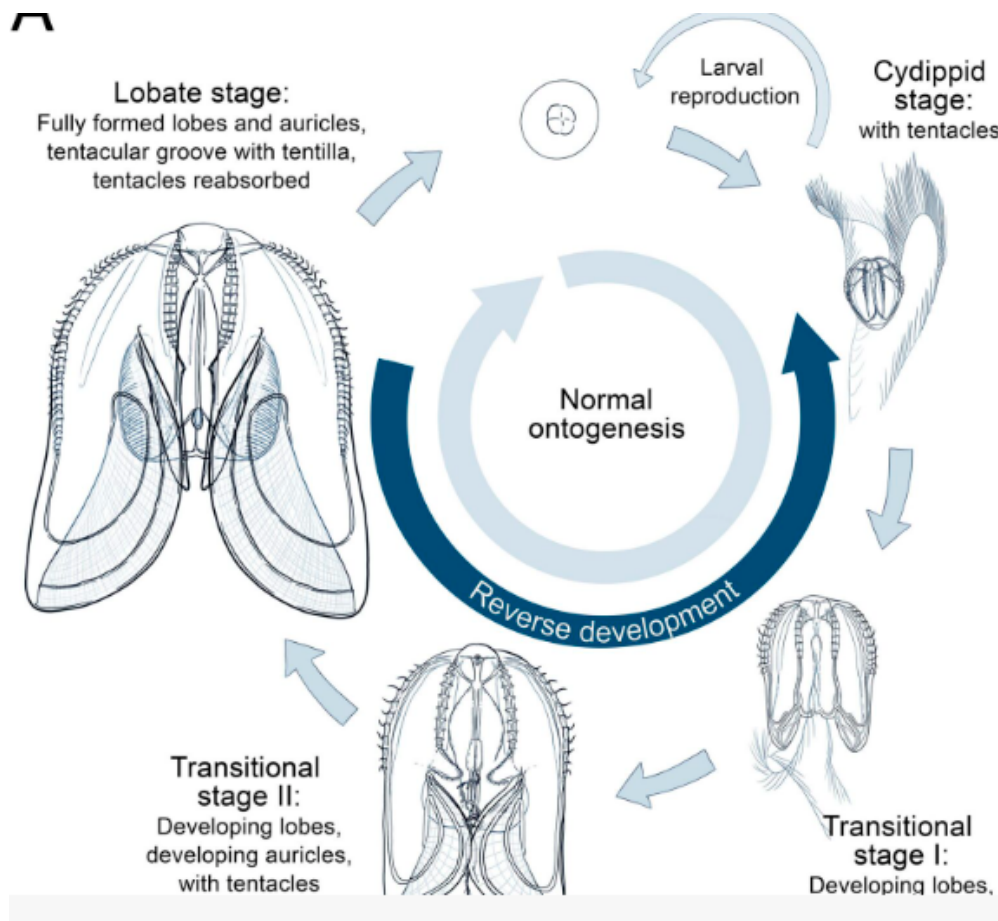


## UPSC Daily Current Affairs | Prelim Bits 18-11-2024

### Reverse Development in Jellyfish

Recently, scientists in Norway have discovered that [comb jellies](#) from the species *Mnemiopsis leidyi* reverse from a mature “lobate”, or adult with lobes, to an early larval-state when stressed by starvation.

- **Reverse development in Jellyfish** - A process where an adult comb jelly reverses their development and ***become larva again when stressed by starvation.***
- It helps them survive because *larva eat less than the adults.*
- When *Mnemiopsis leidyi* regress, they *grow a new “structure” tentacles*, which the adult doesn’t have and the tentacles need a specific nervous system to function.



This reverse development is just like the “immortal” *Turritopsis dohrnii*, a jellyfish that was discovered in 1980’s.

	<b>Turritopsis dohrnii</b>	<b>Mnemiopsis leidyi</b>
Group	cnidarians	ctenophores

<b>Reverse development</b>	Each individual reverses into a colony of individuals, rather than a single larva.	Each individual can reverse to a single larva.
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- **Survival strategy** - Once they are back at the larval, or cydippid stage, if they are provided with enough food, they can *grow back to an adult*.
- And this cycle could *theoretically repeat again and again*.
- Though it doesn't necessarily mean that they live forever as they could get eaten by a predator, for example.
- **Ecological impact** - These species are highly **invasive**.
- **Significance** - Reverse development can occur also in non-cnidarians.
- **Future prospects** - If a genetic switch exists in them for this process, then we might try to see if it works also in human cells.
- The rejuvenation of humans, though, is highly unfeasible due to our low brain plasticity.

*Brain plasticity refers to the capacity of the nervous system to change its structure and ultimately its function over a lifetime.*

## Reference

[The Indian Express| Jellyfish Reverses Development](#)

### Infectious Disease among Bees

*A recent research paper explores the presence of some virus species in wild bee and hoverfly species across different landscapes in Switzerland.*

- **Virus in Bees** - Recent study found the presence of ***deformed wing virus and black queen virus*** in 19 wild bee and hoverfly species across different landscapes in Switzerland.
- They found *higher loads of these pathogens in wild pollinators* that used floral resources the honey bees accessed as well.
- **Causes** - *Western honey bees are often viral reservoirs* and can infect wild species when they share habitats.
- **Pathogen spillover** - A process of the transmission of pathogens between managed honey bees and wild pollinators.
- The loads were 10-times higher among the wild pollinators in these shared habitats.
- **Pathogen spillback** - The less virulent virus could *mutate in the wild pollinators and then spill back* to honeybees in a more virulent form, being more detrimental to honeybees.
- **Habitat loss** - It could force pollinators into smaller suitable habitats and increase the risk of disease transmission.
  - A recent estimate showed that 40% of bumblebee species in the Indian Himalaya could lose more than 90% of their habitat by 2050, raising concerns about the competition for resources with western honey bees.
- **Control mechanism** - *Diverse pollinator-friendly habitats* with more floral resources

lowered the chance pathogen spillover & spillback between wild pollinators and managed western honey bees.

- More research and surveillance are required to monitor emerging diseases in bees and other pollinators.

## Bees in India

- It hosts *more than 700 bee species*, including **4 indigenous honey** bees
  - Asiatic honey bee (*Apis cerana indica*)
  - Giant rock bee (*Apis dorsata*)
  - Dwarf honey bee (*Apis florea*)
  - Stingless bee (sp. *Trigona*)
- **Introduction of Western honey bees** - They were introduced in India in 1983 to increase the country's honey yield.
- **Infection** - In 1991-1992, a *Thai sacbrood virus* outbreak devastated around 90% of Asiatic honey bee colonies in South India and *reemerged in 2021 in Telangana*.

- **Impact** - It threatens world's economies

*More than 75% of food crops, fruits, and flowering plants need bees, wasps, beetles, flies, moths, and butterflies to yield successful harvests.*

## Reference

[The Hindu| Infectious Disease among Bees](#)

## Genus Koima

*A team of researchers have discovered Koima, a new genus of freshwater fish endemic to the Western Ghats.*

- **Genus Koima** - The generic name, Koima is *derived from Malayalam* and is the vernacular word used for loaches.
- It now encompasses 2 known species that were *previously misclassified* under the genus *Nemacheilus* as *Mesonoemacheilus remadevii* and *Nemacheilus monilis*.

*The family Nemacheilidae includes a diverse group of freshwater fish found mostly in tropical Asia & Europe and many species are valued both as a food source for local communities and as popular ornamental fish.*

- **Unique features** - It has a unique colour pattern which comprises of
  - Yellowish-brown ground colour
  - A single row of black spots on lateral line
  - All fins hyaline
  - Absence of a uniform banding pattern on dorsal side
- **Habitat** - Kunthi, Bhavani, Moyar, Kabini, and Pambar rivers in the Western Ghats.

## Koima Remadevii

- **Habitat** - *Swift-flowing riparian streams with substrates* comprising rocks, boulders, and gravel, with sand and silt patches scattered throughout.
- **Microhabitats** - These substrates produce a variety of microhabitats like gaps under boulders, and clefts between rocks that provide protection from powerful currents.
- **Observation** - Currently, it is only known from its type locality in the *Kunthi river inside Silent Valley National Park*.

### **Koima monilis**

- **Microhabitats** - It ranges from *large rivers to small, fast-flowing streams* at elevations between 350 and 800 m.
- **Observations** - In various *tributaries of the Cauvery River*.



- **Significance of discovery** - It highlights the importance of Western Ghats as a biodiversity hotspot and a centre of endemism, it also underscores the need for a comprehensive taxonomic revision of many freshwater fish groups including nemacheilid loaches.

## **References**

### **The Hindu | Genus Koima**

### **Partnerships for Accelerated Innovation and Research (PAIR)**

Recently, the Partnerships for Accelerated Innovation and Research (PAIR) initiative was launched to enhance research capabilities of universities, particularly central and state public institutions.

- It is designed to foster collaboration between research and teaching institutions.
- **Launched by** - Anusandhan National Research Foundation (ANRF).
- **Objectives** - To *stimulate scientific innovation* in institutions with limited research, in a **mentorship mode** by leveraging the knowledge and expertise of top-ranking institutions.
- Support internationally competitive research and foster successful *collaborative networks* between diverse institutions.
- **Hub-and-spoke model of implementation**
  - **Hub** - Well established institutions
  - **Spoke** - Emerging institutions
- **PAIR network** - It will consist of a central hub institution and between 3 to 7 spoke

institutions.

- A hub institution can submit only 1 proposal and each institution can participate *as a spoke in only 1 network*.
- *At least 2 state public universities* must be included in each PAIR network, and to ensure regional diversity, at least 1 spoke institution must be located outside the state of the hub institution.
- **Funding for PAIR network** - It will vary based on factors such as the research theme, the number of spoke institutions, and the involvement of multiple departments and faculty members.
  - **Maximum funding** - Rs.100 crore
  - **Budget distribution between the hub and spoke** - 30:70 ratio
- **First phase** - It will target institutions that are ranked within
  - Top 25 in NIRF overall rankings over the past 2 years
  - Between the rank 26 and 50 in Institutions of National Importance
- **Eligibility for the spoke institutions** - It has been divided into 3 categories.

<b>Category I</b>	It includes central and state public universities ranked <i>within the top 200 overall NIRF</i> rankings, top 100 NIRF university rankings, or top 100 NIRF state public university rankings, excluding those eligible as hubs.
<b>Category II</b>	It includes <i>NITs and IITs</i> as per the approved list.
<b>Category III</b>	It includes any central or state public university not in the 1st two categories but demonstrating potential in specific research areas

- **Significance** - It is a key component of the National Education Policy 2020 (NEP 2020) and will play a crucial role in fostering a robust research culture across India's higher education institutions.

## References

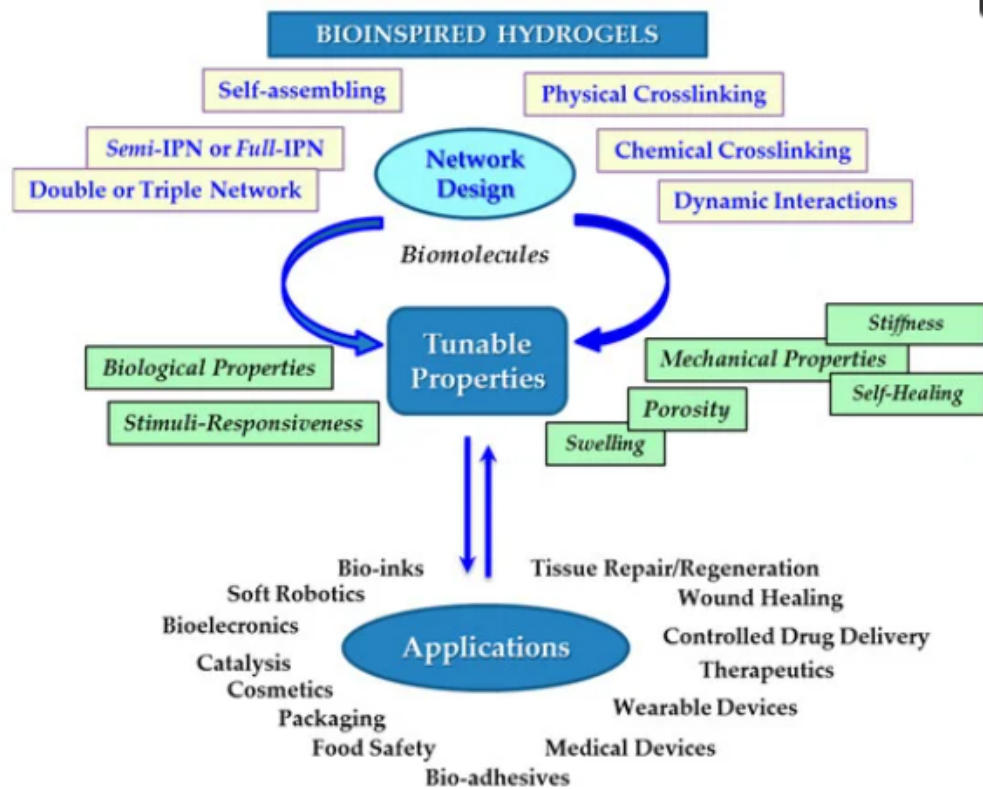
1. [Hindustan Times| PAIR Program to Accelerate Research](#)
2. [ANRF| Partnerships for Accelerated Innovation and Research](#)

## Bioinspired Hydrogels

Recently, researchers have designed a new type of bioinspired hydrogel that can generate hydrogen and oxygen by splitting [water molecules](#) using sunlight.

- **Hydrogels** - They are *soft biomaterials* that can be engineered to mimic many aspects of a tissue structure.
- **Bioinspired hydrogels** - They are **3-dimensional networks** composed of *hydrophobic polymers* synthesized by crosslinking water-soluble polymers.

**Bioinspired materials** are synthetic materials whose structure, properties or function mimic those of natural materials or living matter.



## Bioinspired Hydrogels for Hydrogen Production

- **Working principle** - The polymer network prevent the molecules from clumping together and help *control the transfer of electrons*, which is crucial for splitting water into hydrogen and oxygen.
- **Working** - It mimics nature by using sunlight directly to split water.
- They are packed with functional molecules, such as *ruthenium complexes and platinum nanoparticles* which work together to simulate the natural process of photosynthesis.
  - Photocatalytic splitting of water,  $2 \text{H}_2\text{O} \rightarrow 2 \text{H}_2 + \text{O}_2$

**Artificial photosynthesis** is a process that seeks to replicate nature's method, using sunlight to drive chemical reactions that generate clean energy.

- **Advantages** - This prevent the functional molecules from aggregating thereby boosting the activity of the water-splitting process and *producing more hydrogen*.
- Molecules organized within the hydrogel made the energy conversion process much more efficient.
- **Significance** - It has major implications for clean energy and could help sustainably reshape energy technologies

## Hydrogen as Fuel

- It is seen as a promising fuel for the future as it is clean & renewable
- Currently, hydrogen is produced from electrolysis of water by using electrical power.
- **Challenges** - It rely on external energy sources.

## Reference

[The Physics Organization| Bioinspired Hydrogels](#)

