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Bimetallic NiFe systems

A new study claims that a bimetallic Nickel-Iron layered double hydroxide system is the most efficient for oxygen production through water splitting.

- **Research by -** The Institute of Advanced Study in Science and Technology (IASST).
- **Nodal Agency-** Department of Science and Technology (DST)
- **Finding-** A bimetallic Nickel-Iron layered double hydroxide system ***efficiently produces O2 through water splitting***.
- It eliminates the need for trimetallic solutions to enhance productivity.

Water splitting is a sustainable and eco-friendly method to generate green and pure H2 and O2 on a large scale without harming flora and fauna.

- To improve water splitting efficiency, scientists have focused on 2 key reactions i.e.
  - The hydrogen evolution reaction (HER) and
  - The oxygen evolution reaction (OER).
- **Composition and Structure-** NiFe systems combine nickel (Ni) and iron (Fe) at the molecular level.
- NiFe LDHs are structured with ***positively charged*** metal hydroxide layers separated by anions and water molecules.
- This structure provides a high surface area and favorable catalytic sites.
- **Catalytic Properties-** NiFe LDHs are highly efficient catalysts for the OER, a crucial step in water splitting.
- The combination of ***Ni and Fe*** improves ***catalytic activity*** and stability.
- **Applications-** NiFe systems are extensively used in electrochemical cells for splitting water into hydrogen and oxygen.
- They also explored applications in batteries, supercapacitors, and other energy storage and conversion devices due to their excellent electrochemical properties.
- **Advantages-** NiFe systems are made from abundant and inexpensive

metals, making them a cost-effective alternative to precious metal catalysts like ***platinum and iridium.***

Reference

PIB | Bimetallic NiFe systems

Chandipura virus

Recently 6 children have died due to suspected Chandipura virus Infection (CHPV) in Gujarat.

- Chandipura virus, aka Chandipura vesiculovirus (CHPV), is an ***RNA virus.***

  RNA virus is a virus that has single-stranded as well as double-stranded RNA as its genetic material.

- It is a ***noncontagious*** disease.
- **Virus Family-** Rhabdoviridae family.

  The Rhabdoviridae family are bullet-shaped, negative-sense single-stranded RNA (ssRNA) viruses which also includes the rabies virus.

- **First identified-** In 1965 in Chandipura, Maharashtra.
- **Transmission-** Chandipura virus is primarily transmitted through the ***bite of infected sandflies*** (genus Phlebotomus).
- The virus primarily affects children and has been associated with outbreaks of acute encephalitis in India.
- It is a serious pathogen with a rapid onset of severe symptoms, primarily affecting children in certain regions.
- The virus resides in the salivary gland of these insects, and can be transmitted to humans or other vertebrates like domestic animals through bites.
    - **Vector-borne transmission-** The primary mode of transmission is through sandfly bites.
    - **Animal reservoirs-** Certain animal species may act as reservoirs for the virus, though this is still under investigation.
    - **Environmental factors-** Outbreaks have been linked to specific

environmental conditions that favor the breeding of sandflies.

- **Symptoms -** Fever, Headache, Vomiting, Convulsions, Coma.
- **Treatment-** There is ***no specific antiviral treatment*** or vaccine for Chandipura virus infection.
- **Prevalance of Disease in India-** Significant outbreaks of the disease in India were seen in 2003-04 in states such as ***Maharashtra, northern Gujarat and Andhra Pradesh***.
- The infection has largely remained endemic to the central part of India, where the population of CHPV infection-spreading sandflies and mosquitoes is higher.

Reference

Indian Express | Chandipura virus

Governing rules on civil servants

The Centre has formed a single-member committee to review all documents submitted by probationary IAS officer Puja Khedkar for her civil services candidature.

- All IAS, Indian Police Service (IPS) and Indian Forest Service officers are governed by the ***All India Services (conduct) Rules, 1968*** from the time they are allotted their service, and begin training.
- **AIS (Conduct) Rule 3(1)-** Every member of the Service shall always maintain absolute integrity and devotion to duty and shall do nothing unbecoming of a member of the Service.
- **Rule 4(1)**- Officers must not use their "position or influence" to "secure employment for any member of his family with any private undertaking or NGO".
- **Rule 11(1)**- Officers may accept gifts from close relatives or friends without official dealings on special occasions but must report gifts over Rs 25,000.
- **Rule 12**- It outlines circumstances for discharging probationers, including being found ineligible or unsuitable by the central government, willfully neglecting probationary studies or duties, and lacking necessary qualities of mind and character.
- **Few sub-rules**
- Officers should maintain ***high ethical standards***,
    - Integrity and honesty;

    - Political neutrality;
    - Accountability and transparency;
    - Responsiveness to the public, particularly to the weaker sections; courtesy and good behavior with the public.
- They must take a decision solely in the public interest.
- Declare any private interests relating to his public duties.
- Not place himself under any financial or other obligations to any individual or organization which may influence him.
- Not misuse his position as civil servant and not take decisions to derive financial or material benefits for himself, his family or his friends.

Reference

The Indian Express | Rules governing civil servants

Squalus Hima

Scientists from the Zoological Survey of India (ZSI) have discovered a new species Squalus hima from Sakthikulangara fishing harbour in Kerala along the Arabian Sea.

- It is a newly discovered dogfish shark characterized by smooth dorsal fin spines.
- It is commonly known as ***spurdogs***.
- **Genus -** Squalus and Centrophorus.
- **Family**- Squalidae.
- This species has been largely misidentified with S. mitsukurii and S. Lalannei.
- **Distinction**- Squalus hima sp.nov differs from other species by the number of precaudal vertebrae, total vertebrae, teeth count, trunk & head heights, fin structure, and fin color.
- **Apperance** – It is characterised by an angular short snout, a small mouth almost as wide as the snout, first dorsal fin origin behind the pectoral fins, and body without any spots.
- **Threats -** Genus Squalus and Centrophorus contains liver oil that with high levels of squalene (or squalane is when it is processed for products).
- It is in high demand for pharmaceutical industries, particularly for making high end cosmetic products and anti-cancerous products.

Reference

The Hindu | Squalus hima