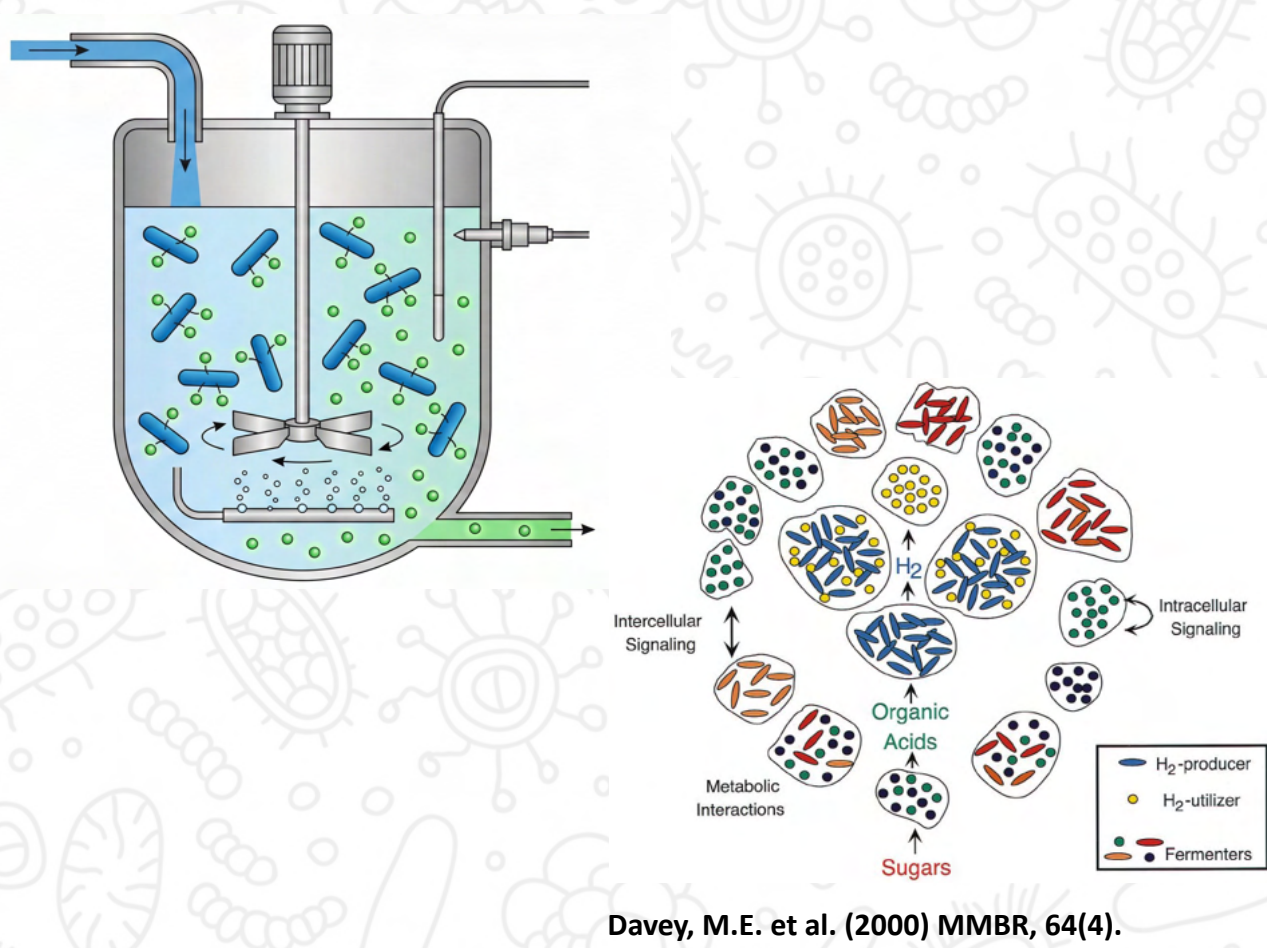


Distributing Chemical Reactions between Cell Populations: Exemplar Studies

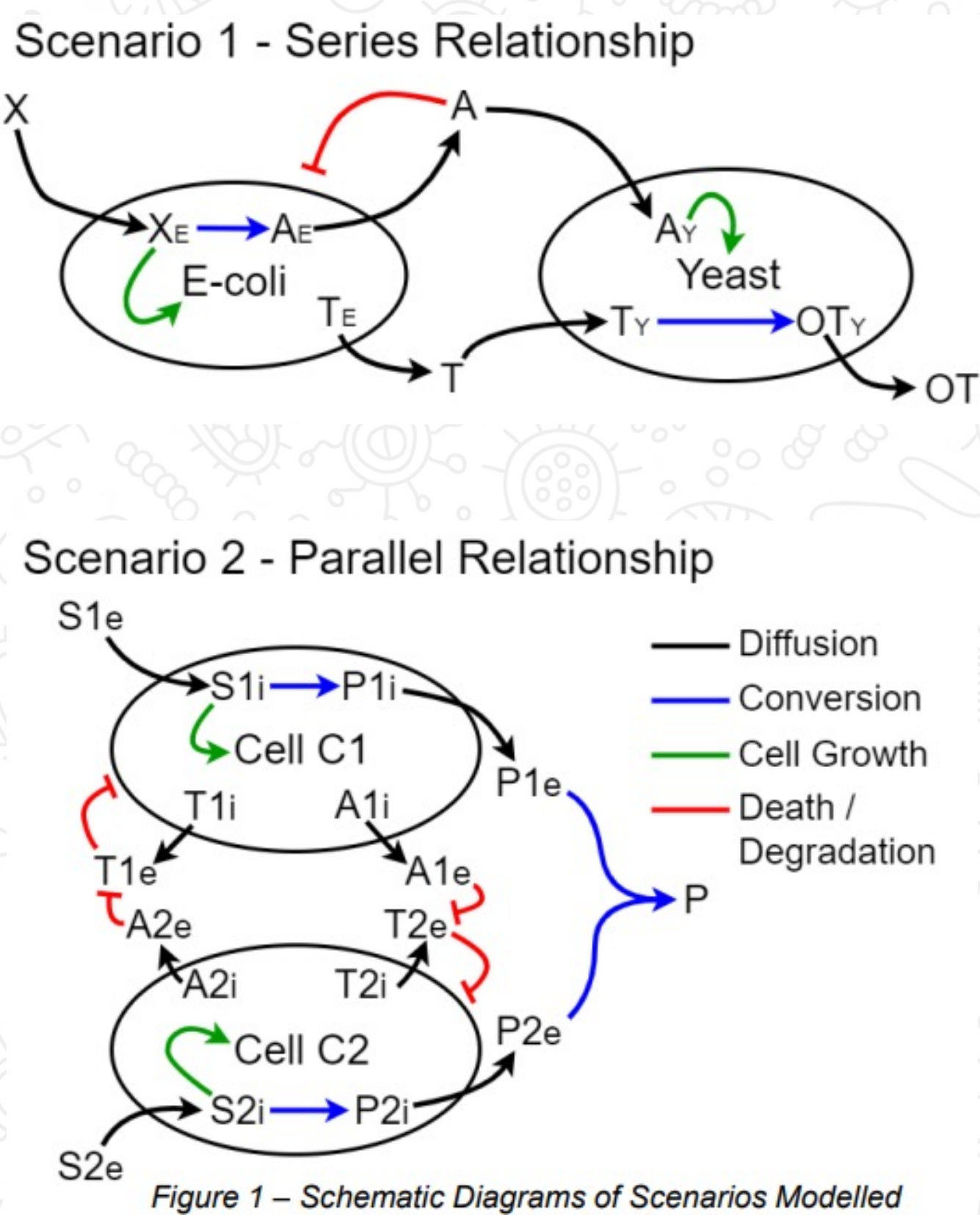
Chinmay K. Haritas & Sameer Sekhri
with J. Krishnan

1. Context

1. Microbial manufacturing is pivotal to many biochemical products.
2. Compared to single-species cultures, **communities of microbes** can handle immensely more complex processes.
3. There are unexplored complex-system advantages like burden distribution and robustness!



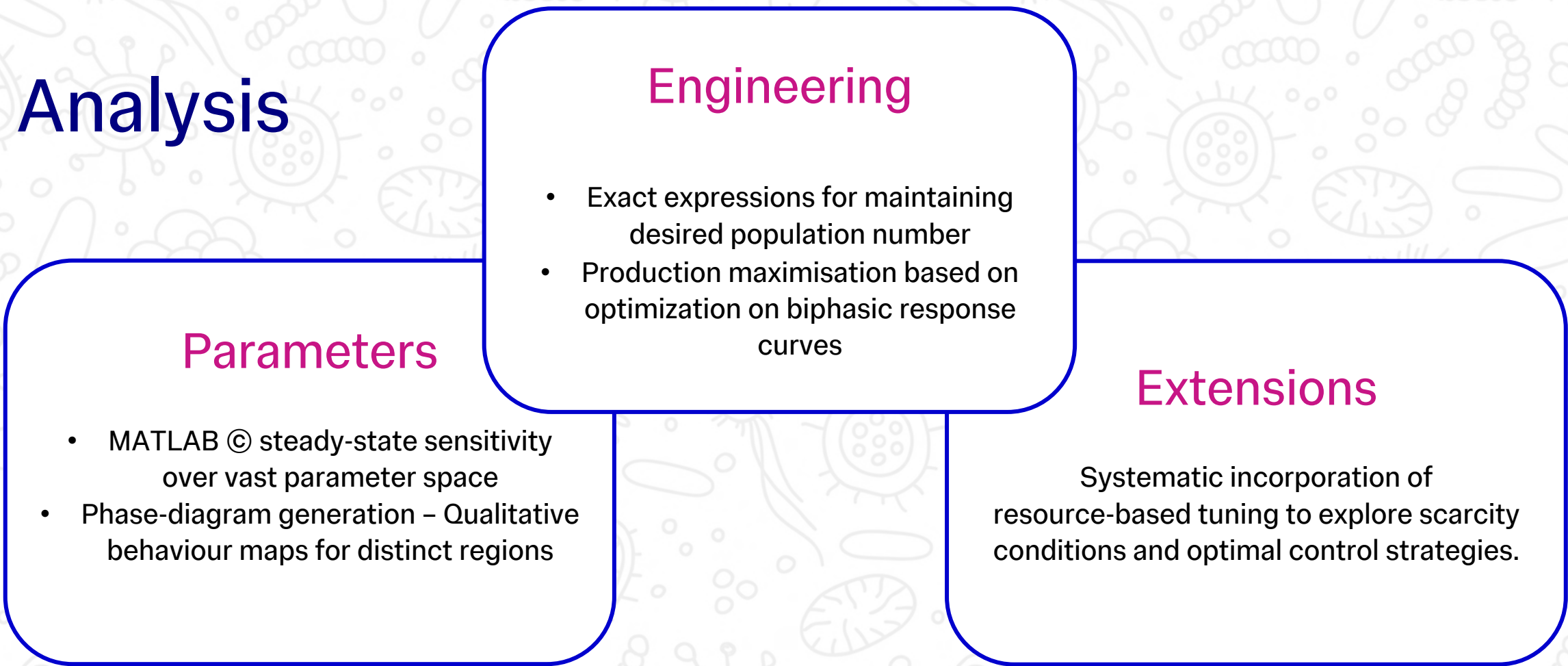
Lack of theory blocks our ability to apply techniques from single-species cultures to microbial communities



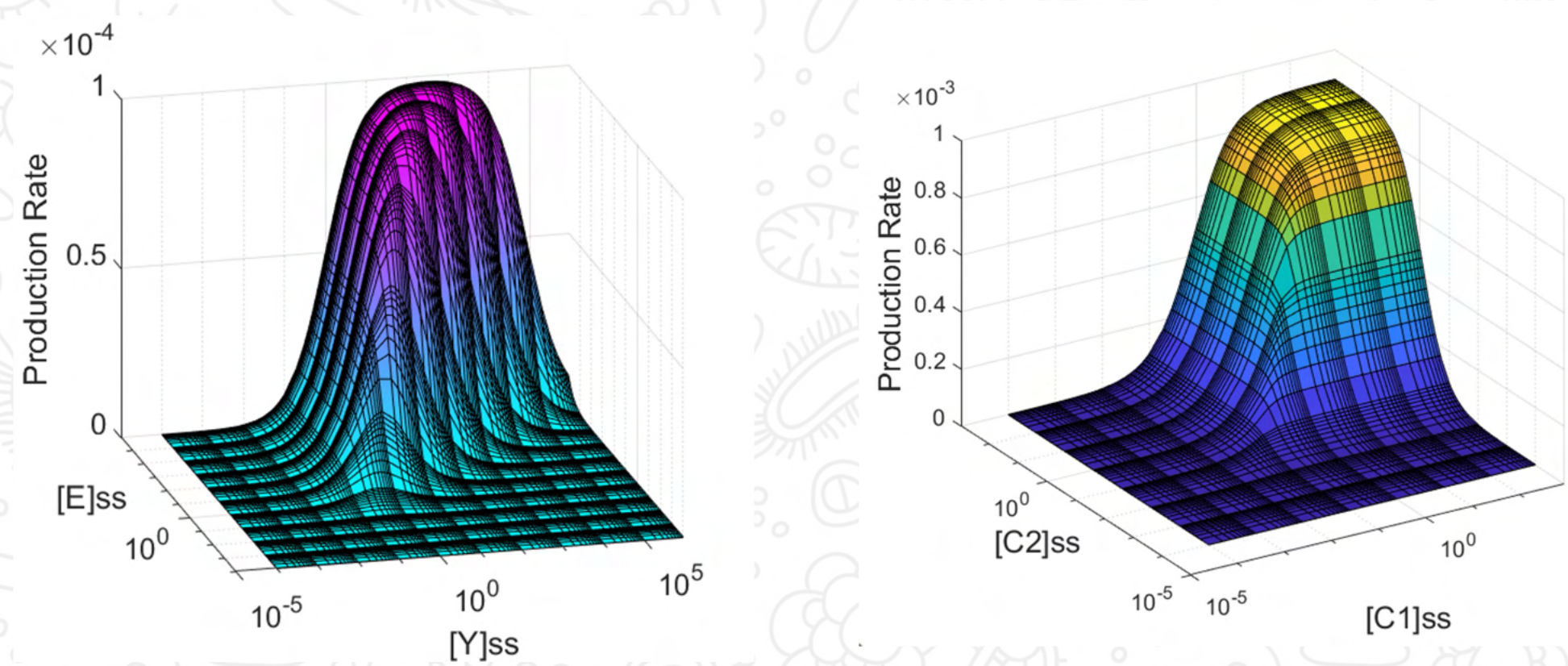
2. Model Construction1

1. Engineered chemical interactions – toxin-antitoxin motif to create a **stable community**.
2. Population modelling **built from ground-up**, having reviewed existing population-level models, and in accordance.
3. Model motif **well-established in experimental studies** and therefore extended.
4. Constructed ODE models with only necessary assumptions – results **readily verifiable**.

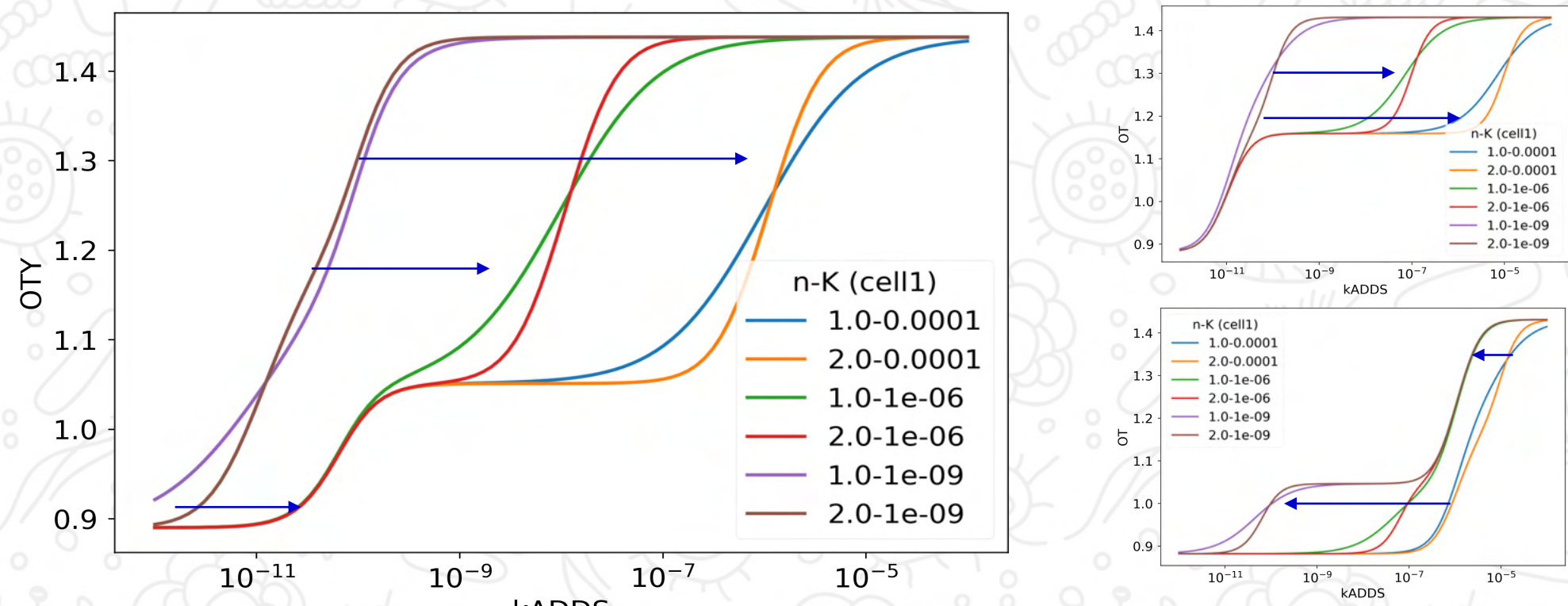
3. Analysis



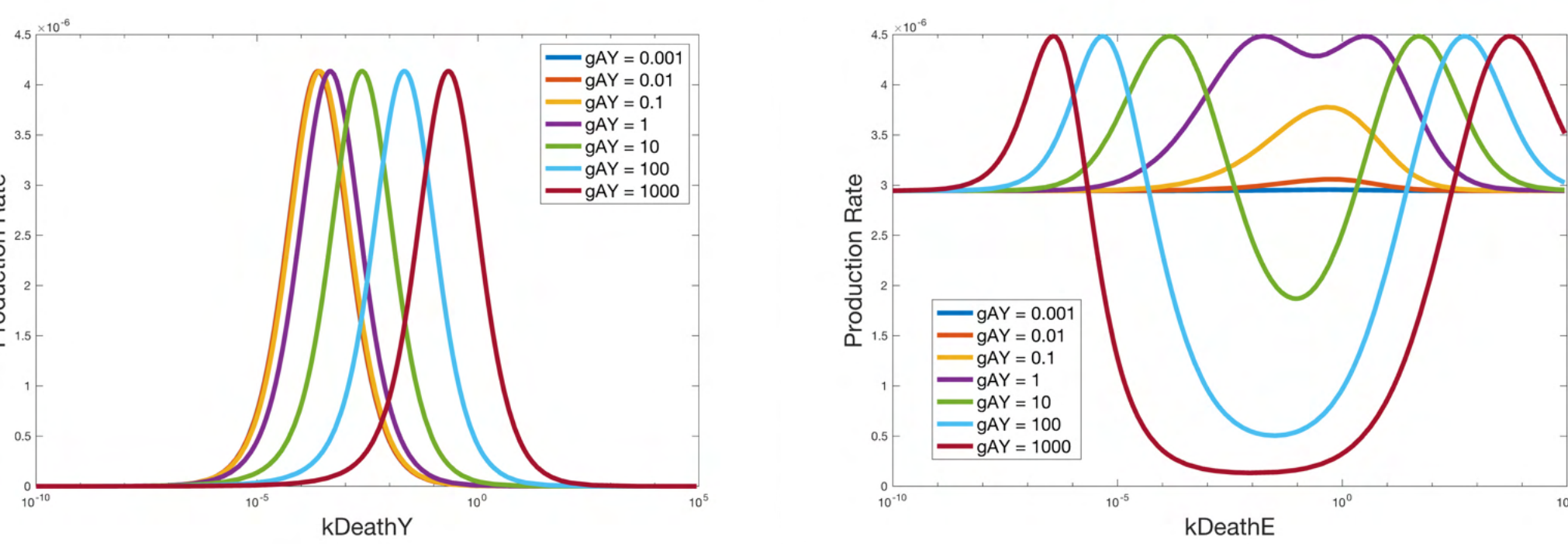
Solved production rate!



Resource-limited control



Non-trivial Biphasic



Ultrasensitive steady states

