Bioluminescence

Prelims: *Current events of national and international importance | Environment*

Why in News?

Bioluminescence, the natural ability of organisms to produce light, is increasingly observed in Indian coastal regions (Goa, Maharashtra) and forests (Western Ghats).

- **Definition –** Bioluminescence is the ability of living organisms to produce and emit light through chemical reactions.
- **Mechanism –** Luciferase, an enzyme, enables luciferin to react with oxygen and release energy in the form of light.
- Some species use *symbiotic bioluminescent bacteria* instead of luciferin/luciferase (e.g., squid, anglerfish).
- About *76% of all marine animals are bioluminescent,* but not freshwater animals.
- **Features –** It is a *"cold light"*, which means that the light generated does not produce heat.
- It used to attract prey/mates, camouflage, defence (e.g., glowing mucus) and Spore dispersal (fungi).
- **Historical use –** During World War I, soldiers used glow worms to read important messages or maps in the dark without giving their position away.
- **Unique Examples**

Organism	Bioluminescent Feature & Purpose
Fireflies	Flashing signals to attract mates.
Dinoflagellates	Glow in Indian beaches (Goa, Maharashtra).
Angler Fish & Squid	Host bioluminescent bacteria in organs.
Railroad Worm	Red head & green body glow resembling a traffic signal
Vampire Squid	Defence by ejecting a glowing mucus cloud.
Latia neritoides (New Zealand snail)	Releases glowing slime, the only known freshwater bioluminescent animal.
Mycena Fungi	"Foxfire" glow on the forest floor/tree trunks to attract insects for spore dispersal.

- **Environmental Concerns –** Today, a new phenomenon called *"light pollution"* is disrupting Nature's glow.
- Artificial lighting (LEDs, streetlights) disrupts natural cycles.
- Many bioluminescent species *require complete darkness to glow effectively*; increasing urban brightness threatens their visibility and ecological balance.

Reference

The Hindu | Bioluminiscence

