

# growth\_curves

July 19, 2022

## 0.1 96 well raw data growth experiment analysis

<IPython.core.display.Javascript object>

<IPython.core.display.HTML object>

<IPython.core.display.HTML object>

## 1 Raw data file parsing and virtual plate layout creation

Plate ID is: Plate 1

Time interval is: 10.0 minutes

The time difference between [359.55] and [1029.55]is: 670.0 minutes

The number of missing time points for the whole plate is: 67.0

Zero values measured:

No zero values detected for the samples on the plate

Blank progression:

NC\_NB:

NC\_NB A4 didn't show growth

NC\_NB A5 didn't show growth

NC\_NB A6 didn't show growth

NC\_TSB:

NC\_TSB B4 didn't show growth

NC\_TSB B5 didn't show growth

NC\_TSB B6 didn't show growth

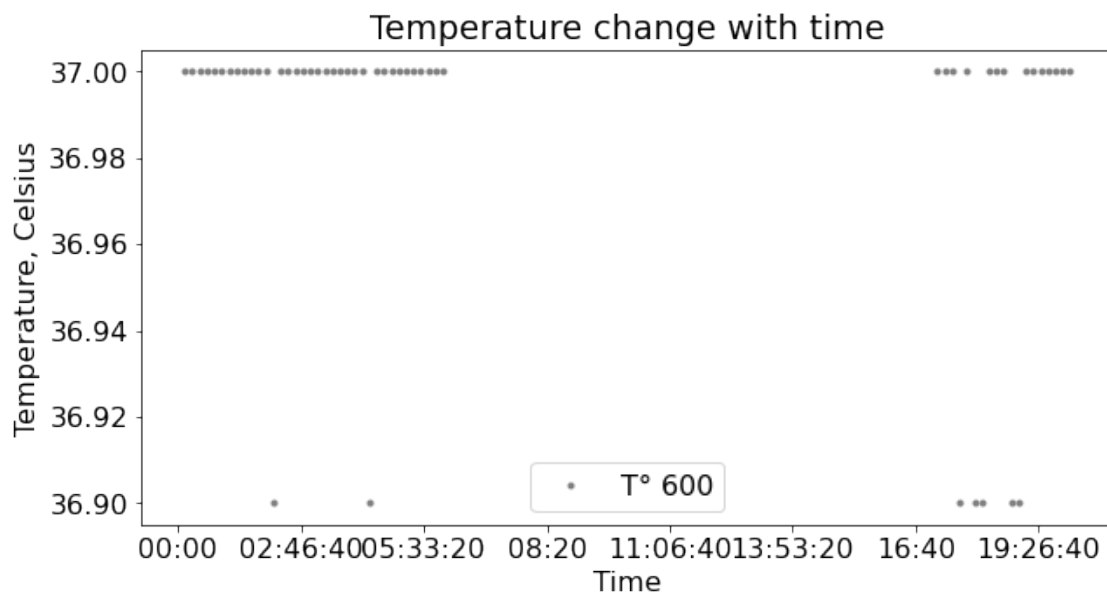
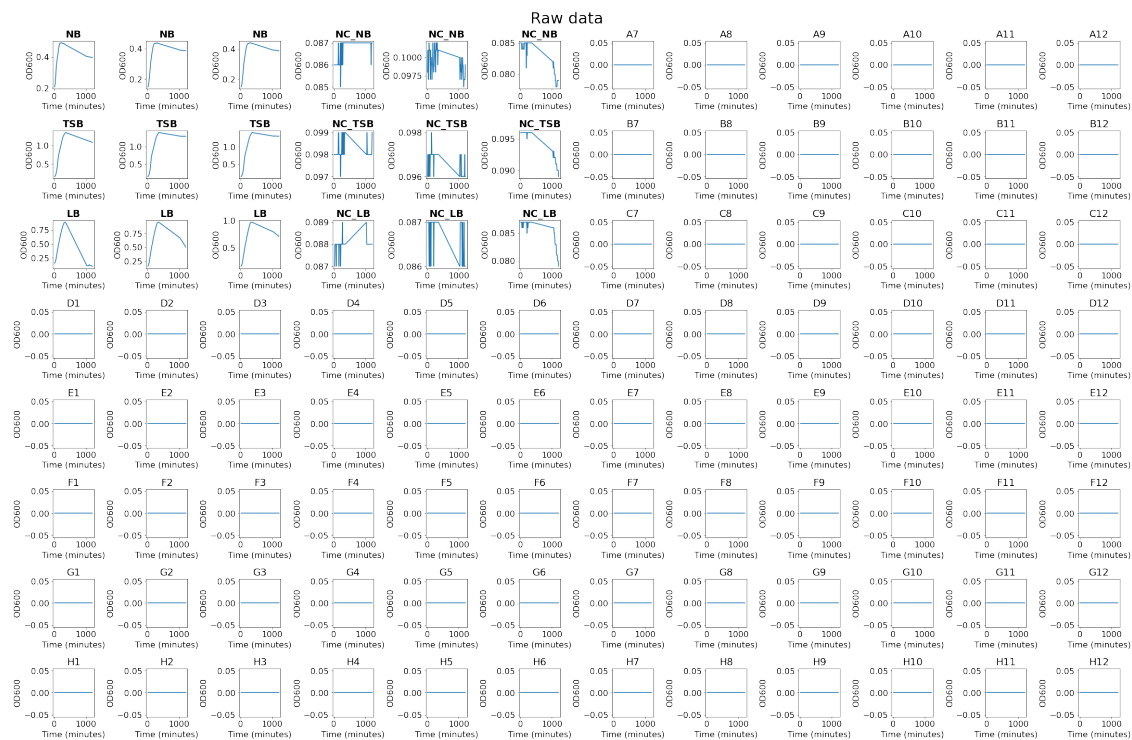
NC\_LB:

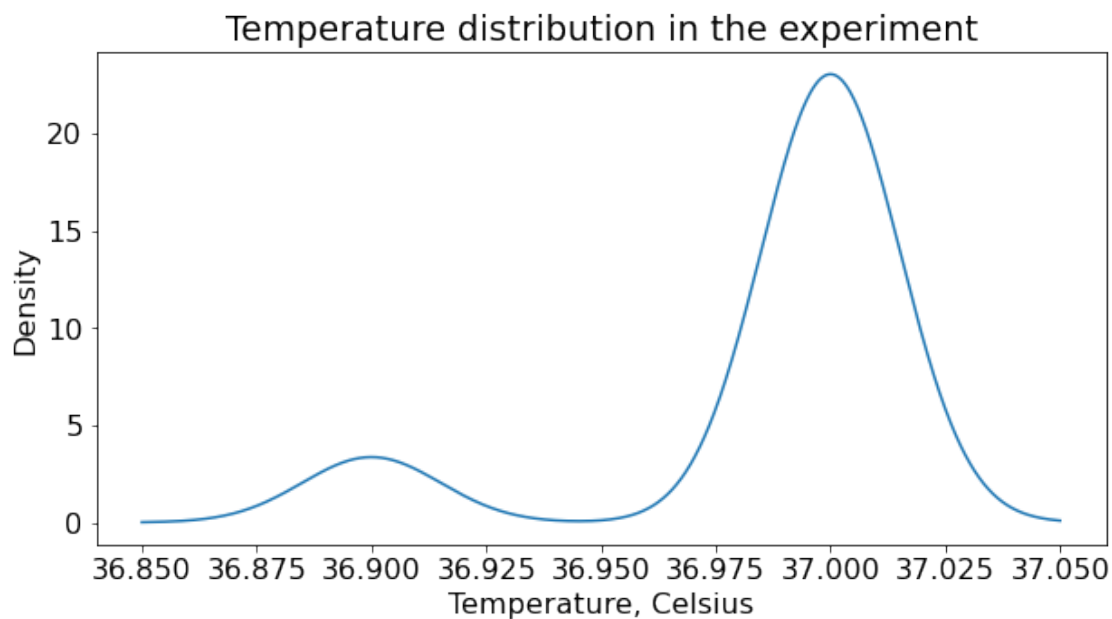
NC\_LB C4 didn't show growth

NC\_LB C5 didn't show growth

NC\_LB C6 didn't show growth

## 2 Plate raw data overview



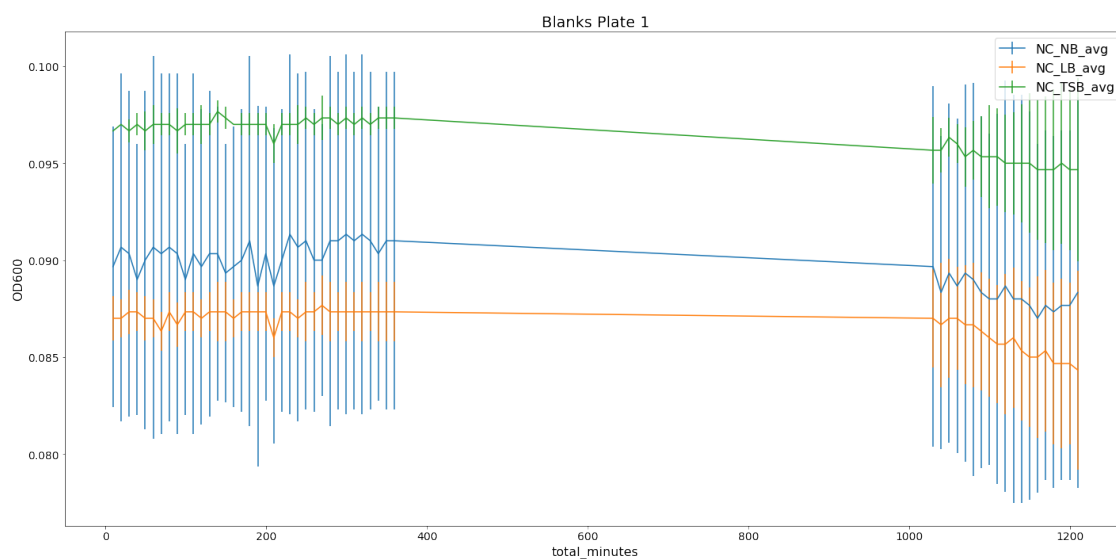


### 3 Blank subtraction

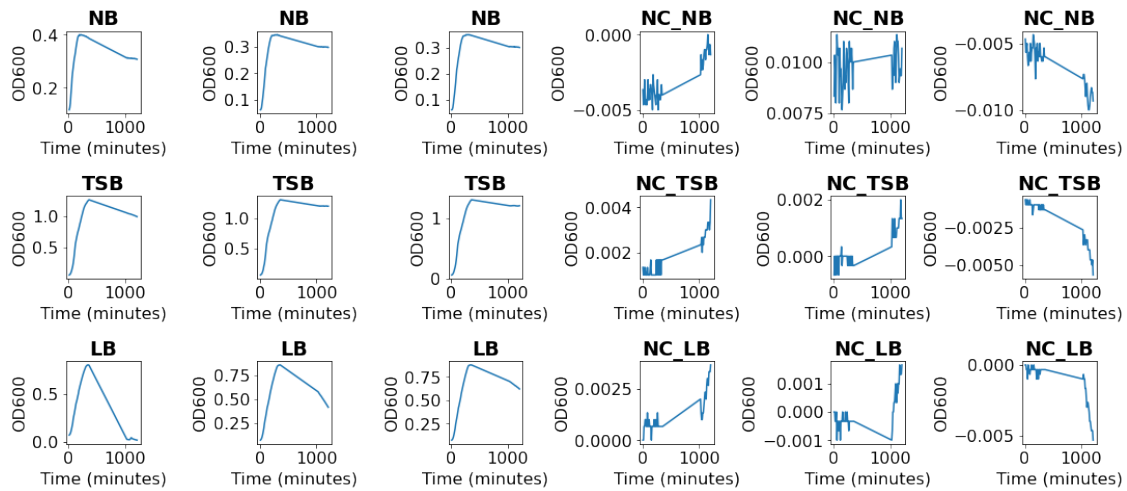
After reading the plate, identify samples by loading a sample file

55it [00:00, 1281.79it/s]

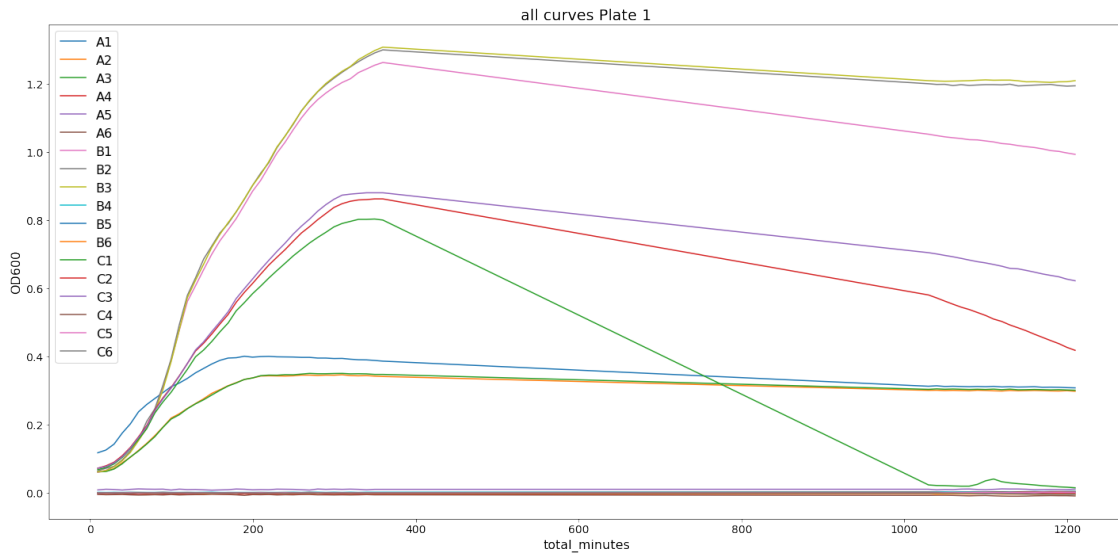
<Figure size 432x288 with 0 Axes>



## Raw data after blank



<Figure size 432x288 with 0 Axes>



## 4 Add log2 values

Growth/no growth report:

NB:

A1: Growth

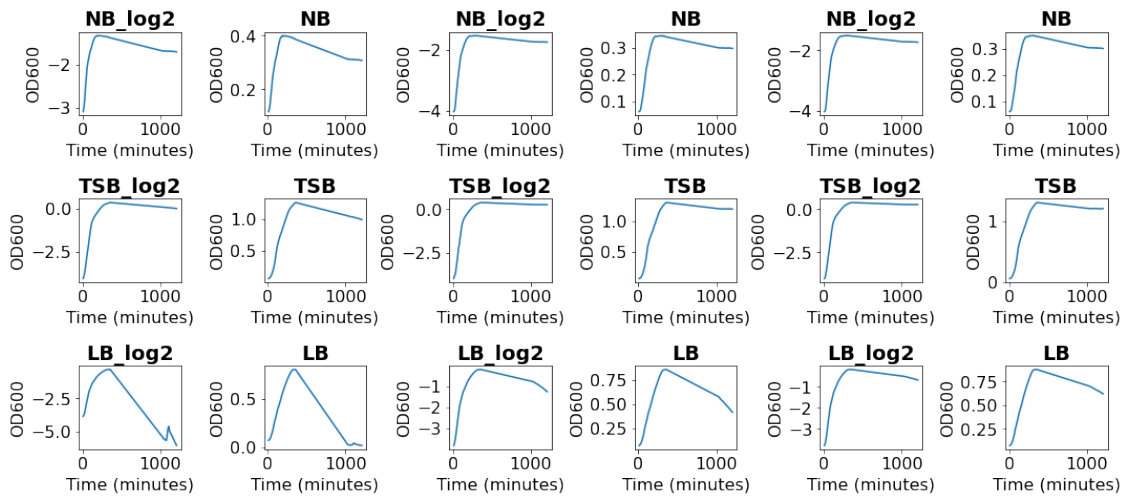
A2: Growth

A3: Growth

TSB:

B1: Growth  
 B2: Growth  
 B3: Growth  
 LB:  
 C1: Growth  
 C2: Growth  
 C3: Growth

Raw and log2 after blank



## 5 Get metrics for all the sample wells curves

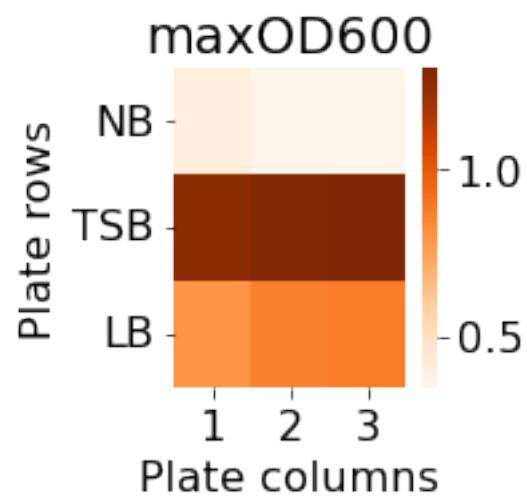
```
[64]: sample_name well plate_id maxOD600 Maximum_slope Doubling_time \
0      NB      A1  Plate 1  0.400333      0.025085      39.863905
1      NB      A2  Plate 1  0.346000      0.023807      42.003657
2      NB      A3  Plate 1  0.350000      0.022113      45.222373
3      TSB     B1  Plate 1  1.261667      0.034028      29.387500
4      TSB     B2  Plate 1  1.298667      0.038634      25.883756
5      TSB     B3  Plate 1  1.306667      0.034811      28.726583
6      LB      C1  Plate 1  0.802667      0.029941      33.399438
7      LB      C2  Plate 1  0.861667      0.029689      33.682148
8      LB      C3  Plate 1  0.879667      0.030824      32.442596

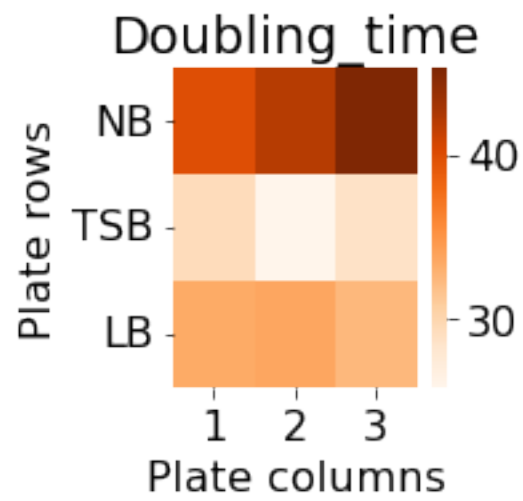
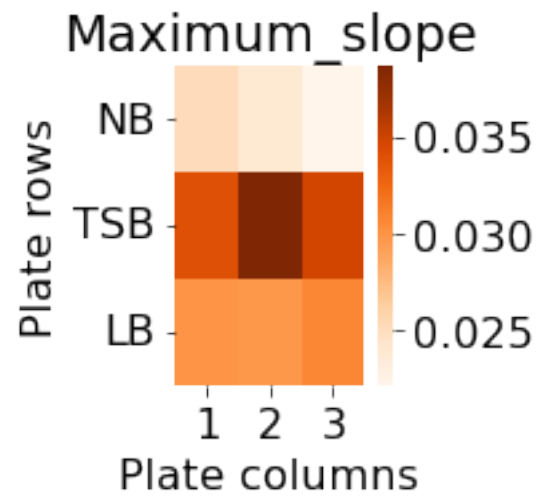
Time_to_reach_maxOD600_(minutes) Maximum_slope_OD \
0      189.55      0.202000
1      309.55      0.144667
2      269.55      0.142667
3      359.55      0.309333
4      359.55      0.209000
5      359.55      0.384000
```

|   |        |          |
|---|--------|----------|
| 6 | 349.55 | 0.157000 |
| 7 | 349.55 | 0.164000 |
| 8 | 339.55 | 0.162000 |

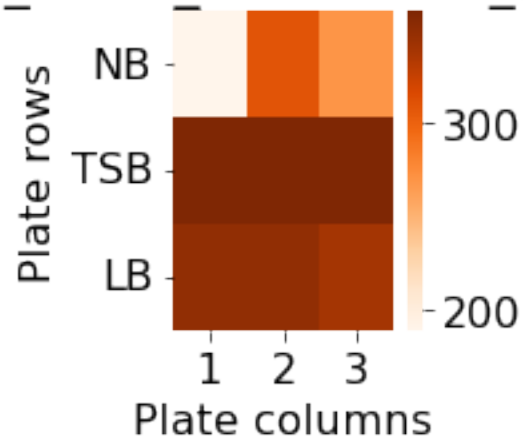
|   | Time_to_reach_max_slope_(minutes) |
|---|-----------------------------------|
| 0 | 49.55                             |
| 1 | 69.55                             |
| 2 | 69.55                             |
| 3 | 89.55                             |
| 4 | 69.55                             |
| 5 | 99.55                             |
| 6 | 59.55                             |
| 7 | 59.55                             |
| 8 | 59.55                             |

## 6 Plot the plate in a per metric look for column selection

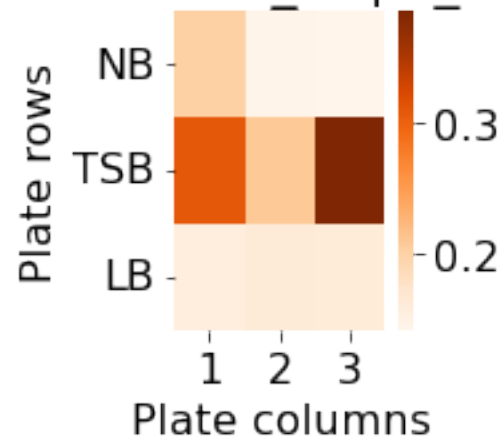




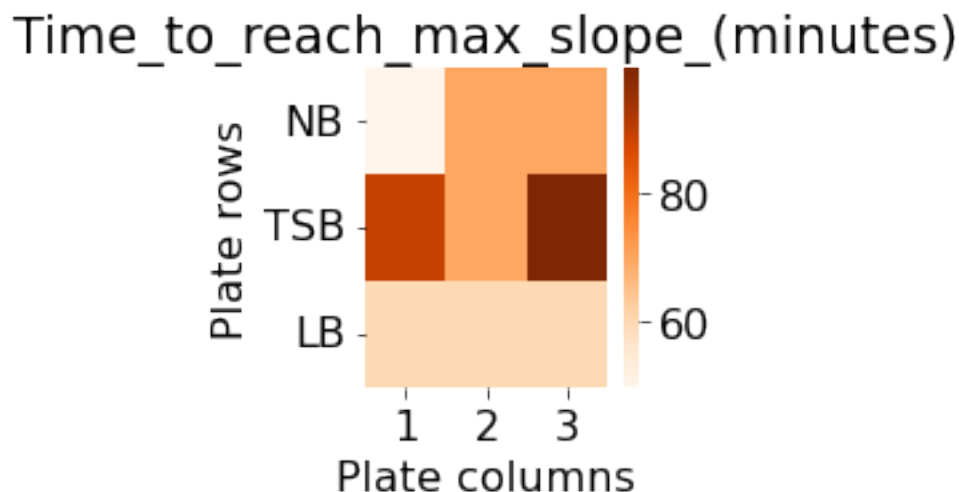
Time\_to\_reach\_maxOD600\_(minutes)



Maximum\_slope\_OD







## 7 Select columns to remove from the table

The code will drop two columns for each choice - one for the od values and one for the log2 values

<IPython.lib.display.IFrame at 0x1918950d4e0>

## 8 Continue analyzing with consolidated, cleaned data

Plotting the growth curves

```
[68]: sample_name well plate_id maxOD600 Maximum_slope Doubling_time \
0      NB      A1  Plate 1  0.400333      0.025085      39.863905
1      NB      A2  Plate 1  0.346000      0.023807      42.003657
2      NB      A3  Plate 1  0.350000      0.022113      45.222373
3      TSB     B1  Plate 1  1.261667      0.034028      29.387500
4      TSB     B2  Plate 1  1.298667      0.038634      25.883756
5      TSB     B3  Plate 1  1.306667      0.034811      28.726583
6      LB      C1  Plate 1  0.802667      0.029941      33.399438
7      LB      C2  Plate 1  0.861667      0.029689      33.682148
8      LB      C3  Plate 1  0.879667      0.030824      32.442596

Time_to_reach_maxOD600_(minutes) Maximum_slope_OD \
0      189.55      0.202000
1      309.55      0.144667
2      269.55      0.142667
3      359.55      0.309333
4      359.55      0.209000
5      359.55      0.384000
6      349.55      0.157000
```

|   |        |          |
|---|--------|----------|
| 7 | 349.55 | 0.164000 |
| 8 | 339.55 | 0.162000 |

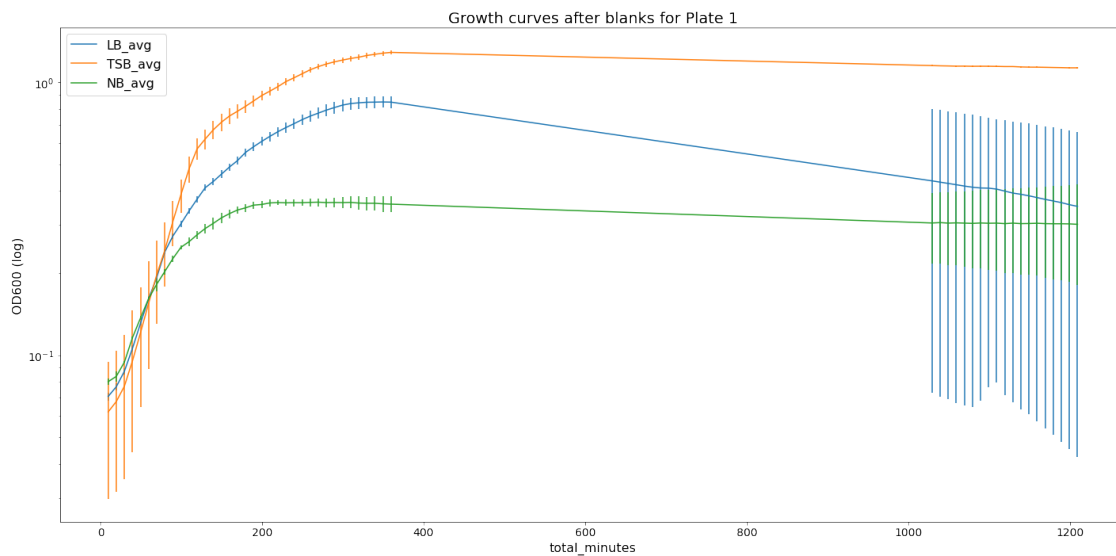
|   | Time_to_reach_max_slope_(minutes) |
|---|-----------------------------------|
| 0 | 49.55                             |
| 1 | 69.55                             |
| 2 | 69.55                             |
| 3 | 89.55                             |
| 4 | 69.55                             |
| 5 | 99.55                             |
| 6 | 59.55                             |
| 7 | 59.55                             |
| 8 | 59.55                             |

## 9 Consolidate curve and parameter data

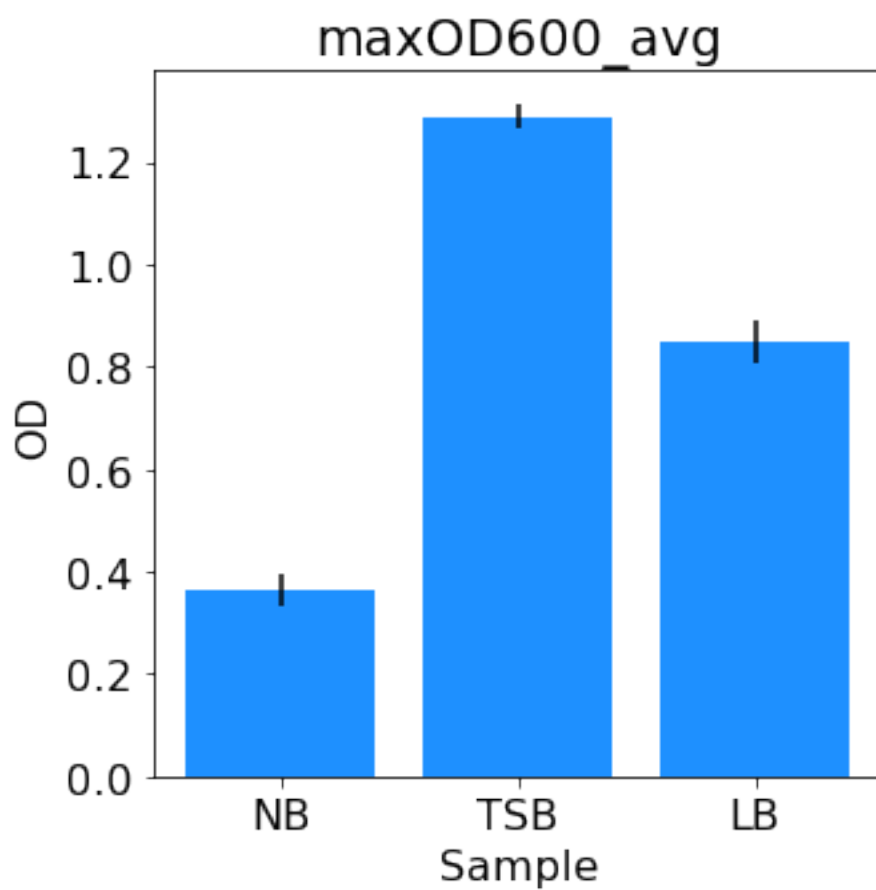
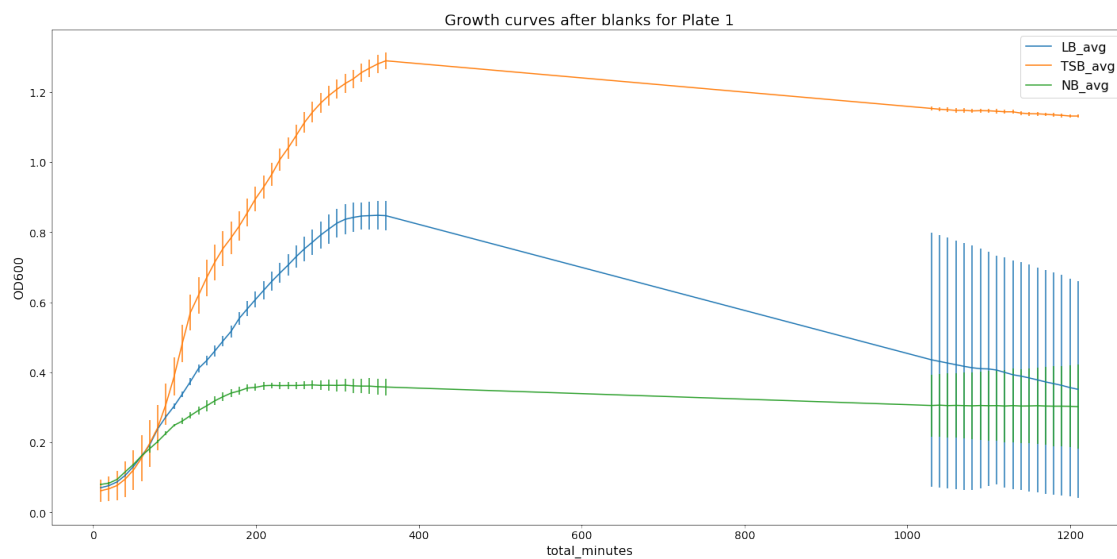
Calculate the average and standard deviation of sample using the wells that are left.

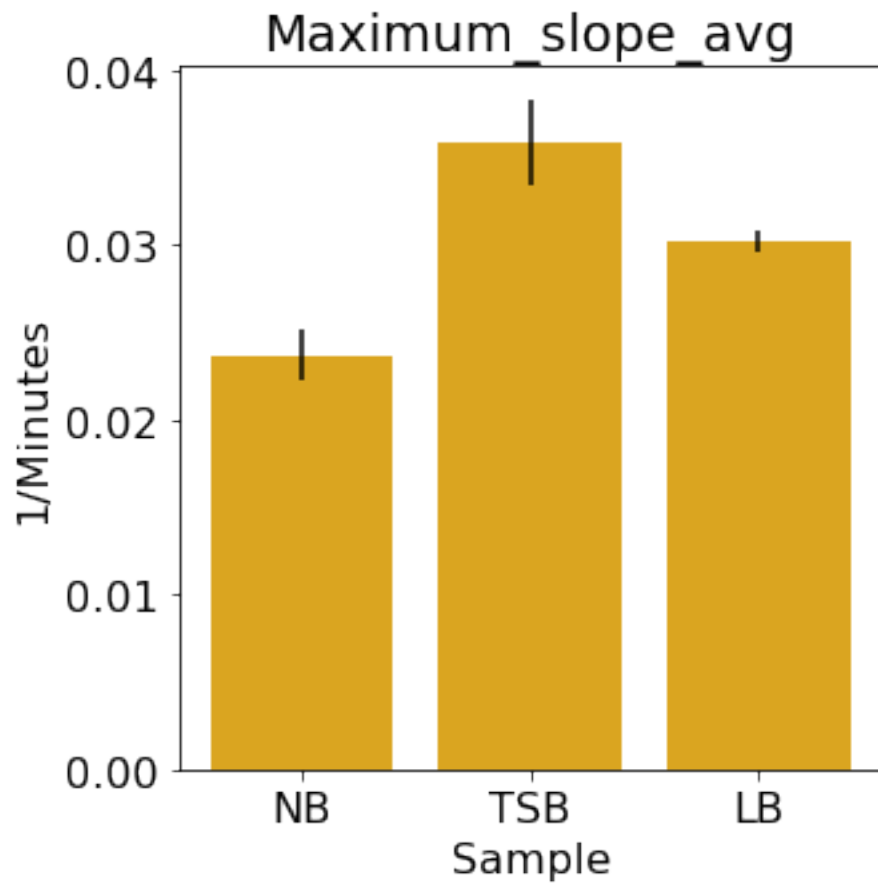
55it [00:00, 2199.93it/s]

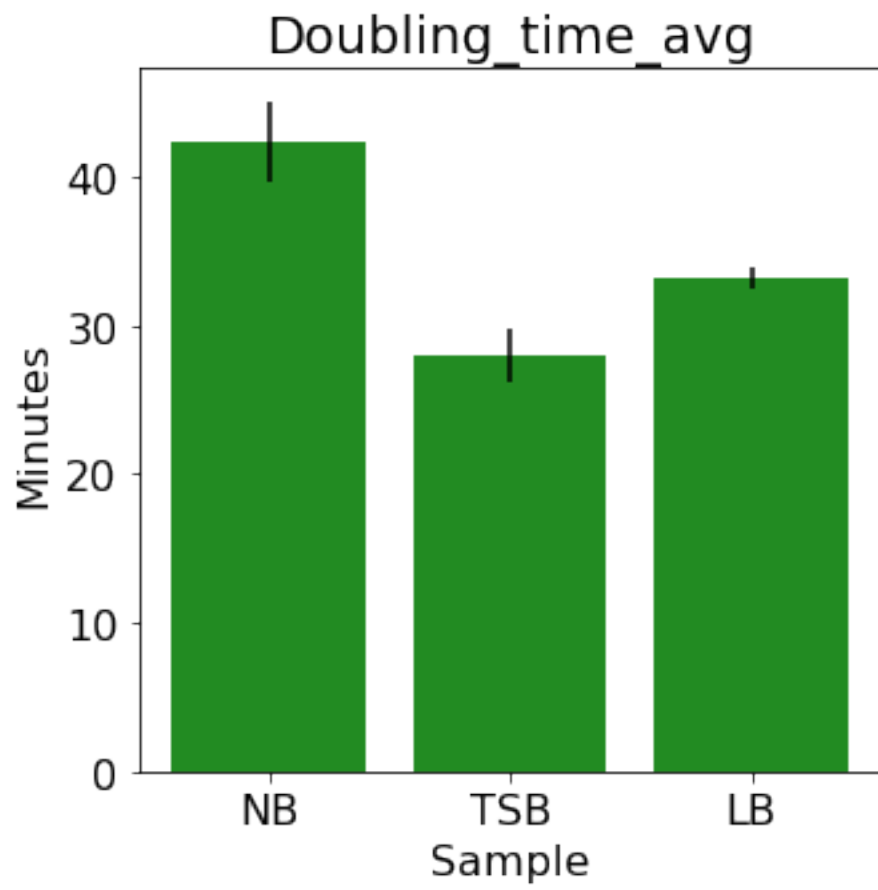
<Figure size 432x288 with 0 Axes>



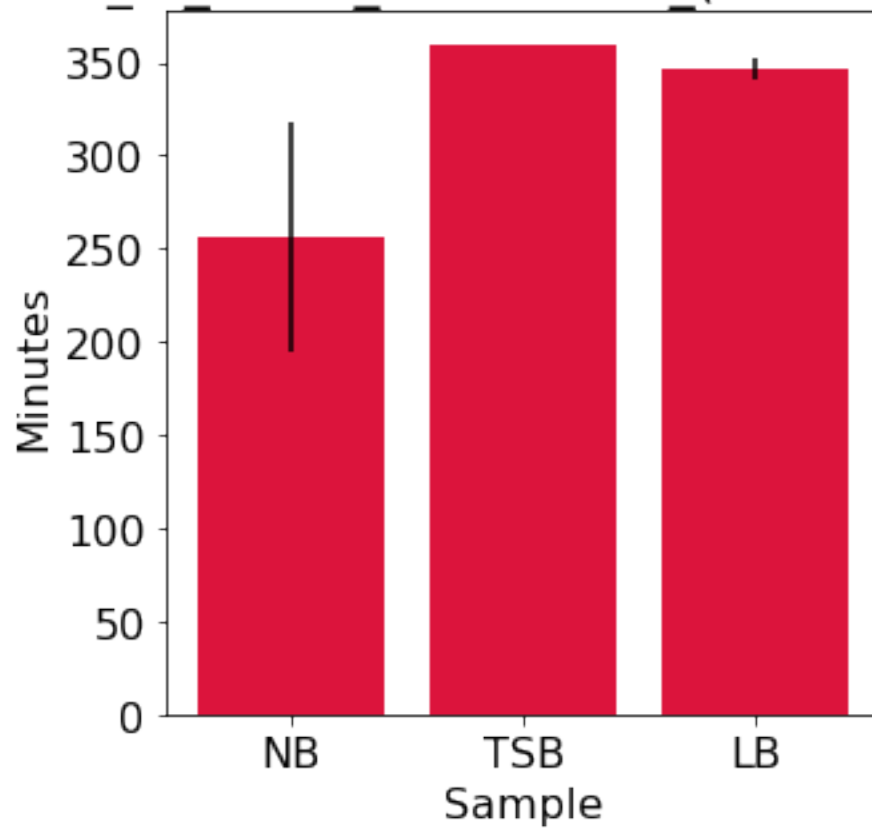
<Figure size 432x288 with 0 Axes>

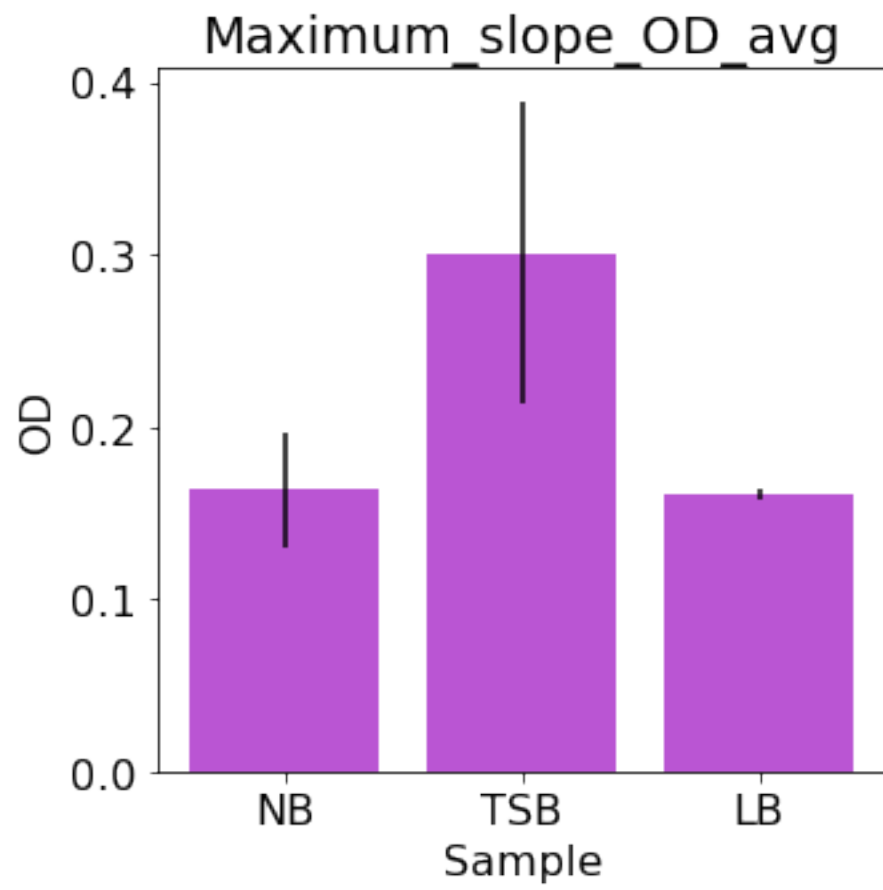




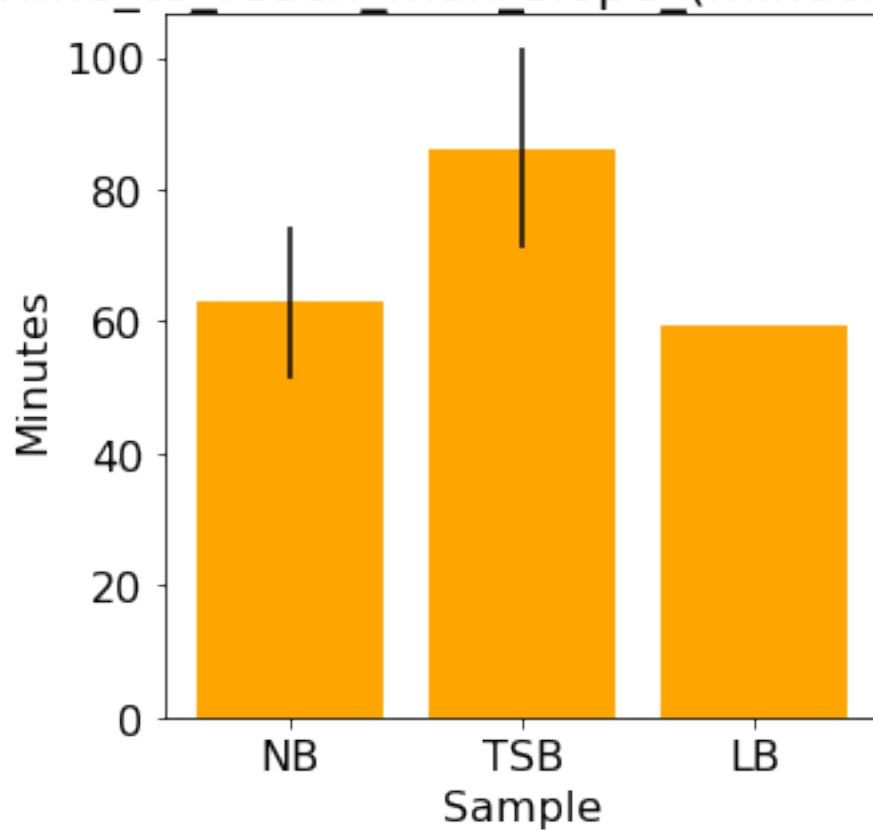


Time\_to\_reach\_maxOD600\_(minutes)\_avg





Time\_to\_reach\_max\_slope (minutes)\_avg



```
[69]: sample maxOD600_avg maxOD600_stdev Maximum_slope_avg \
0 NB 0.365444 0.030281 0.023669
1 TSB 1.289000 0.024007 0.035824
2 LB 0.848000 0.040278 0.030151

Maximum_slope_stdev Doubling_time_avg Doubling_time_stdev \
0 0.001491 42.363312 2.697278
1 0.002465 27.999280 1.861661
2 0.000596 33.174727 0.649610

Time_to_reach_maxOD600_(minutes)_avg \
0 256.216667
1 359.550000
2 346.216667

Time_to_reach_maxOD600_(minutes)_stdev Maximum_slope_OD_avg \
0 61.101009 0.163111
1 0.000000 0.300778
2 5.773503 0.161000
```



|   | Maximum_slope_OD_stdev | Time_to_reach_max_slope_(minutes)_avg | \ |
|---|------------------------|---------------------------------------|---|
| 0 | 0.033694               | 62.883333                             |   |
| 1 | 0.087813               | 86.216667                             |   |
| 2 | 0.003606               | 59.550000                             |   |

|   | Time_to_reach_max_slope_(minutes)_stdev |
|---|---|
| 0 | 11.547005                               |
| 1 | 15.275252                               |
| 2 | 0.000000                                |

## 10 Heatmap views of the data

