India is guided by resource scarcity, fluctuating energy markets, and rising temperatures. HPBs offer resilience through adaptive, self-sufficient structures. They promote social well-being by nurturing healthier indoor environments, including air quality.

For example, TCS Banyan Park in Mumbai incorporates extensive green spaces and water features and its daytime lighting strategy includes well-placed windows and skylights to reduce artificial lighting. Such projects consume fewer resources while elevating the quality of the workplace.

For India, where rapid urbanisation can and does strain public infrastructure, HPBs offer a proactive solution that positions the built environment as a driver of the country's transition to a low-carbon, more sustainable economy. In sum, in a rapidly changing real-estate landscape, where adaptability is key, HPBs stand out as future-proof investments capable of weathering evolving environmental and economic pressures while delivering value.

Sandhya Patil is a sustainability expert with the Indian Institute for Human Settlements (IIHS) and anchors technical assistance for ASSURE. The author does not have any financial interests vested with any company or organisation that would benefit from this article.

- Buildings contribute significantly to global emissions, especially in growing cities, and improving their energy efficiency is crucial to avoid higher energy consumption and missed climate targets.
- Globally, buildings use nearly 40% of energy, leading to 28% of carbon emissions. In India, buildings account for over 30% of energy use and 20% of emissions.
- As India's urban population grows, adopting energy-efficient building practices is key to meet climate goals.
- **"High-performance buildings" (HPBs)** aim to **maximize energy efficiency** and **environmental sustainability** using advanced technologies like **smart lighting, natural ventilation, and water recycling.**
- Unlike traditional green buildings, HPBs **continuously track their performance in real-time to achieve higher efficiency**.

- Examples in India include buildings that integrate technologies to reduce energy use, enhance thermal comfort, and improve indoor air quality.

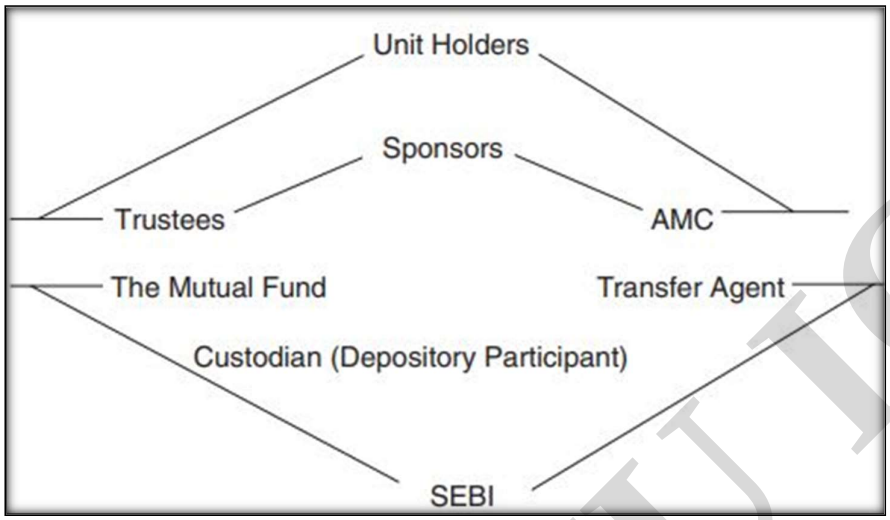
HPBs offer multiple benefits, including:

- Lower operational costs,
- Longer-lasting systems, and
- Higher property values.
- They promote better occupant well-being by improving air quality and using natural lighting.
- By adopting HPBs, India can manage resource scarcity, energy demands, and rising temperatures, positioning the building sector to lead the shift towards a low-carbon economy.
- SEBI recently introduced the liberalized **Mutual Funds Lite (MF Lite) framework** for **passively managed schemes.**

What are Mutual Funds ?

- A mutual fund serves as a link between the **investor** and the **securities market** by mobilizing savings from the investors and investing them in the securities market **to generate returns.**
- A mutual fund in India is constituted in the form of a **public trust created under the Indian Trusts Act, 1882**

DIFFERENT FRAMEWORK FOR PASSIVE MFS



- **Sponsor** means any person who acts alone or with another body corporate establishes a mutual fund.
- **A trustee company/ board of trustees** is set up by the sponsor.The trustees have the power of superintendence and control over the asset management company (AMC).
- **The Asset Management Company** manages the funds by investing in various securities. It acts like the investment manager of the trust.
- **A custodian** is responsible for safekeeping of cash, securities, gold or gold related instruments or real estate mutual fund instruments.

Passive and Active Mutual Funds ?

- **Passively managed mutual fund schemes** are generally considered **less risky** compared to their actively managed peers.
- They **usually track a benchmark index.**
- AMCs of the fund, thus have "negligible discretion" about asset allocation and the investment objective.
- The current framework, intended primarily for active mutual fund operators, may not be relevant for passively managed schemes.
- So SEBI, opting to introduce the **"relaxed framework".**
- Relaxation on two fronts: **governance structures (**and responsibilities) and for **net worth holdings.**
- **Benefit:** It will promote the entry of new players into the MF ecosystem, present diversified investment opportunities for retail investors through less risky schemes and enhance market liquidity.