REVERSE DEVELOPMENT IN MARINE SPECIES - ENVIRONMENT

NEWS: Almost by chance, researchers in Norway have found that adult comb jellies reverse their development and become larva again when stressed by starvation.

WHAT'S IN THE NEWS?

- **Historical Context**:
    - Scientists accidentally discovered that some jellyfish-like creatures can reverse their development under stress.
    - This process is akin to reversing their life cycle stages, going from adult back to an earlier phase to survive harsh conditions.

Reverse Development in Turritopsis dohrnii (Immortal Jellyfish)

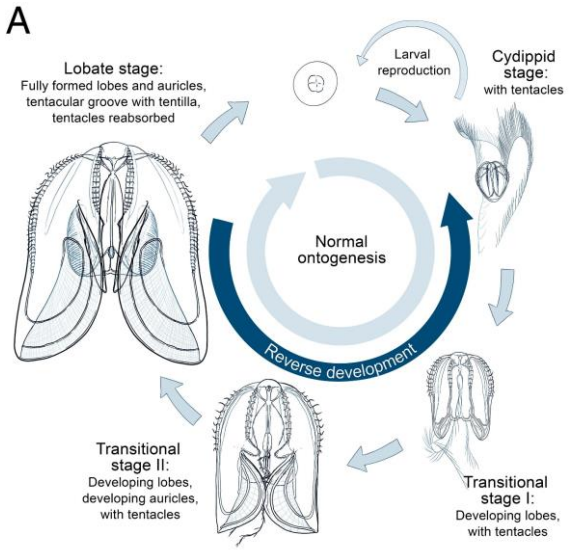
- **Unique Life Cycle**:
    - Under stress, Turritopsis dohrnii can revert from its adult stage back to a juvenile phase instead of dying.
    - This is compared to a "butterfly turning back into a caterpillar."
- **Mechanism**:
    - The adult stage releases larval forms called planulae, which then develop into polyp colonies and eventually produce new adults.
    - However, stressed adults can directly revert to polyp form, effectively starting their life cycle anew.

Recent Discovery of Reverse Development in Comb Jellies (Mnemiopsis leidyi)

- **New Findings**:
    - Research showed that comb jellies can also undergo reverse development under stress, regressing from an adult stage to a larval state.
- **Stress Factors**:
    - Methods to induce stress included prolonged starvation and physical injury.
    - Reverse development success rates were higher with physical injury compared to starvation.
- **Observations**:
    - Comb jellies can regrow into adults after regressing to larvae if given enough food, demonstrating a potentially cyclic regenerative process.

Differences Between Turritopsis dohrnii and Mnemiopsis leidyi

- **Species Classification**:



  - Turritopsis dohrnii belongs to the group called cnidarians.
  - Mnemiopsis leidyi is a ctenophore, which has different body structures compared to cnidarians.
- **Single vs. Colonial Reversion**:
  - Turritopsis reverses to form a colony of polyps, making it harder to track individual specimens.
  - Mnemiopsis can revert to a single larval state, allowing for precise observation of individual development.

Implications of Reverse Development in Marine Species

- **Survival Strategy**:
  - Reverse development may allow species like Mnemiopsis leidyi to survive in resource-scarce or hostile environments.
  - The larval stage has lower energy needs compared to adults, potentially giving it an edge in unfavorable conditions.
- **Ecological Impact**:
  - The regenerative ability of Mnemiopsis leidyi could have significant ecological consequences, especially as an invasive species.
  - Historical examples suggest its population boom may have impacted marine ecosystems, such as the collapse of fisheries in the Black Sea.

Potential Applications of Reverse Development Research

- **Human Aging**:

- Researchers are investigating whether the biological processes involved in jellyfish reverse development could inform strategies for slowing human aging.
- Human aging involves cellular degeneration and reduced brain plasticity, making reverse development unfeasible with current knowledge.

- **Future Research Goals**:
  - The focus is on understanding genetic switches and nervous system adaptations that allow these marine species to reverse their development.
  - Identifying the genetic triggers in reverse development could provide insights for broader applications, although transferring this to humans is speculative and challenging.

Key Takeaways

- **Reverse Development as a Survival Mechanism**:
  - A process seen in different marine species that helps them withstand environmental stressors by regressing to a more adaptable stage.
- **Inter-Species Differences**:
  - The phenomenon spans across marine species with varying body structures, expanding the understanding of developmental plasticity.
- **Research and Human Connection**:
  - The study of jellyfish and comb jellies offers potential insights into regenerative biology but is far from being applicable to human health due to complexity and limitations in human cellular plasticity.