



Stochastic redox catalyses in cells & beyond

MURBURN CONCEPT DISCUSSION FORUM

National Seminar & Brainstorming

*Fueling critical debates and
defining novel research frameworks*

3-4 August 2026

VENUE: ICAR-CMFRI, Kochi



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<https://shorturl.at/dSNRh>

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www.cmfri.org.in



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DISCUSSION FORUM ON MURBURN CONCEPT

Rethinking Redox Catalysis, Bioenergetics & Homeostatic Physiology

Why Do We Need Oxygen ?

Murburn concept (derived from "mured burning," signifying a closed and controlled redox process) offers a revolutionary perspective on how life-activities are powered using oxygen in cells.

Murburn concept introduces a paradigm shift in how we understand cellular functioning, challenging traditional textbook models of electron transfer and metabolic pathways. By focusing on diffusible reactive species (DRS) as essential components of biological processes, this framework opens new frontiers in life and ecological sciences.

This two-day DISCUSSION FORUM brings together national-level biochemists, biophysicists, molecular biologists, physicians, physiologists and system biologists to critically deliberate on the recent advances in the area with a thrust focus upon formulating new research objectives in the pertaining fields, including the Fisheries disciplines.

The Paradigm Shift:

The classical bioenergetics and electrophysiology scheme relies on electron transport chains, ion pumping proteins and rotary/motor like functionalisms. Murburn theory proposes that Effective Charge Separation (ECS) mediated by redox enzymes form DRS, whose Sustained Release Dynamics (SRD) lead to the emergence of ChemicoElectromagnetic Matrix (CEM). This is the immediate biological intelligence, or governing logic of cellular level activities. The central dogma (gene-protein-active site catalysis) outcomes play significant "deterministic" roles, but on a relatively slower time scale.

Cells as Simple Chemical Engines (SCE):

Murburn concept suggests that cells function as SCE where stochastic (probabilistic) interactions between Molecules, Unbound ions, and Radicals/Radiations enable important metabolic and physiological outcomes such as key molecules' (like ATP) synthesis, thermogenesis, electrophysiological signaling, etc.

Significance:

This new approach provides a thermodynamically, kinetically, mechanistically (structure distribution-function correlations) and evolutionarily superior/parsimonious explanation for the role of oxygen and toxicity of cyanide (and a bevy of other ions and small molecules). It explains the mechanism of the most fundamental reaction on planet earth: photosynthesis, and the most vital process for all aerobic organisms: respiration. It is also a key mechanism involved in fundamental physiology, like vision/photoreception. In toto, murburn concept revamps the understanding of several facets of cellular function; leading to and stemming from PCHEMS (Powering, Coherence, Homeostasis, Electro-Mechanical & Sensing-response) activities. These new discoveries open up unprecedented avenues and horizons in biology and medicine.

Further Reading

1. Kelath Murali Manoj *et. al*, 2026. Structure and mechanism of cellular cation-transporters: Affinity-binding and murburn models. *Intl. J. Biological Macromolecules*, 150614. doi: 10.1016/j.ijbiomac.2026.150614.
2. Laurent Jaeken & Kelath Murali Manoj. 2025. Murburn bioenergetics and "Origins–Sustenance–Termination–Evolution of Life": Emergence of intelligence from a network of molecules, unbound ions, radicals and radiations. *Intl. J. Molecular Sciences*, 26, 7542. doi: 10.3390/ijms26157542.
3. Kelath Murali Manoj & Laurent Jaeken 2023. Synthesis of theories on cellular powering, coherence, homeostasis and electro-mechanics: Murburn concept & evolutionary perspectives. *J. Cellular Physiology*, 238, 931. doi: 10.1002/jcp.31000.
4. https://en.wikipedia.org/wiki/Murburn_concept

Who can participate

The Forum welcomes all who approach science with objective curiosity. Pre-registration is mandatory for all participants. Registration is free for students and research scholars under the age of 35 (as of June 30, 2026). For all other attendees, a registration fee of ₹1,000 is payable at the venue.

- **Registration closes at midnight of 29 ^{July} Aug (Wed).**
- A sum of Rs. 300 would be collected for on site food/refreshments (2 days) at the time of registration.
- Accommodation arrangements for students can be made at nominal rates (separate payment!) by prior intimation with organizers.

ICAR-CMFRI

Established in 1947, the Indian Council of Agricultural Research - Central Marine Fisheries Research Institute is a premier global authority in tropical marine fisheries research. Its headquarters is in Kochi, Kerala. Driven by a vast multi-decadal database, the Institute supports national policies, estimates marine fish landings, and champions sustainable ecosystem management. Renowned for its breakthroughs in coastal mariculture and open-sea cage farming, ICAR-CMFRI continuously delivers cutting-edge technologies to empower coastal communities, boost fish production, and secure marine livelihoods across India's 11K+ km coastline.



Location: ICAR-CMFRI is situated about 2.5/4 km from the Ernakulam Town/ Junction Railway Station and 3 km from the KSRTC Bus Stand. Nearest Metro station MG Road; nearest bus stop is High Court

SWADESHI SCIENCE MOVEMENT KERALA (SSMK)

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