MainMethod

March 25, 2021

Taking the output from DEG-SEQ2, the data “5LS_L2L3Combined.csv” contains the 5 life stages we are interested in: Embryo, L1 larva, Dauer Larva, L2L3 Larva and Adult, lets take a peek of that data

[1]:

```python
import csv
import os

#user configurable variables
number_of_lines_to_print=10
expressionCountFile=os.path.join(os.getcwd(),'csvs/5LS_L2L3Combined.csv')
#Code Chunk for printing the file
with open(os.path.join(os.getcwd(),expressionCountFile)) as csv_file:
    csv_reader = csv.reader(csv_file, delimiter=',')
    for row in csv_reader:
        print(row)
        number_of_lines_to_print-=1
        if number_of_lines_to_print<=0:
            break
```

```
['WBID', 'elongating embryo Ce', 'L1 larva Ce', 'dauer larva Ce', 'adult Ce',
'L2L3_larva']
['WBGene00000001', '4208', '12140', '5547', '2246', '2369']
['WBGene00000002', '12554', '7828', '831', '280', '2591']
['WBGene00000003', '7180', '11253', '570', '212', '2466']
['WBGene00000004', '33305', '26947', '3212', '576', '5391']
['WBGene00000005', '595', '132', '37', '281', '1410']
['WBGene00000006', '425', '12243', '3146', '228', '2446']
['WBGene00000007', '36', '314', '129', '197', '1719']
['WBGene00000008', '0', '19', '663', '19', '182']
['WBGene00000009', '71', '416', '193', '20', '64']
```

Lets look at some statistics about the data:

[2]:

```python
import pandas as pd
import numpy as np

exp_data = pd.read_csv(expressionCountFile)
```

```
print(exp_data.describe())
```

```
      elongating embryo Ce   L1 larva Ce  dauer larva Ce      adult Ce  \
count           20361.000000  2.036100e+04    2.036100e+04  2.036100e+04
mean             3692.118364  1.097686e+04    3.908223e+03  2.065875e+03
std             12796.637118  5.382926e+04    2.111976e+04  2.269343e+04
min                 0.000000  0.000000e+00    0.000000e+00  0.000000e+00
25%                 8.000000  5.700000e+01    2.700000e+01  5.000000e+00
50%               201.000000  7.240000e+02    4.030000e+02  8.600000e+01
75%              2730.000000  4.645000e+03    2.375000e+03  8.690000e+02
max            355180.000000  1.890193e+06    1.303599e+06  2.253663e+06

         L2L3_larva
count  2.036100e+04
mean   4.178275e+03
std    1.964655e+04
min    0.000000e+00
25%    2.900000e+01
50%    3.910000e+02
75%    2.292000e+03
max    1.103229e+06
```

Now, we need to determine the genes that we consider to be life stage biased, here are the some criterias that must be fullfilled to be considered a life stage biased gene:

This gene has the highest expression in that life stage

This gene's expression at this life stage has at least a fold difference of 2 comparing the max expression in other life stages

At least one life stage has a count that is higher than at least 10% of of counts across all life stages. *This ensures we dont include genes that have high fold diff due to unbalanced low expression counts, for example, a gene has a count of 1 in one life stage and are not found in other life stages(0 counts),this gene is a uniformly lowly expressed gene in all life stages, however, using the criteria one, this gene would have a fold difference of infinity, by setting a lower bound filter, we exclude these extremely lowly expressed gene counts that are prone to sequencing uncertainties.

Let's process the expression file using above criterias:

[3]:
```
from Code import LifeStageBiased as LSB
#Speficy input and output
LSB.inputFile= expressionCountFile
outputFilePath=os.path.join(os.getcwd(),'csvs/LSB.csv')
LSB.outputFile= outputFilePath
LSB.cutLowPercentile=0.15
LSB.foldDiff=2
LSB.fixedCutValue=0 #This overrides the percentil cut value, set to 0 disables␣
 ↪it
LSB.main()
```

```
The cutOff Value for the specified percentaile is:  5.0
```

*In the data we are analyzing, there are very few genes that have observed expression only in one life stage, in which case the max expression for other life stages is 0, this will yield infinity for the fold diff value, in theory, these are “life stage specific genes” rather than “life stage biased genes”, however, since the same reason we mentioned above about the sequecing uncertainties, we do not believe that a gene with a few counts only in one life stage is more likely to be a life stage biased gene comparing to a gene with high expression in one life stage and very low expression in other life stages, see example below:

[4]:
```
ls_data = pd.read_csv(outputFilePath)

print(ls_data.loc[ls_data['GeneID'] == "WBGene00015845"])
print()
print(ls_data.loc[ls_data['GeneID'] == "WBGene00000609"])
```

```
              GeneID        LS  LS_EXP  SecondMax  RestMean  FoldDiff
6043  WBGene00015845  adult Ce     7.0        0.0       0.0       7.0

             GeneID        LS   LS_EXP  SecondMax  RestMean    FoldDiff
218  WBGene00000609  adult Ce  71952.0      148.0     76.75  486.162162
```

As shown above, Gene “WBGene00015845” is a relatively lowly expressed gene that is only expressed in adult stage, and “WBGene00000609” has significantly higher expression in adult stage comparing to other life stages, which one are we more confident to select as the life stage biased gene?

There is no sure way to know, to compensate that, instead of putting infinity as the fold difference value for these “life stage specific” genes and put more confidence in them above all other genes, we decided to use their expression value as their foldDiff value, in which case a highly expressed “life stage specific” gene will be given higher confidence comparing to a lowly expressed one.

We are aware that this is perhaps not the best way of handling these genes, but luckily, there are only 15 such genes out of the 10099 life stage biased genes(0.15%) we selected using above filter, so it is extremly unlikely that different handlings of these genes will make a significant difference.

Now the genes that fit into our criteria should be in the *outputFilePath* we set ealier, lets take a look at some basic statistics of these selected life stage biased genes:

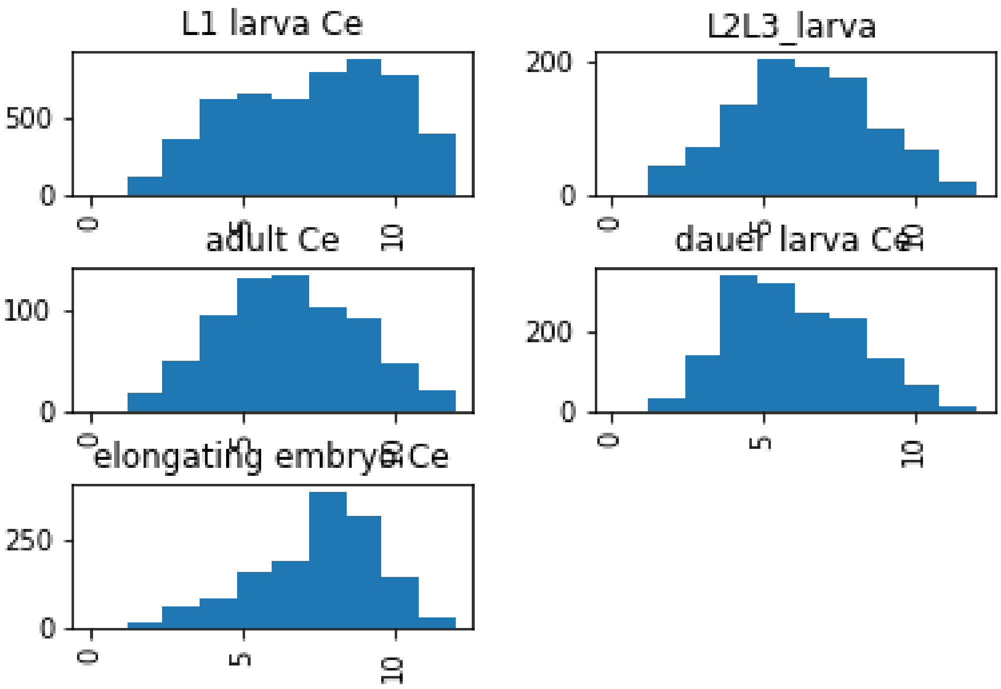
[14]:
```
ls_data.head()
print(ls_data.columns)

ls_data[["LS_EXP","SecondMax","FoldDiff"]]=ls_data[["LS_EXP","SecondMax","FoldDiff"]].
 ↪apply(pd.to_numeric)
ls_data.sort_values(by=['FoldDiff'],ascending=False)


ls_data['LS_EXP_LOG']=np.log((ls_data['LS_EXP']))
ls_data['FoldDiff_LOG']=np.log((ls_data['FoldDiff']))
ls_data['RestMean_LOG']=np.log((ls_data['RestMean']))
```

```python
print(ls_data.describe())
print()
print("ls_data Summary By Life Stage Group")
print(ls_data.groupby("LS").describe())

ax=ls_data['LS_EXP_LOG'].hist(by=ls_data['LS'],range=[0,12])
```

```
Index(['GeneID', 'LS', 'LS_EXP', 'SecondMax', 'RestMean', 'FoldDiff',
       'LS_EXP_LOG', 'FoldDiff_LOG'],
      dtype='object')
             LS_EXP      SecondMax       RestMean      FoldDiff    LS_EXP_LOG  \
count  1.009900e+04   10099.000000   10099.000000  10099.000000  10099.000000
mean   1.679783e+04    4102.327656    2191.947742     15.490207      7.073785
std    7.351532e+04   19035.148534   10168.396260    176.069930      2.538669
min    5.000000e+00       0.000000       0.000000      2.000000      1.609438
25%    1.560000e+02      28.000000      12.250000      2.617371      5.049856
50%    1.298000e+03     248.000000     108.750000      3.776471      7.168580
75%    8.224500e+03    1946.000000     988.500000      6.722003      9.014873
max    2.253663e+06  540124.000000  315851.750000  12412.000000     14.628067

       FoldDiff_LOG  RestMean_LOG
count  10099.000000  1.009900e+04
mean       1.586584          -inf
std        0.907085           NaN
min        0.693147          -inf
25%        0.962170  2.505526e+00
50%        1.328790  4.689052e+00
75%        1.905386  6.896189e+00
max        9.426419  1.266303e+01

ls_data Summary By Life Stage Group
                      LS_EXP                                              \
                       count          mean            std  min     25%
LS
L1 larva Ce           5426.0  25057.749355   89726.448364  5.0  187.00
L2L3_larva            1018.0   4984.386051   13889.489577  5.0  124.00
adult Ce               695.0  13820.099281  111338.218970  5.0  131.00
dauer larva Ce        1550.0   3776.957419   15036.754400  5.0   83.00
elongating embryo Ce  1410.0   9322.402128   25125.246231  5.0  517.75

                                                   SecondMax               ...  \
                         50%       75%        max      count         mean  ...
LS                                                                         ...
L1 larva Ce           2159.5  14543.50  1890193.0     5426.0  6524.922226  ...
L2L3_larva             547.0   2903.50   173036.0     1018.0  1200.904715  ...
adult Ce               619.0   3951.00  2253663.0      695.0   842.952518  ...
dauer larva Ce         300.0   1844.00   235883.0     1550.0   691.027097  ...
```

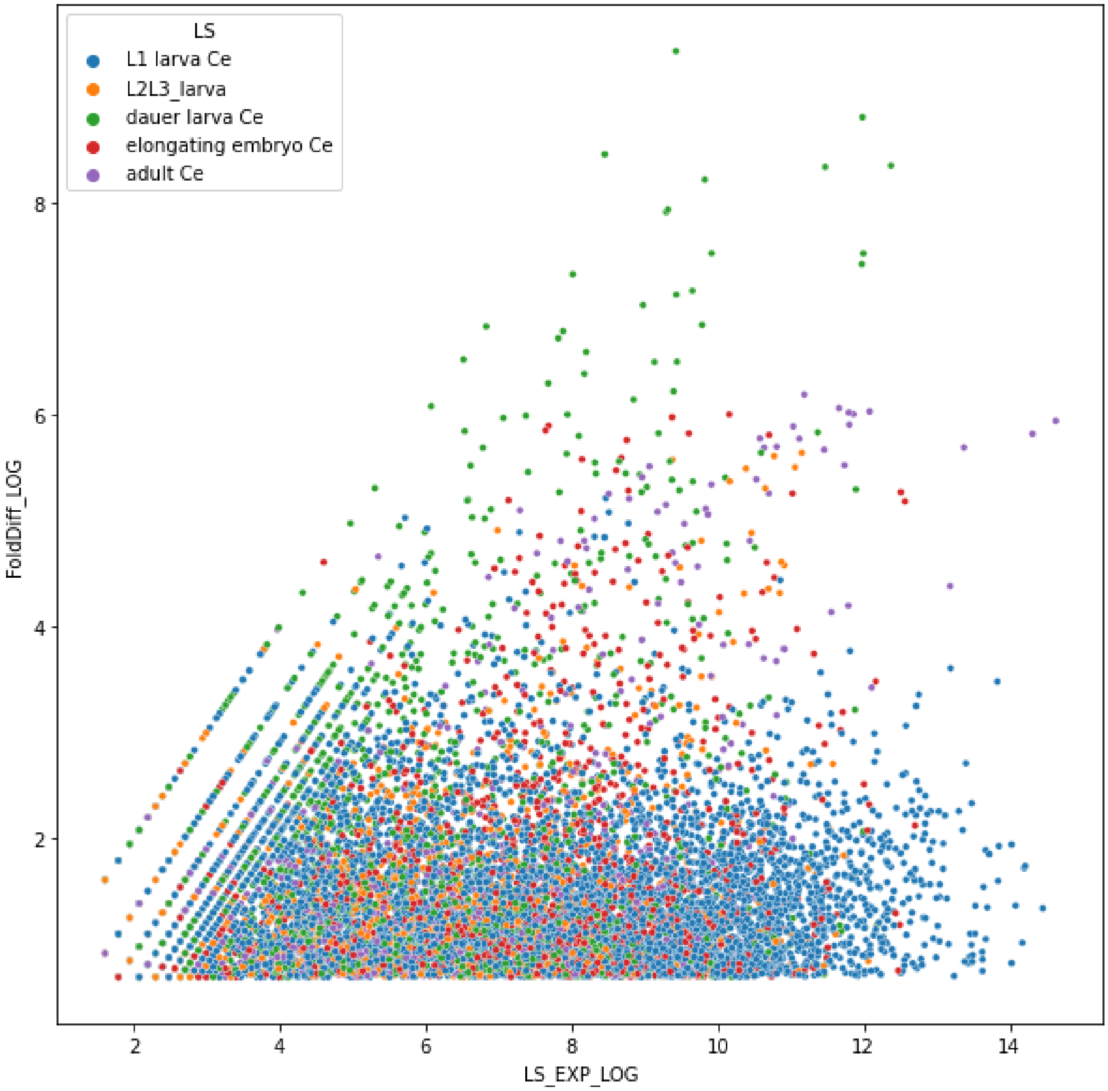
```
elongating embryo Ce  2472.5   7250.25   328012.0    1410.0  2231.002837  …

                     FoldDiff_LOG           RestMean_LOG                \
                              75%       max        count mean std  min
LS
L1 larva Ce              1.807424  5.210326       5426.0 -inf NaN -inf
L2L3_larva               1.843245  5.637077       1018.0 -inf NaN -inf
adult Ce                 1.925177  6.186542        695.0 -inf NaN -inf
dauer larva Ce           2.483414  9.426419       1550.0 -inf NaN -inf
elongating embryo Ce     1.930634  5.998820       1410.0 -inf NaN -inf


                           25%       50%       75%        max
LS
L1 larva Ce           2.791910  5.493061  7.677081  12.663028
L2L3_larva            2.490061  3.963188  5.468584  10.355311
adult Ce              2.611864  3.936716  5.523903   9.268963
dauer larva Ce        1.386294  2.803360  4.901099  10.365506
elongating embryo Ce  3.459854  5.441335  6.927496  10.556119

[5 rows x 56 columns]
```

```
/home/lu/.local/lib/python3.8/site-packages/pandas/core/series.py:726:
RuntimeWarning: divide by zero encountered in log
  result = getattr(ufunc, method)(*inputs, **kwargs)
```



```
[6]: from matplotlib import pyplot as plt
     import seaborn as sns



     ax2=plt.figure(figsize=[10,10])
     sns.scatterplot(x='LS_EXP_LOG',y='FoldDiff_LOG',hue='LS', data=ls_data,s=15)
```

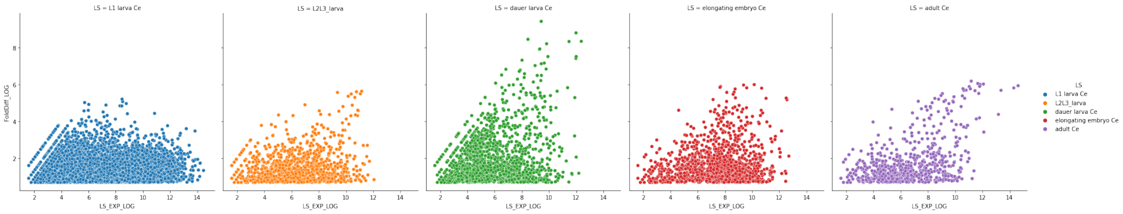
```
[6]: <AxesSubplot:xlabel='LS_EXP_LOG', ylabel='FoldDiff_LOG'>
```



```
[7]: ax3=plt.figure(figsize=[20,20])
     sns.relplot(
         data=ls_data,x='LS_EXP_LOG', y="FoldDiff_LOG",
    col="LS", hue="LS",
    kind="scatter"
)
```

[7]:
```
<seaborn.axisgrid.FacetGrid at 0x7f7aecfcab20>
```

```
<Figure size 1440x1440 with 0 Axes>
```

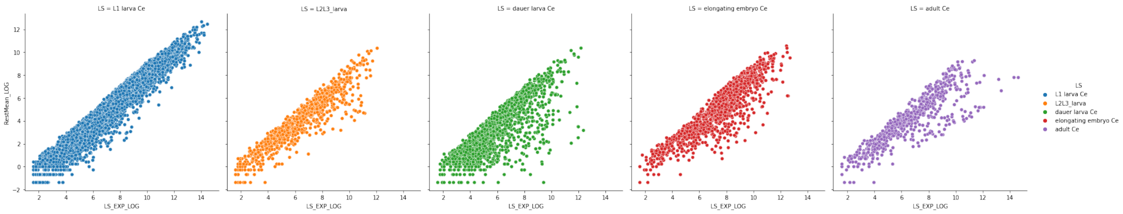


[ ]:
```

```

Look at the relationship bettween the max expression vs mean of expression in other life stages

[15]:
```
ax4=plt.figure(figsize=[20,20])

splot=sns.relplot(
    data=ls_data,x='LS_EXP_LOG', y="RestMean_LOG",
    col="LS", hue="LS",
    kind="scatter"
)
```

```
<Figure size 1440x1440 with 0 Axes>
```



Now, lets look at the number of genes from each life stage selected when we change the threshhold:

[63]:
```
sorted_ls_data=ls_data.sort_values(['LS','FoldDiff'],ascending=False)

thresholds=[2**i for i in range(1,11)]

for threshold in thresholds:
```

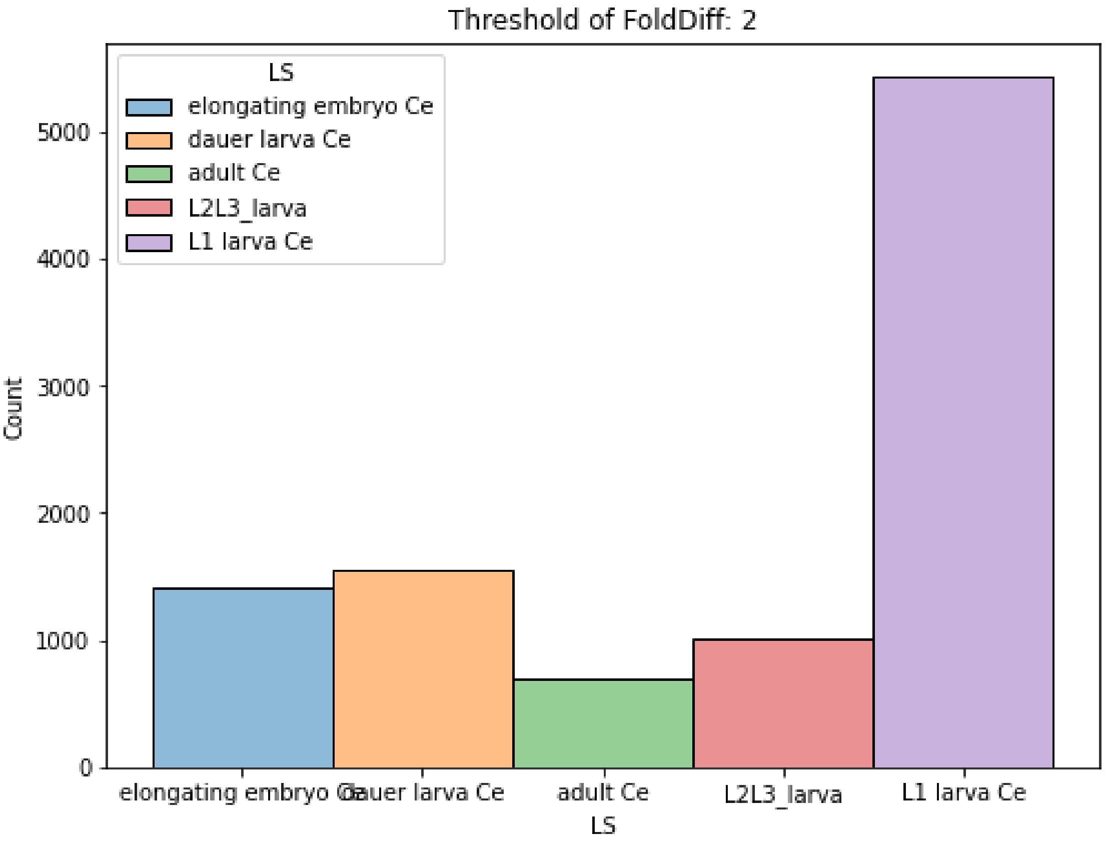
```
df_filtered=sorted_ls_data.loc[sorted_ls_data['FoldDiff'] >= threshold]
df_count=df_filtered.groupby("LS").count()
ax=plt.figure(figsize=[8,6])
text=("Threshold of FoldDiff: "+ str(threshold))
sns.histplot(df_filtered, x="LS",hue="LS").set_title(text)
print(text)
print(df_filtered.describe())
```

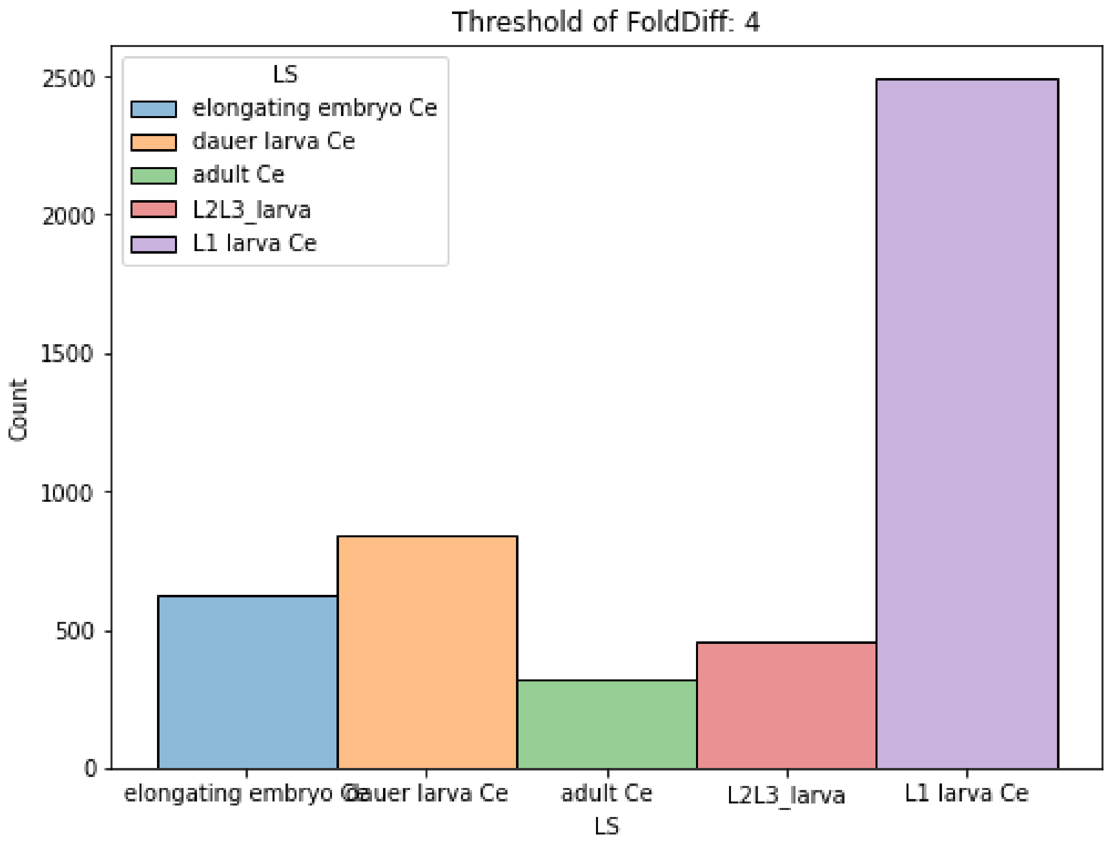
```
Threshold of FoldDiff: 2
             LS_EXP      SecondMax      RestMean      FoldDiff    LS_EXP_LOG  \
count  1.009900e+04   10099.000000  10099.000000  10099.000000  10099.000000
mean   1.679783e+04    4102.327656   2191.947742     15.490207      7.073785
std    7.351532e+04   19035.148534  10168.396260    176.069930      2.538669
min    5.000000e+00       0.000000      0.000000      2.000000      1.609438
25%    1.560000e+02      28.000000     12.250000      2.617371      5.049856
50%    1.298000e+03     248.000000    108.750000      3.776471      7.168580
75%    8.224500e+03    1946.000000    988.500000      6.722003      9.014873
max    2.253663e+06  540124.000000 315851.750000  12412.000000     14.628067

       FoldDiff_LOG  RestMean_LOG
count  10099.000000  1.009900e+04
mean       1.586584          -inf
std        0.907085           NaN
min        0.693147          -inf
25%        0.962170  2.505526e+00
50%        1.328790  4.689052e+00
75%        1.905386  6.896189e+00
max        9.426419  1.266303e+01
Threshold of FoldDiff: 4
             LS_EXP      SecondMax      RestMean      FoldDiff   LS_EXP_LOG  \
count  4.736000e+03    4736.000000    4736.000000   4736.000000  4736.000000
mean   1.874109e+04    2476.493454    1307.303262     29.896106     7.027185
std    8.095115e+04   10934.194589    5513.457001    256.362229     2.558391
min    5.000000e+00       0.000000       0.000000      4.000000     1.609438
25%    1.450000e+02      15.000000       6.500000      5.108633     4.976734
50%    1.014000e+03      95.000000      41.625000      7.072728     6.921658
75%    7.755500e+03     829.250000     387.875000     12.500000     8.956157
max    2.253663e+06  261525.000000  118162.250000  12412.000000    14.628067

       FoldDiff_LOG  RestMean_LOG
count   4736.000000   4736.000000
mean       2.253014          -inf
std        0.934246           NaN
min        1.386294          -inf
25%        1.630932      1.871802
50%        1.956246      3.728696
```

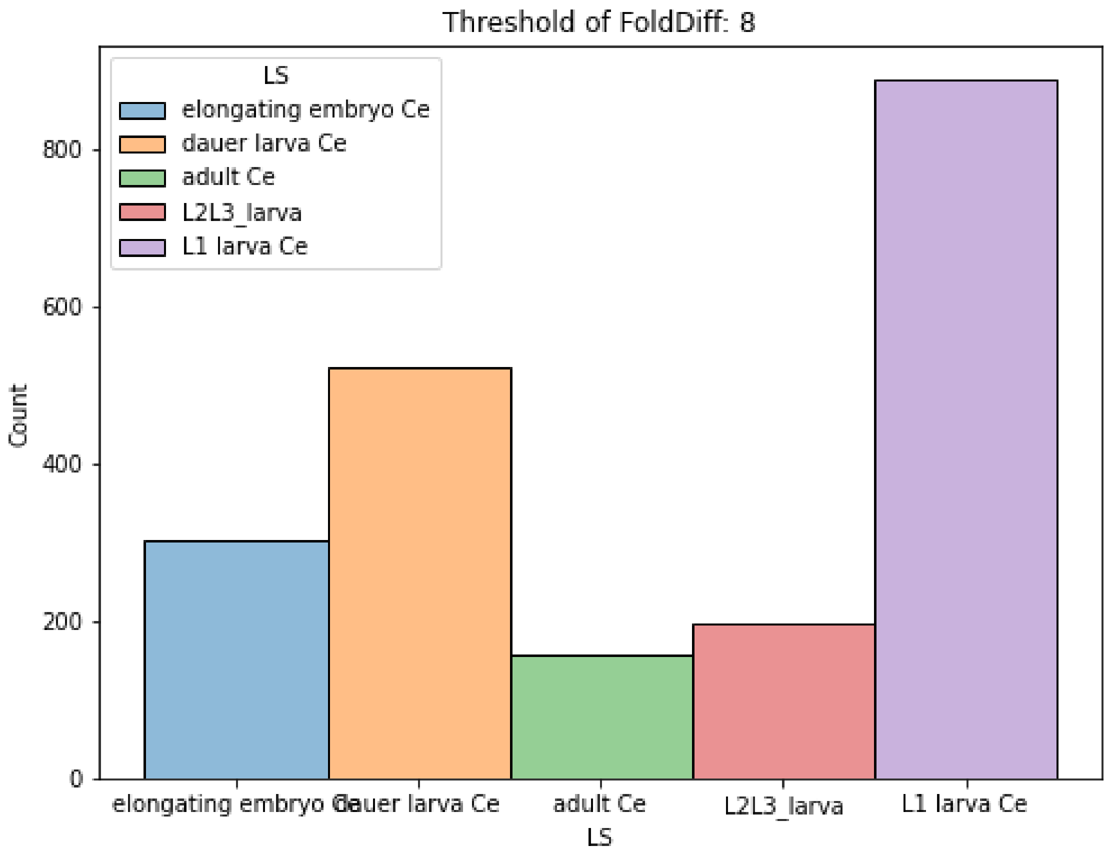
```
75%        2.525729      5.960682
max        9.426419     11.679814
Threshold of FoldDiff: 8
             LS_EXP     SecondMax      RestMean      FoldDiff   LS_EXP_LOG  \
count  2.065000e+03   2065.000000   2065.000000   2065.000000  2065.000000   
mean   1.737960e+04    998.086199    542.603995     61.463707     6.996054   
std    8.397990e+04   4394.859318   2509.116448    386.007561     2.438047   
min    8.000000e+00      0.000000      0.000000      8.000000     2.079442   
25%    1.510000e+02      8.000000      3.750000     10.000000     5.017280   
50%    9.560000e+02     40.000000     19.500000     14.112252     6.862758   
75%    6.565000e+03    291.000000    129.250000     27.111111     8.789508   
max    2.253663e+06  69368.000000  34733.500000  12412.000000    14.628067   

       FoldDiff_LOG  RestMean_LOG
count   2065.000000   2065.000000
mean       2.989515          -inf
std        0.995191           NaN
min        2.079442          -inf
25%        2.302585      1.321756
50%        2.647043      2.970414
75%        3.299944      4.861749
max        9.426419     10.455460
Threshold of FoldDiff: 16
             LS_EXP     SecondMax      RestMean      FoldDiff  LS_EXP_LOG  \
count  8.960000e+02    896.000000    896.000000    896.000000  896.000000   
mean   2.031709e+04    389.906250    201.989397    127.457483    7.345930   
std    1.092277e+05   1657.088913   1000.941265    579.578809    2.296912   
min    1.600000e+01      0.000000      0.000000     16.000000    2.772589   
25%    2.440000e+02      6.000000      2.750000     21.266304    5.497168   
50%    1.468000e+03     28.500000     13.250000     30.992188    7.291656   
75%    8.493000e+03    143.250000     67.312500     68.844626    9.046993   
max    2.253663e+06  31253.000000  21759.250000  12412.000000   14.628067   

       FoldDiff_LOG  RestMean_LOG
count    896.000000    896.000000
mean       3.801458          -inf
std        1.033031           NaN
min        2.772589          -inf
25%        3.057124      1.011601
50%        3.433735      2.583998
75%        4.231837      4.209345
max        9.426419      9.987794
Threshold of FoldDiff: 32
             LS_EXP     SecondMax      RestMean      FoldDiff  LS_EXP_LOG  \
count  4.350000e+02    435.000000    435.000000    435.000000  435.000000   
mean   3.073044e+04    296.452874    151.092529    238.972031    8.016322   
std    1.519043e+05   1758.203487   1122.729190    817.602619    2.146121   
min    3.300000e+01      0.000000      0.000000     32.125000    3.496508   
```

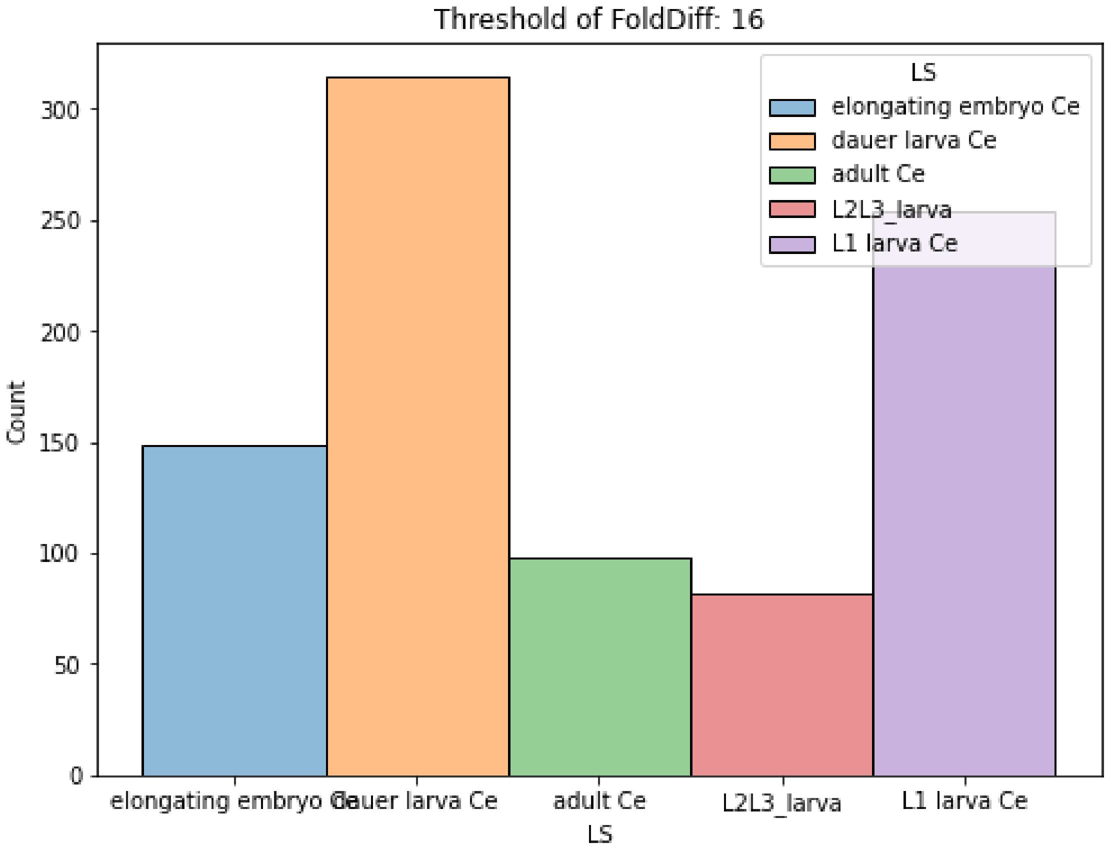
```
25%    6.830000e+02      6.500000      3.000000     44.006400    6.526456
50%    3.270000e+03     31.000000     14.250000     74.452830    8.092545
75%    1.319700e+04    123.500000     55.875000    161.126961    9.487694
max    2.253663e+06  31253.000000  21759.250000  12412.000000   14.628067

       FoldDiff_LOG  RestMean_LOG
count    435.000000    435.000000
mean       4.564515          -inf
std        1.011964           NaN
min        3.469635          -inf
25%        3.784335      1.098612
50%        4.310166      2.656757
75%        5.082192      4.023095
max        9.426419      9.987794
Threshold of FoldDiff: 64
             LS_EXP    SecondMax     RestMean      FoldDiff  LS_EXP_LOG  \
count  2.430000e+02   243.000000   243.000000    243.000000  243.000000
mean   4.192780e+04   184.621399    80.042181    392.949462    8.639722
std    1.882614e+05   686.621839   282.602225   1069.972609    1.927644
min    7.500000e+01     0.000000     0.000000     64.000000    4.317488
25%    1.528500e+03     7.000000     3.500000     90.302020    7.331232
50%    5.698000e+03    32.000000    16.250000    135.000000    8.647871
75%    1.771950e+04   121.000000    52.875000    275.230000    9.782410
max    2.253663e+06  6635.000000  2439.000000  12412.000000   14.628067

       FoldDiff_LOG  RestMean_LOG
count    243.000000    243.000000
mean       5.192860          -inf
std        0.954800           NaN
min        4.158883          -inf
25%        4.503147      1.252763
50%        4.905275      2.788093
75%        5.617553      3.967794
max        9.426419      7.799343
Threshold of FoldDiff: 128
             LS_EXP    SecondMax     RestMean      FoldDiff  LS_EXP_LOG  \
count  1.280000e+02   128.000000   128.000000    128.000000  128.000000
mean   6.679294e+04   198.757812    84.787109    665.200762    9.205471
std    2.526545e+05   719.674442   312.341413   1422.451233    1.893452
min    1.440000e+02     0.000000     0.000000    128.200000    4.969813
25%    2.808000e+03     6.750000     3.250000    190.966121    7.940212
50%    9.453000e+03    26.500000    13.625000    263.228205    9.153855
75%    3.939975e+04   121.250000    51.312500    405.291451   10.581488
max    2.253663e+06  5944.000000  2439.000000  12412.000000   14.628067

       FoldDiff_LOG  RestMean_LOG
count    128.000000    128.000000
mean       5.833815          -inf
```

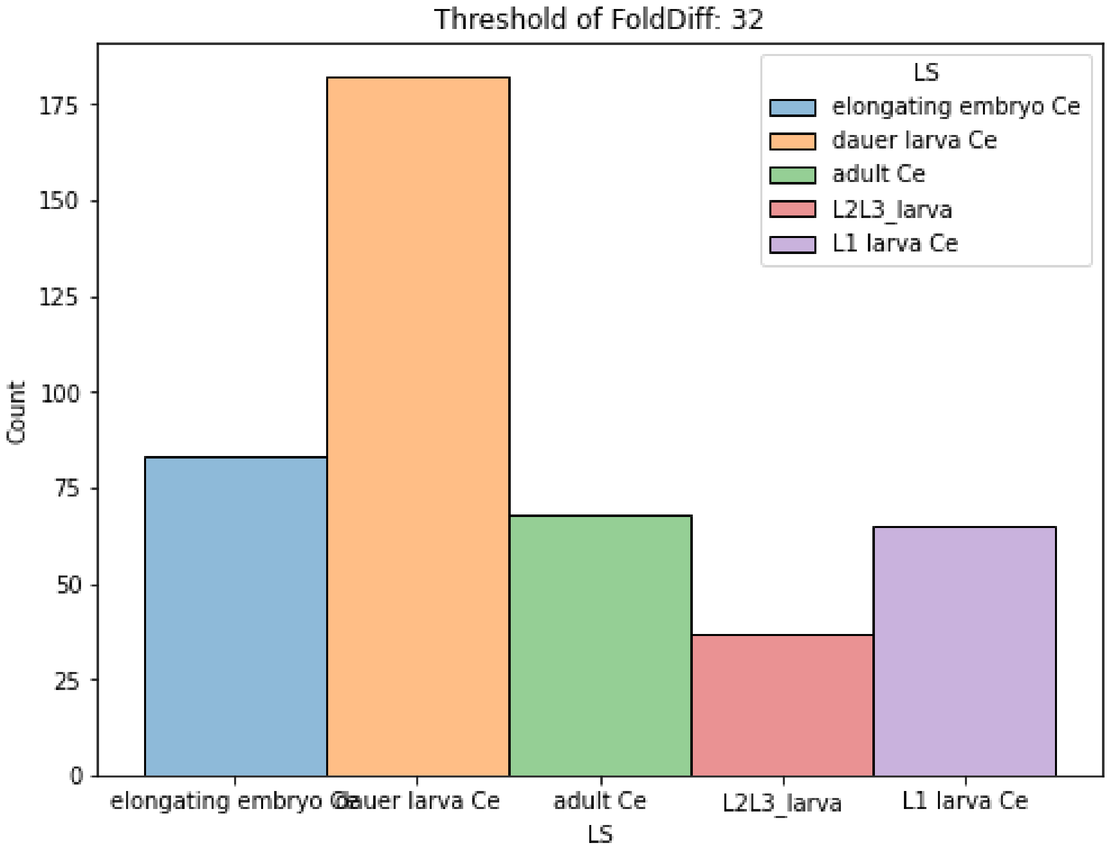
```
std        0.909382           NaN
min        4.853592          -inf
25%        5.252095      1.178655
50%        5.573018      2.611527
75%        6.004585      3.937566
max        9.426419      7.799343
Threshold of FoldDiff: 256
             LS_EXP    SecondMax     RestMean      FoldDiff  LS_EXP_LOG  \
count  6.800000e+01    68.000000    68.000000     68.000000   68.000000
mean   1.041002e+05   262.176471   116.525735   1089.632088    9.667749
std    3.396591e+05   948.722172   418.548195   1855.841604    1.882576
min    4.350000e+02     0.000000     0.000000    256.062500    6.075346
25%    3.520250e+03     5.750000     2.500000    321.370004    8.166179
50%    1.222350e+04    21.000000     8.500000    402.690848    9.410997
75%    6.791150e+04   141.250000    59.562500    894.000000   11.125859
max    2.253663e+06  5944.000000  2439.000000  12412.000000   14.628067

       FoldDiff_LOG  RestMean_LOG
count     68.000000     68.000000
mean       6.395987          -inf
std        0.921161           NaN
min        5.545422          -inf
25%        5.772592      0.916291
50%        5.998169      2.140066
75%        6.795521      4.086894
max        9.426419      7.799343
Threshold of FoldDiff: 512
             LS_EXP  SecondMax   RestMean      FoldDiff  LS_EXP_LOG  \
count      25.00000  25.000000  25.000000     25.000000   25.000000
mean    39358.52000  16.680000   6.890000   2371.482954    9.341956
std     66170.68322  25.450475   9.392783   2626.937144    1.612699
min       677.00000   0.000000   0.000000    540.750000    6.517671
25%      3550.00000   3.000000   1.250000    826.666667    8.174703
50%     11140.00000   6.000000   3.250000   1293.500000    9.318298
75%     18451.00000  19.000000   8.000000   2785.000000    9.822874
max    235883.00000  95.000000  33.250000  12412.000000   12.371091

       FoldDiff_LOG  RestMean_LOG
count     25.000000     25.000000
mean       7.378386          -inf
std        0.848040           NaN
min        6.292957          -inf
25%        6.717402      0.223144
50%        7.165107      1.178655
75%        7.932003      2.079442
max        9.426419      3.504055
Threshold of FoldDiff: 1024
              LS_EXP  SecondMax   RestMean      FoldDiff  LS_EXP_LOG  \
count      15.000000  15.000000  15.000000     15.000000   15.000000
mean    61883.400000  22.866667   9.433333   3457.096160   10.139472
std     78268.637283  31.217822  11.307972   2942.840547    1.425323
min      3023.000000   1.000000   0.250000   1130.571429    8.014005
25%     11010.500000   4.000000   1.375000   1588.897368    9.306535
50%     15522.000000  10.000000   4.250000   2720.250000    9.650014
75%    127015.000000  23.500000  10.750000   4187.228649   11.720771
max    235883.000000  95.000000  33.250000  12412.000000   12.371091

       FoldDiff_LOG  RestMean_LOG
count     15.000000     15.000000
mean       7.901033      1.405217
std        0.691138      1.512399
min        7.030478     -1.386294
25%        7.369608      0.314304
50%        7.908479      1.446919
75%        8.339777      2.361477
max        9.426419      3.504055
```

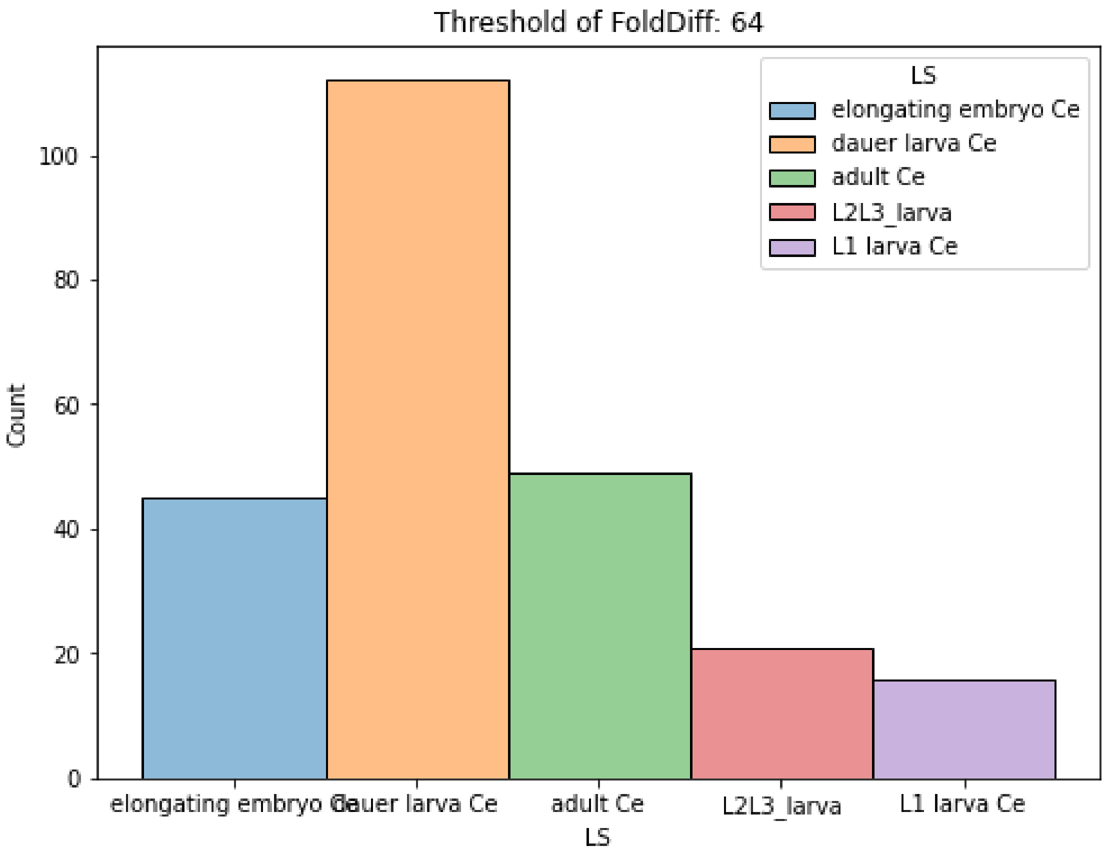


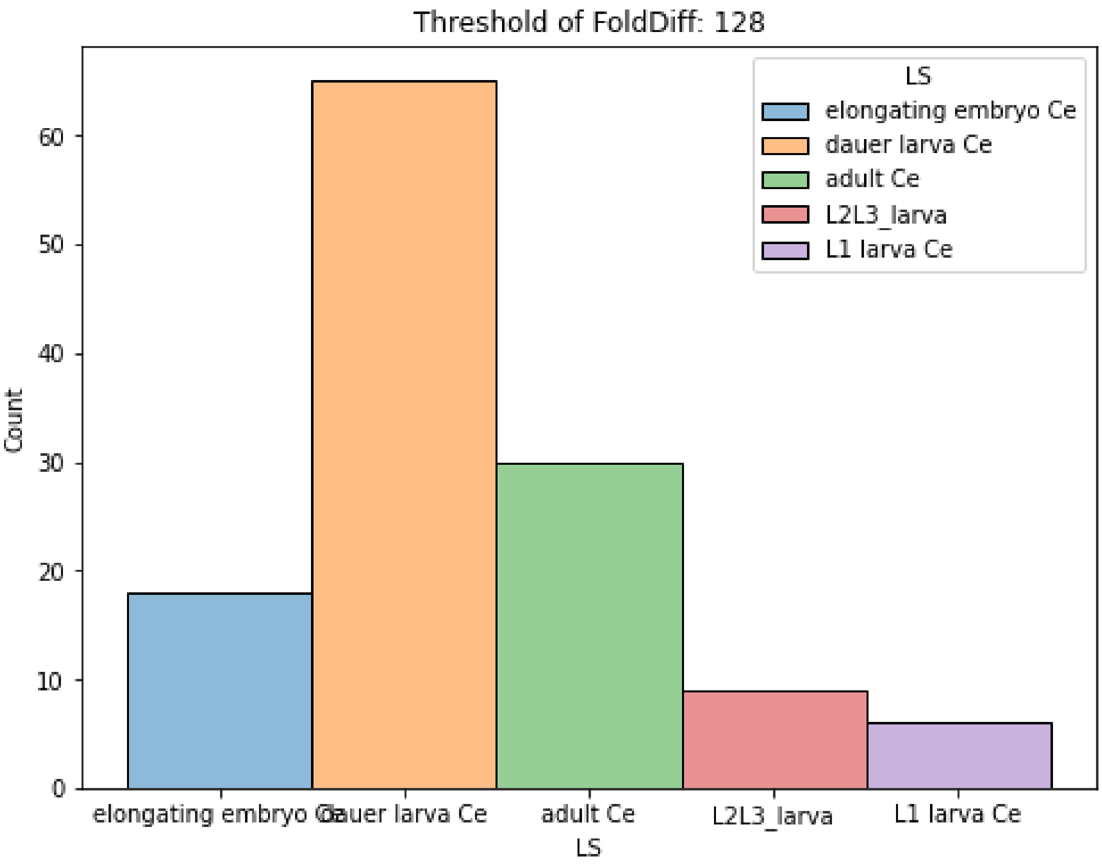

Threshold of FoldDiff: 4
LS
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
Count
2500
2000
1500
1000
500
0
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
LS

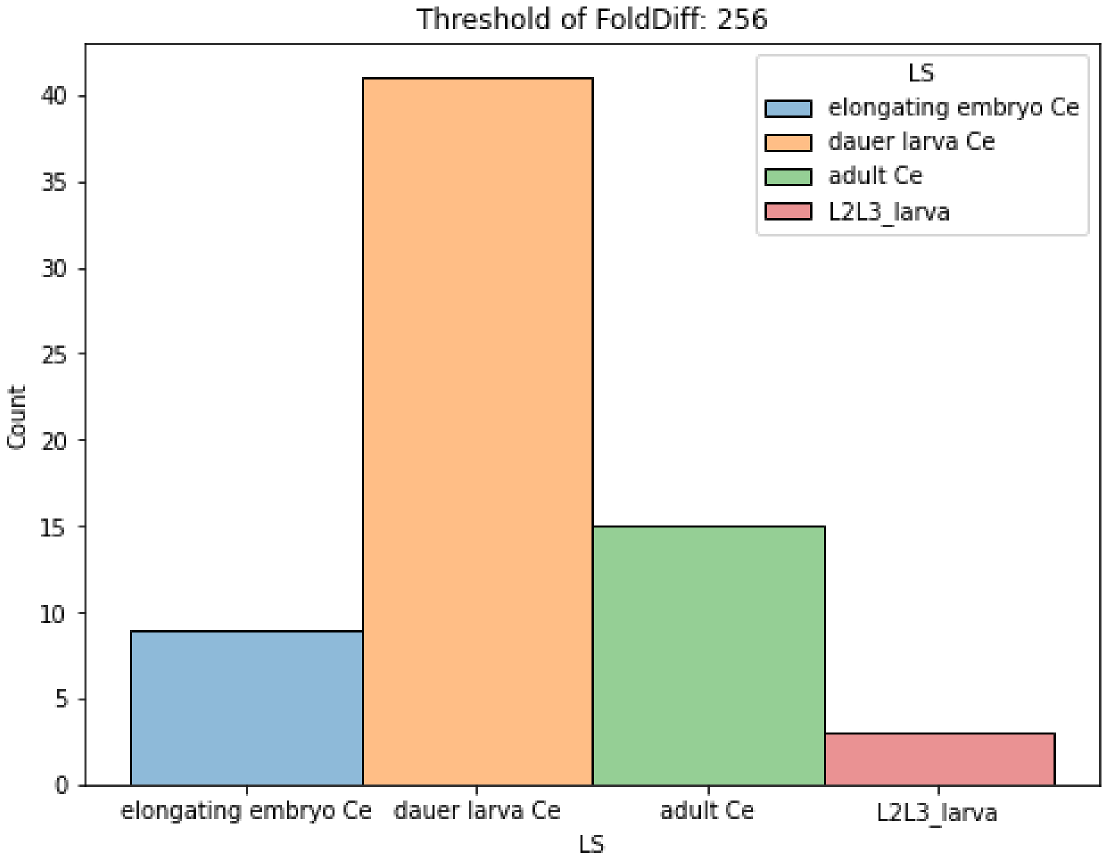

Threshold of FoldDiff: 8
LS
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
Count
0
200
400
600
800
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
LS

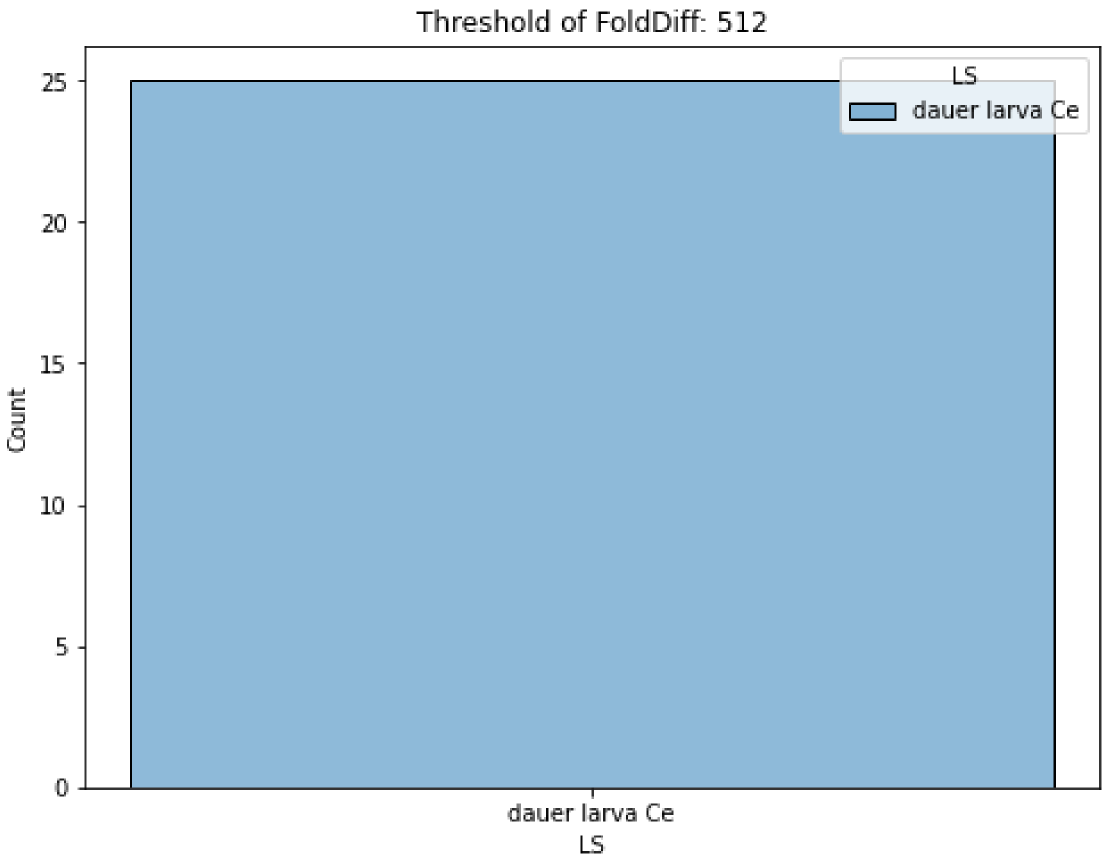

Threshold of FoldDiff: 16
LS
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
Count
0
50
100
150
200
250
300
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
LS

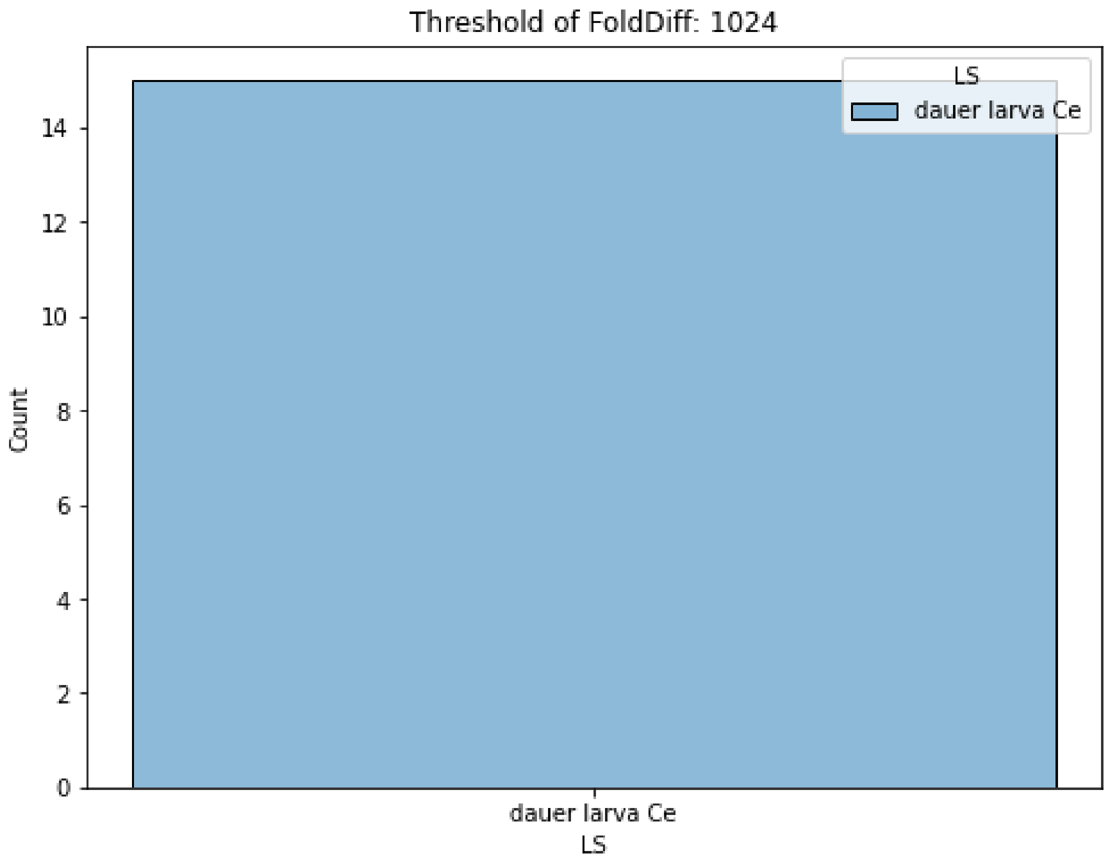

Threshold of FoldDiff: 32
LS
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
Count
0
25
50
75
100
125
150
175
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
LS


Threshold of FoldDiff: 64
LS
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
Count
0
20
40
60
80
100
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
LS


Threshold of FoldDiff: 128
LS
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
Count
0
10
20
30
40
50
60
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
L1 larva Ce
LS


Threshold of FoldDiff: 256
Count
0
5
10
15
20
25
30
35
40
LS
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
elongating embryo Ce
dauer larva Ce
adult Ce
L2L3_larva
LS


Threshold of FoldDiff: 512
LS
dauer larva Ce
25
20
15
10
5
0
Count
dauer larva Ce
LS



[30]:

[30]:

```
                           GeneID  LS_EXP  SecondMax  RestMean  FoldDiff  \
LS
L1 larva Ce                  5426    5426       5426      5426      5426
L2L3_larva                   1018    1018       1018      1018      1018
adult Ce                      695     695        695       695       695
dauer larva Ce               1550    1550       1550      1550      1550
elongating embryo Ce         1410    1410       1410      1410      1410

                           LS_EXP_LOG  FoldDiff_LOG  RestMean_LOG
LS
L1 larva Ce                      5426          5426          5426
L2L3_larva                       1018          1018          1018
adult Ce                          695           695           695
dauer larva Ce                   1550          1550          1550
elongating embryo Ce             1410          1410          1410
```

[ ]: