# Fitting against PNAS 11 growth curves

The goal of this experiment is to run the model of co-cultures for multiple phototroph-autotroph virtual species (generated by assigning a set of parameter values per species). The results will be clustered to see different growth dynamics. and implied physiological process. A subgoal is to suggest processes explaining the diversity of dynamics reported in the PNAS11 paper.

## Model variables:

For species *i*:

* *Xi* – number of cells
* *Bij* – species *i* biomass of nutrient *j* (do not distinguish between organic and inorganic)

(T – Inorganic / Organic)

For nutrient j:

* *ROj* – concentration of organic nutrient *j* in the media
* *RIj* – concentration of inorganic nutrient *j* in the media
* possibly can add refractory organic nutrient. Only change is in Roj

### Model parameters:

parameters per species:

General params:

|  |  |  |
| --- | --- | --- |
| Param | Description | Value |
| u\_inf | Infinite growth rate |  |
| m | Mortality rate |  |

Params per species and nutrient

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Param \ nutrient | Description | N | | C | |
|  |  | Organic | Inorganic | Organic | Inorganic |
| Qmin | Min quota |  |  |  |  |
| Qmax | Max quota |  |  |  |  |
| Vmax | Max uptake rate |  |  |  |  |
| K | Half saturation |  |  |  |  |
| Excretion | Excretion rate |  |  |  |  |
| Gamma | Fraction of inorganic matter released |  |  |  |  |
| Gamma refractory | Fraction of organic refractory matter (from all organic matter) |  |  |  |  |

30 params per species