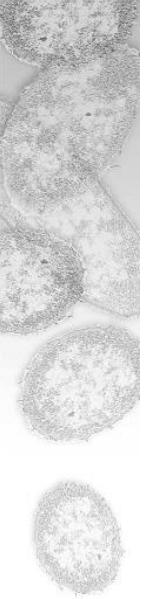


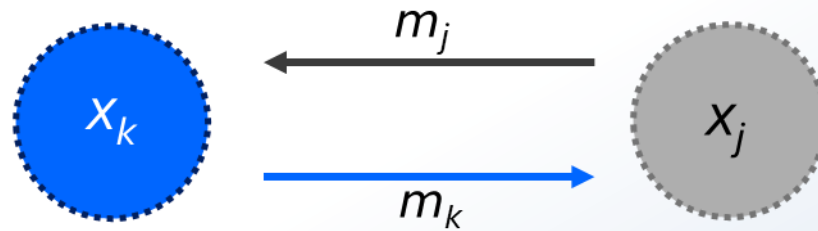


Cellular Economics of Exchanged Metabolites Alter Ratios of Microbial Trading Partners



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Opportunity Costs and Metabolic Burden



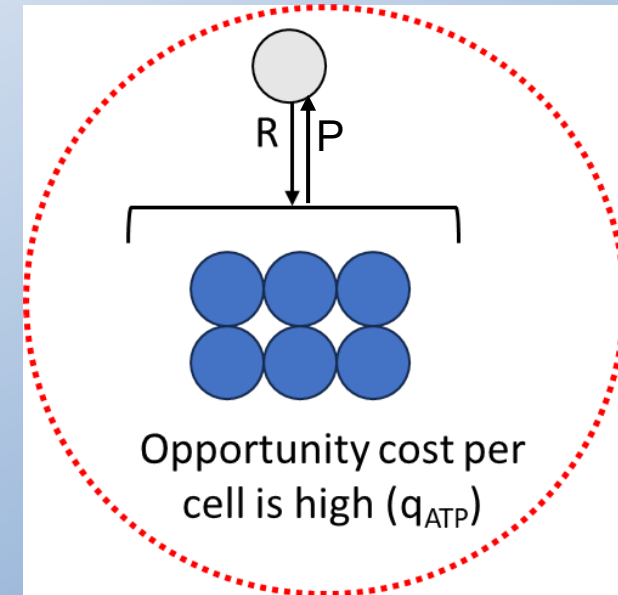
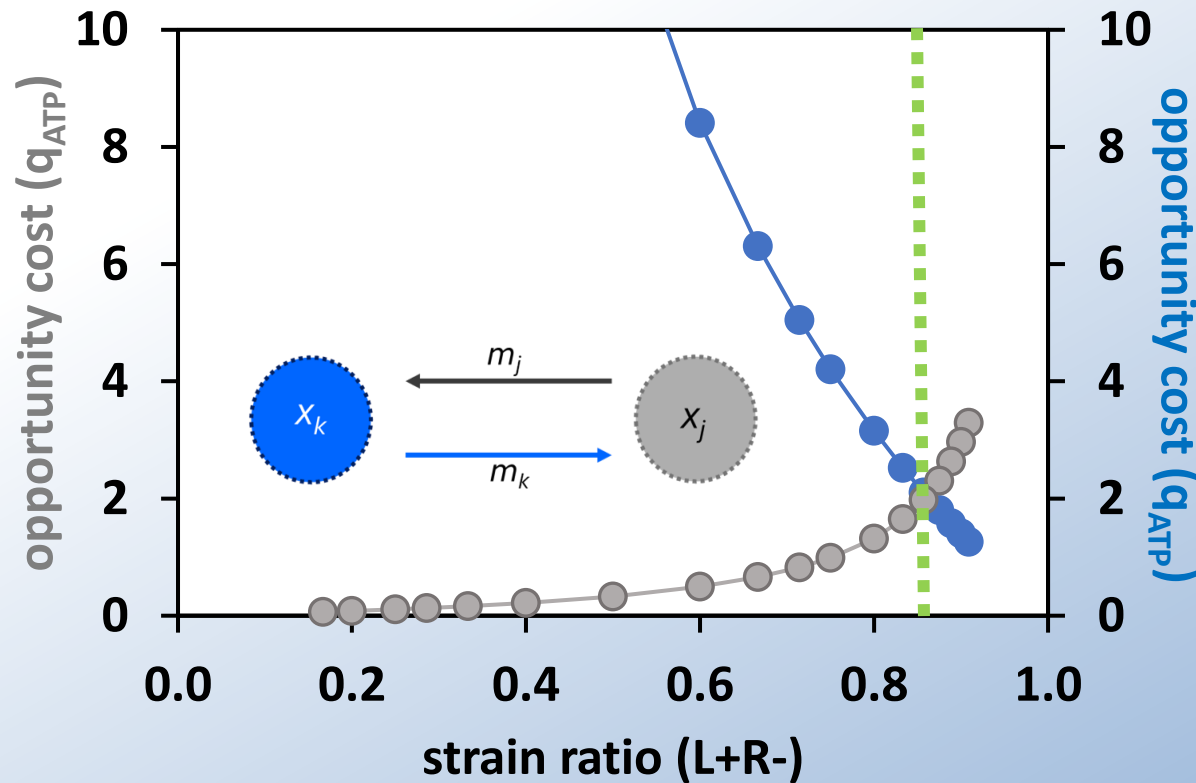
Hypothesis: during obligate metabolite exchange, cells exchange equitable quantities of the resources.

Equitable can be quantified as the number of ATP bonds that could be made if the exchanged metabolite were instead retained and catabolized.

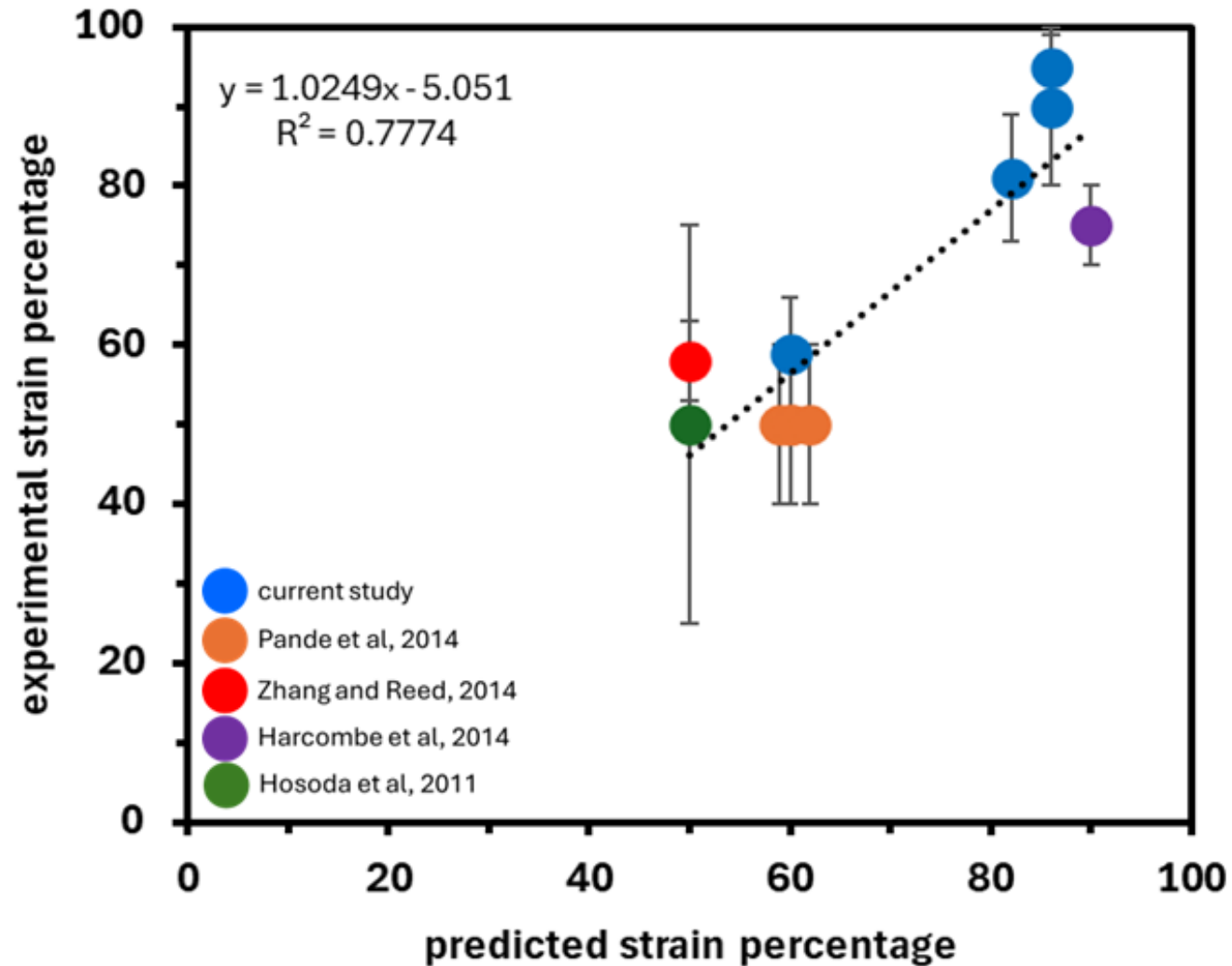
Hypothesis: Consortia will Assemble at Ratios where Each Strain Bears Similar Metabolic Burden

ATP equivalent balance:

$$\frac{dATP_k}{dt} = G_{atp,k} - q_{x,k} - q_{atp,k} - q_{mx,k} + q_{mx,j}$$



Theory Predicts Trading Partner Ratios



Conclusions

- 1) Obligate cross feeding consortia assemble at ratios consistent with equal metabolic burden.
- 2) Altering the cellular cost of exchanged metabolites shifted consortia ratios in predictable manner.
- 3) Theory consistent with seven published consortia.

