

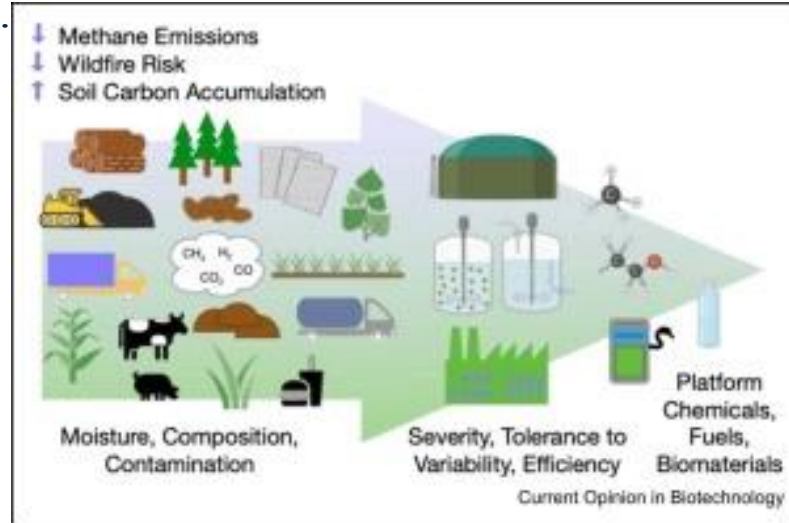
Editorial Reflections on BioEnergy: Perspectives from 2024

Background/Objective

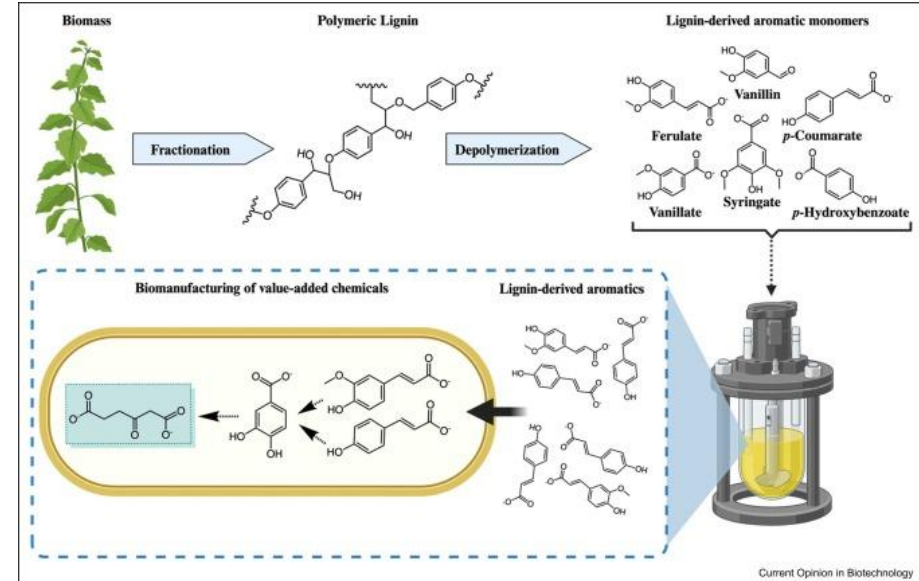
- This special issue of *Current Opinion in Biotechnology* focuses on the challenges in bioenergy and includes twelve reports from prominent international research groups. Our editorial connects the significance of these reports into a thematic collection.

Results & Significance

- Applying cutting-edge advances in synthetic biology, machine learning, and gene editing have yielded important insights into how we can further enable bioenergy and biotechnology to solve these critical challenges. As real-world solutions, understanding the economic constraints of these core processes will enable their widespread adoption and eventual application.



From Scown *et al.*,
doi.org/10.1016/j.copbio.2023.103017



From Liu *et al.*,
doi.org/10.1016/j.copbio.2024.103178

Agarwala S., Curr Opin Biotechnol. doi: 10.1016/j.copbio.2024.103243 (JBEI #1207)

ENABLED PUBLICATIONS

Revealing systematic changes in the transcriptome during the transition from exponential growth to stationary phase

Background/Objective

- The composition of bacterial transcriptomes is determined by the transcriptional regulatory network (TRN)
- The TRN regulates the transition from one physiological state to another.

Approach

- We used independent component analysis to monitor the composition of the transcriptome during the transition from the exponential growth phase to the stationary phase
- With *E. coli* K-12 MG1655 as a model strain, we trigger the transition using carbon, nitrogen, and sulfur starvation

Results

- The transition to the stationary phase accompanies common transcriptome changes, including increased stringent responses and reduced production of cellular building blocks and energy regardless of the limiting element

Significance/Impacts

- This study demonstrates how the combination of genome-scale datasets and new data analytics reveals the fundamental characteristics of a key transition in the life cycle of bacteria.

Lim, H. G., et. al. mSystems. doi: 10.1128/msystems.01315-24 (JBEI #106)

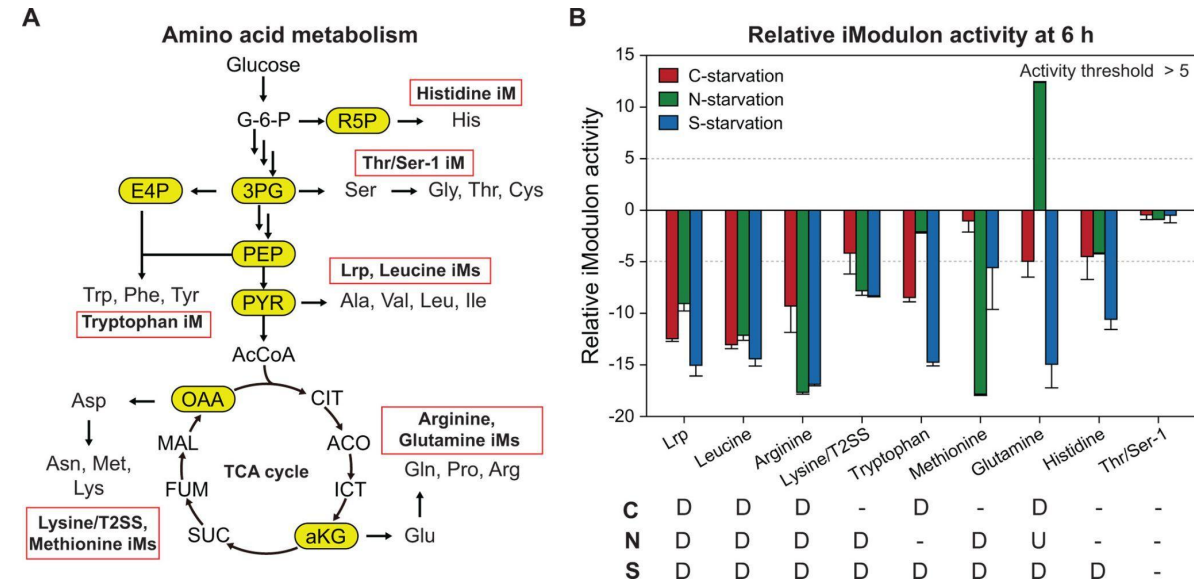


Figure: Different activity changes of amino acid metabolism-related iModulons. (A) Simplified metabolic pathway map for amino acid metabolism and related iModulons. (B) Relative iModulon activity at 6 h compared with their activities in the C-limiting condition at 3 h. “D”, “U”, and “-” indicates “downregulation,” “upregulation,” and “no change,” respectively, with an activity threshold of 5.