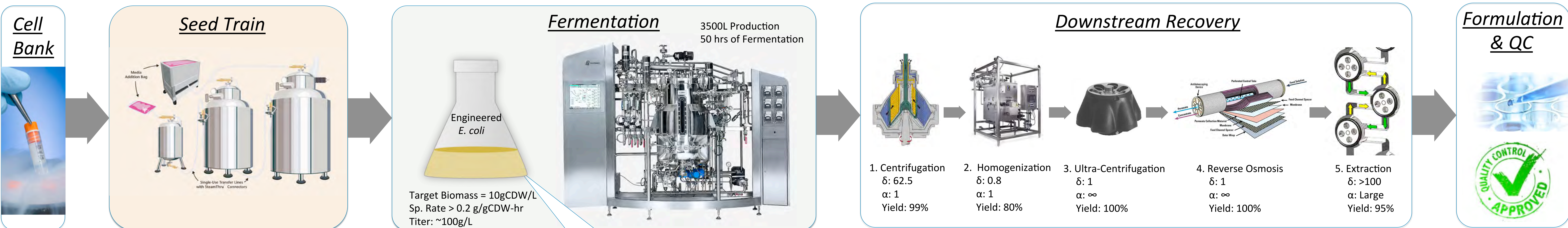




A Bioprocess Design for Microbial Production of Taxol

Banskota, S., Ciesla T.J., Moreb, E.
BME 590-02 Fall 2015

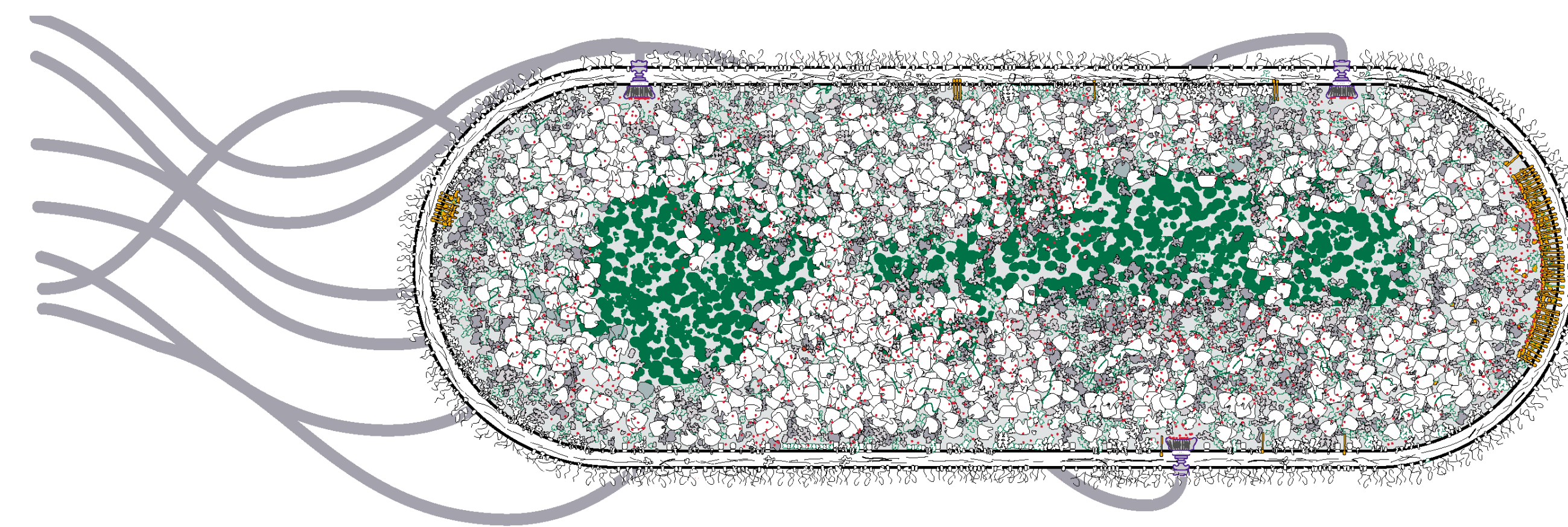
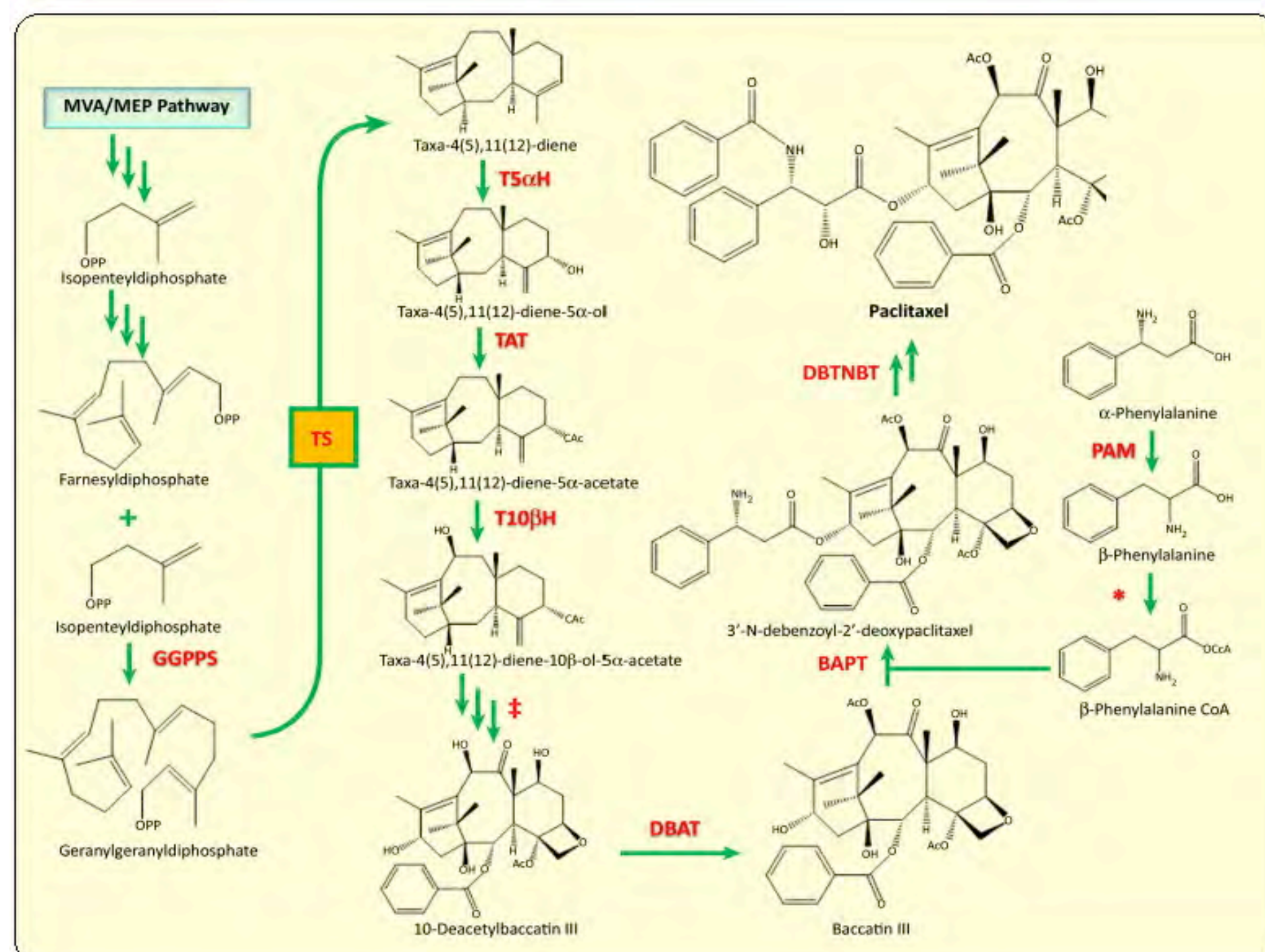
Taxol Bioprocess Design



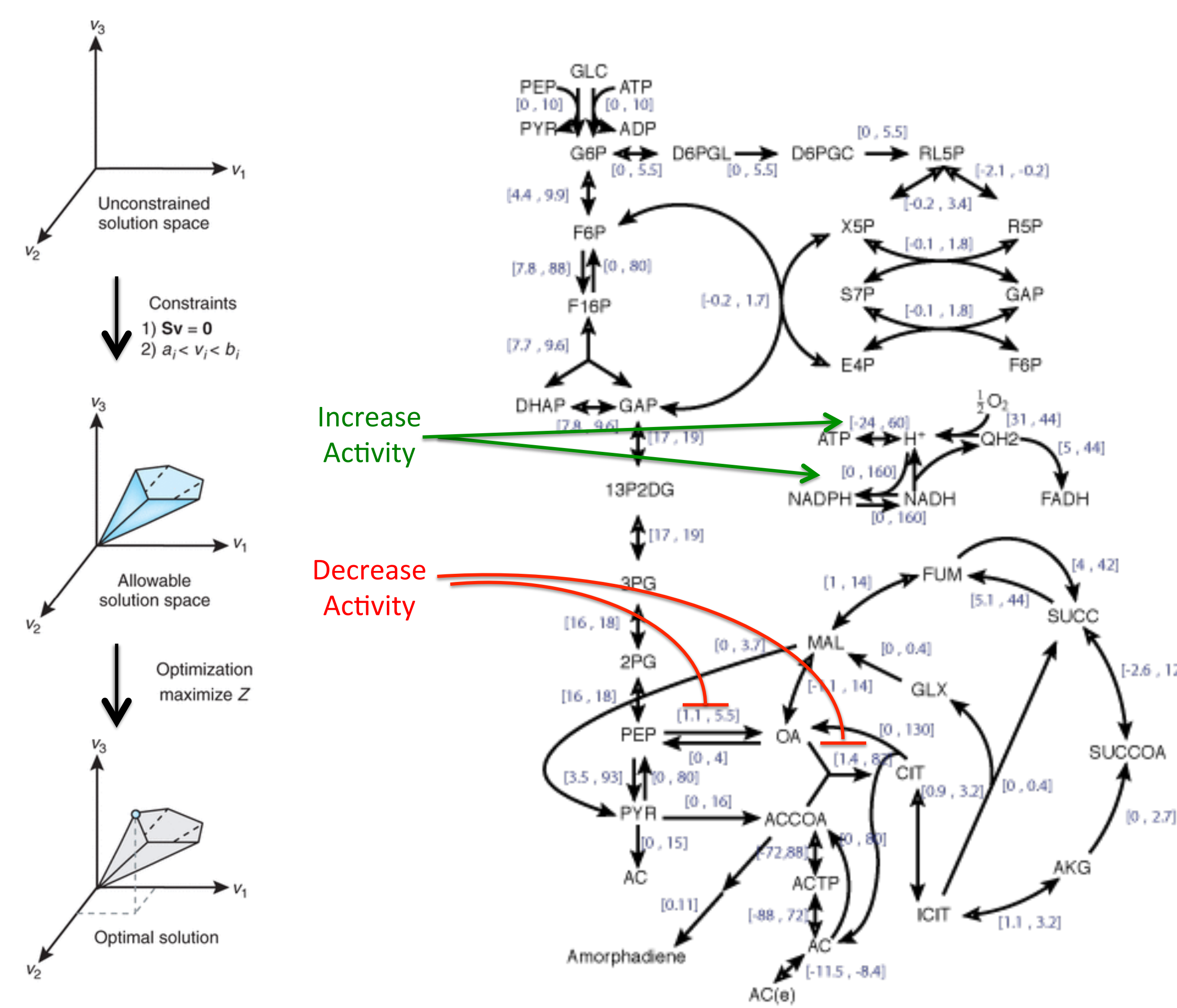
Strain Design

Techoeconomic Analysis

Metabolic Pathway Engineering



Host Strain Engineering



Problem:

Paclitaxel (Taxol) is a small molecule drug belonging to the taxane family. It is one of the most commonly used chemotherapeutics, used for treatment of many cancers, as a monotherapy or in combination with other drugs to treat breast, lung and ovarian cancer as well as Kaposi's sarcoma. Taxol is on the World Health Organization's (WHO) List of Essential Medicines, a list that includes most the important medications for basic health. The worldwide demand for paclitaxel is exceeding the current supply. In addition the current cost of paclitaxel limits use in many parts of the developing world. Lower cost sources of paclitaxel can have an immediate impact to human health world-wide. Currently taxol is approved in the U.S. as first line of treatment for breast, ovarian and non-small cell lung cancer. The annual new cases of these cancers are ~ 540,000 in the United States.

Market Size: US Market : 1100 kg per year.

Process Design included:

- Genetically Engineered *E. coli* Strain
 - Heterologous Taxol Production Pathway
 - Engineered Host Strain
- GMP Fermentation Process
- 5 Step Downstream Recovery Process

Results:

Our conceptual design results in cost competitive production

- \$0.43/mg - including a 25% Return
- ~\$ 5M in Capital investment
- Current Pricing is ~ \$0.50/mg

