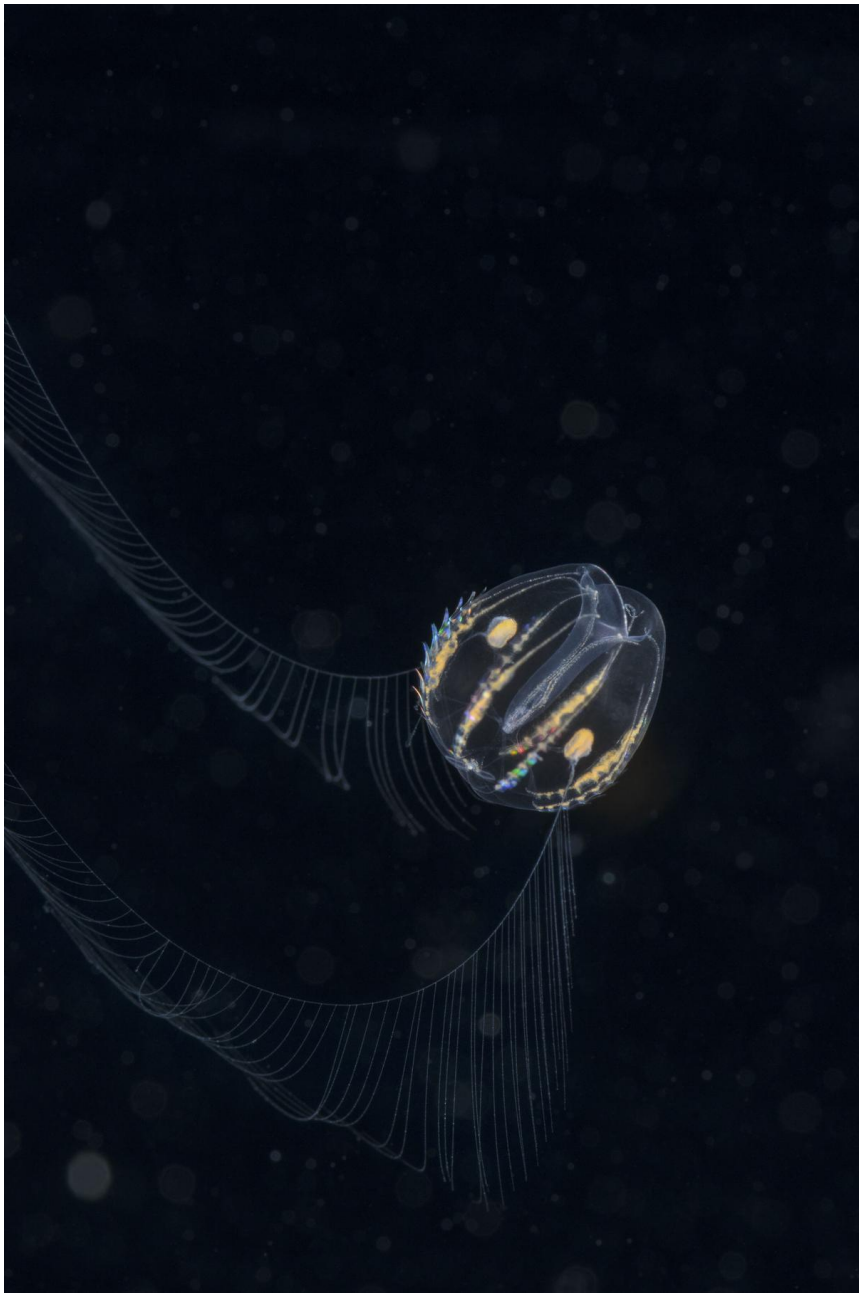
Mysterious Nervous System of Comb Jellies

Why in News?

Comb jellies, or ctenophores, are **ancient** marine animals with unique features that have **sparked scientific curiosity.** Recent research has discovered a **surprising aspect of the comb jelly's** nervous system.

//



What are Comb Jellies?

- **Comb jellies** are marine animals that have fascinated scientists for decades due to their unique features and evolutionary history.
    - They are among the **earliest branching extant lineages of the animal kingdom** and have **a complex nervous system that differs from other animals.**
- **They are transparent, gelatinous animals** that use **long ciliary comb** plates to **propel their body through the water column.**
    - They range in size from a few millimetres to over a metre in length and have diverse shapes and colours. **Some of them can produce** bioluminescence**, a phenomenon where living organisms emit light.**
- They belong to the **phylum Ctenophora,** which contains about **200 species.** They are found in **all oceans and habitats, from polar to tropical regions**, from shallow coastal waters to deep-sea trenches.
    - They **feed on** plankton**, small fish and other** invertebrates, using sticky tentacles or oral lobes to capture their prey.
        - **Invertebrates are animals that do not possess a backbone** or vertebral column.

How does the Comb Jelly Nervous System Work?

- Unlike most animals, comb jellies **do not have a brain.** Instead, they have a **nerve net that consists of interconnected neurons distributed throughout their body.**
    - The nerve net controls various functions such as **locomotion, feeding, sensory perception and bioluminescence.**
- The neurons in the nerve net are **not connected by synaptic junctions,** as would be expected in the nervous system of any other animal.
    - Instead, **they are fused and share a continuous membrane, forming what scientists call a syncytium.** This means that **there are no gaps between nerve cells and that electrical signals** can flow freely along the network.
- However, **not all** neurons **in the comb jelly nervous system are fused.** Some of them still connect with other nerve cells through synapses.
    - This suggests that **comb jellies use two different modes of communication between their nerve cells: a synaptic mode and a syncytial mode (i.e., without any synapses).**

Note: Synapses are the **places where neurons connect and communicate with each other.** Each neuron has anywhere between a **few to hundreds of thousands of synaptic connections,** and these connections can be with itself, neighbouring neurons, or neurons in other regions of the brain.

- The **discovery of syncytia** in comb jellies has **profound implications for understanding the evolution of nervous systems and neurons.**
    - It challenges the **traditional view that synapses are essential for neural communication** and that they evolved only once in the common ancestor of all animals.

Source: TH